

**Understanding the Sustainability of Selected Recommendations for a Nursing Best Practice
Guideline within an Acute Care Context**

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Dedicated to my husband and family

Wayne (husband), Bryanna, Sean and Jazmin (wife), Gail (mom), and Jannah (sister)

Preface

Approvals to Conduct the Research

This dissertation was initially approved by my thesis committee members (see Appendix A), followed by ethical approval from the Research Ethics Boards for the Ottawa Health Science Network (OHSN-REB) and the University of Ottawa (see Appendix B). The participating organization's Nursing Administration (e.g., corporate and unit level administration) provided administrative approval for the study protocol (see Appendix C, D). Following REB and Administrative approvals, approval to obtain access to medical records for auditing purposes was completed (see Appendix E). Informants also provided written informed consent prior to participation (see Appendix F).

Author's Contribution to the Dissertation

This thesis dissertation represents my original work as a doctoral candidate. I assumed the primary role in and was responsible for carrying out all components of the dissertation, including conceptualization, conduct, analysis and reporting. Dr. Janet Squires (primary supervisor) and Dr. Barbara Davies (co-supervisor for the first four years), Dr. Ian Graham and Dr. Chantal Backman (committee members) provided overall academic and instrumental guidance throughout the process from study planning to dissertation completion. An external committee member provided site representation and guidance during the conceptualization and initial conduct phases.

The articles in this dissertation represent my work, to which all committee members contributed. Each of the four articles, of which I am the first author, includes a statement of authors specific contributions. Specifically, I developed the data collection tools (i.e., interview questionnaires, chart audit extraction files), conducted the interviews and audit, completed the data extraction and analysis, and produced the tables, figures and additional files. Thesis

committee members provided input into the analysis and interpretation for each article. I prepared the initial draft for all articles and then circulated to all committee members for comment and revisions. All committee members read and approved the articles for publication in this dissertation.

Abstract

Background: To date, little attention has focused on what the factors are and how Best Practice Guidelines (BPGs) are sustained in acute care over time.

Problem: For ten years, a multi-site acute care center supported the use of a Pain Assessment and Management Policy and Protocol (Pain P/P), placing the decision to use it with point of care nurses. Despite early implementation success, the nursing department identified an evidence-based gap on Medicine care units.

Purpose: To (i) identify factors influencing nurses' use (or not) of the Pain P/P over time, and ten years post-implementation; (ii) examine related knowledge translation interventions (KTIs) used over time, and ten years post-implementation; (iii) validate unit nurses' use of the Pain P/P ten years post-implementation; and (iv) identify relevant sustainability frameworks/models/theories (F/M/Ts), constructs and factors for sustained use of BPGs in acute care.

Methodology: A case study of an organization-wide nursing BPG was conducted ten years following initial implementation using mixed methods guided by the Dynamic Sustainability Framework (Chambers, 2013). The case study setting was a 1122 bed acute care center in Canada. I examined BPG sustainability at the (corporate) department and unit levels (two embedded subcases). Data sources included 19 informant interviews (3-corporate, 16-unit level), 200 chart audits (100/subcase), and 29 documents. I concurrently conducted a systematic review to identify sustainability concepts and factors for use in acute care to compare case study results.

Results: I identified 7 constructs, 49 factors, and 29 KTIs influencing sustained use of evidence-based practices (EBPs) in acute care. Three factors and eight KTIs had a continuous influence during implementation and sustained use phases. Findings confirm the concept of sustainability is a dynamic 'process' or 'ongoing phase'.

Conclusions: This thesis provides a novel resource to support future practice and research aimed at sustaining EBPs to improve nursing practice and related patient outcomes. Attention to the level of application and changing conditions over time impacting factors that influence EBP use is required for sustainment. Use of a participatory approach to engage users in designing remedial plans and link KTIs to target behaviors that incrementally address low adherence rates promotes sustainability.

Keywords: sustainability/sustainment, frameworks/models/theories, routinization, institutionalization, utilization, adherence, audit, quality improvement, case study, nursing, evidence-based practices/guidelines/programs/interventions/innovations.

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To all those who participated in this study: I sincerely would like to thank you for all your investments of intellect and time, support throughout the research process, interests in the topic of sustainability, and commitments towards improving the outcomes of your patients providing evidence-based care, and to your organization. A special thank you to Lisa Freeman for her support,

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To the many University of Ottawa faculty and staff for positively contributing to my success. These doctoral years have been much fuller than just seeking the thesis. The courses and the faculty have stimulated my thought processes in ways I had not previously explored which have expanded my viewpoint. It remains a privilege for me to participate in the diversity of scholarly, educational and administrative initiatives in nursing that I do. Thank you for these opportunities.

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List of Abbreviations

APN – Advance Practice Nurse
APS - Acute Pain Service
BPG - Best practice guideline
BPG-IP - BPG Implementation Program
BPSO – Best Practice Spotlight Organization
CNA - Canadian Nurses Association
CCL – Clinical Care Leader
CNO – College of Nurses of Ontario
DSF – Dynamic Sustainability Framework
EBP – Evidence-based practice
ED# - External document code, numbered 1 to 2
EIDM – Evidence-Informed Decision Making
F/M/T – Framework/Model/Theory
ID# - Internal document code, numbered 1 to 20
IPN – Inter-professional notes
KTIs - Knowledge translation interventions
MR - Medical record
N1-# Subcase-1 – participant/informant code
N2-# Subcase-2 – participant/informant code
P# - Participant informant/code
Pain P/P – Pain policy/protocol
PCS - Palliative Care Service
Rt# - Report code, numbered 1 to 7
R# - Recommendations 1 to 7 within the study site guideline
RNAO – Registered Nurses Association of Ontario

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CHAPTER 1

Introduction

1.1 Overview for this Dissertation and the Research Problem

The overall purpose of this dissertation was to identify the constructs, factors and knowledge translation interventions (KTIs) influencing the sustainability of an evidence-based practice (EBP) within an acute care context over time and at a ten-year timeframe. Two processes were used to achieve this objective. First, I conducted a case study, consisting of two components (corporate and unit level), to better understand the factors and KTIs that influenced acute care nurses' use of a best practice guideline (BPG), over a ten-year period (e.g., 2007-2017), within a large, multi-site, tertiary center. Second, I concurrently conducted a systematic review and theory analysis of known sustainability frameworks/models/theories (F/M/Ts) recommended for use in acute care contexts or unspecified healthcare organizational settings to develop a list of relevant sustainability F/M/Ts, concepts and factors to compare case study results. Results provide a novel resource (e.g., constructs, factors and related knowledge translation interventions (KTIs) that combines theoretical, empirical and practical findings which contribute to current knowledge on the concept of innovation sustainability in acute care

This first chapter orients the reader to my interest related to the topic of sustainability, the research problem, an overview (Grant & Booth, 2009) on what is known about the sustainability of research use in clinical practice, the specific purposes for each study, the methodologies used in the case study and systematic review, the theoretical framework guiding the case study, and the structure for this manuscript-based dissertation.

My Interest in Sustainability

This work is a representation of my passion and interest in the sustainment of evidence-based practices (EBPs) in nursing, particularly within acute care settings. To date, despite

increased interest in defining the concept of innovation sustainability, the aspect of sustaining innovations (e.g., BPGs), within an ever-changing healthcare context, such as complex acute care environments, remains a practical challenge for practitioners and administrators (Cowie et al., 2020; Fleischer et al., 2015; Proctor et al., 2015). I personally have faced this challenge during my thirty-five years as a nursing administrator, leading nurses and allied healthcare professionals in hospitals, the community and academic settings. Throughout my career, I have remained focused on how to best address the process of sustaining research use in clinical practice as a means to improve patient outcomes and the quality of care. In this dissertation, I took the opportunity to identify the factors and KTIs influencing frontline acute care nurses sustained use of a BPG to inform (my) practice and provide direction for future research within acute care. To guide such efforts, recent research (Higuchi et al., 2013; Shelton et al., 2018) suggests there is a need to use existing F/M/Ts that focus solely on the sustainability of EBPs in specific settings. Thus, I set out to concurrently conducted a systematic review and theory analysis of known healthcare sustainability F/M/Ts related to acute care. The purpose of the systematic review was to identify related key concepts and factors that influence/predict the likelihood of successful sustainment of EBPs within acute care and to compare case study results.

The Research Problem

To date, evidence of variable adherence rates to EBP recommendations within acute care contexts (Cowie et al., 2020; Fleischer et al., 2016a; Frykman et al., 2017) demonstrates their sustainment in clinical practice still remains a practical problem (Fleischer et al., 2015; Proctor et al., 2015). Case in point, in 2007, at the study site, the Nursing department initiated a Best Practice Guideline Implementation Program (BPG-IP), which involved implementing several Registered Nurses' Association of Ontario's (RNAO) Best Practice Guidelines (BPGs). One of the BPGs implemented across all units was the Pain Assessment and Management Policy and

Protocol (Pain P/P) (see Table 1), derived from the RNAO Assessment and Management of Pain BPG (RNAO Pain BPG) (RNAO., 2007, 2013). Despite early implementation success, in a meeting with Nursing Leaders in 2016, they indicated ongoing monitoring revealed Pain P/P recommendations were not being used optimally or not documented on the five Medicine care units compared to all other inpatient units. These findings provided an unclear picture of medicine unit nurses' use of the Pain P/P recommendations. Together, Nursing representatives and I identified an opportunity to examine the factors and KTIs influencing Medicine care unit nurses' ongoing use of the Pain P/P from a department level over ten years, and at the unit level at the ten-year timeframe to support ongoing quality improvement.

1.2 Literature Review

An overview (Grant & Booth, 2009), or brief summary of the literature provides evidence of the characteristics related to the concept under study; healthcare innovation sustainability. Most citations were derived from the comprehensive search strategy used for the systematic review included in chapter 5, wherein I conducted a full text screening of all citations to determine eligibility for inclusion. Studies cited in text post the review were derived from ongoing tracking of the same databases. The quality of the studies included were not assessed.

Background

Why do some tertiary nurses continue to use EBPs, such as BPGs, while others do not, where organizational policy supports its sustained use? Understanding what the factors and knowledge translation interventions (KTIs) are that influence the use of research findings in clinical practice and how they can be effectively sustained remains a practical problem for nurses, healthcare managers and administrators (Fleischer et al., 2015). The aim of integrating research findings into practice is primarily to improve: the quality of patient care (Ploeg, 2014), patient safety (Heslop & Lu, 2014; Kurtzman & Corrigan, 2007), the "logistical systems within

the organization” (Straus, 2013, pp. 3-4), and patient outcomes (Doran et al., 2006; Gifford et al., 2013; Heslop & Lu, 2014). In 1997, the National Forum on Health called for a ‘culture of evidenced-based decision making’ and the “term *evidence-based practice* thus became a mantra for advocates of contemporary quality health-care systems” (Estabrooks, 2003, p. 53). Subsequently, in Ontario, Bill 46, known as the Excellent Care for All Act (Care, 2010), mandated all healthcare organizations to promote the provision of care based upon “the best scientific evidence available” (Care, 2010, p. section 4.3) which includes the recommendations from clinical practice guidelines and protocols. Currently, regulatory bodies (Care, 2010, p. section 4.3) have mandated healthcare professionals and organizations incorporate EBPs into decision making processes to ensure safety and improved health outcomes. The literature suggests “more in-depth mixed-methodology studies aimed at building up a rich picture of process and impact” (Greenhalgh, 2004, p. 620) on how to implement research findings in a sustainable manner is needed. This is particularly important given the Canadian Institute for Health Information reports indicate healthcare expenditures are the largest in hospitals (26.4% in 2020)(Canadian Institute for Health Information, 2021). Thus, there is an emergent need for more evidence related to the sustained use for EBPs among nurses in acute care settings (Fleiszer et al., 2016a), such as the tertiary care study site.

What is known about Healthcare Innovation Sustainability

Defining the Concept of Healthcare Innovation Sustainability

Over a decade ago, the sustained use of EBPs was identified as a gap in the literature. Evolving debate among experts suggests ‘sustained use’ of healthcare innovations refers to “the degree to which an innovation (such as an EBP) continues to be used after initial efforts to secure adoption is completed” (Rogers, 2003, p. 429). Wiltsey Stirman et al (2012) argues EBPs can be considered ‘sustained’ at a given point in time, “after initial implementation support has been

withdrawn and the core elements are maintained (remain recognizable) or delivered at a sufficient level of fidelity/intensity to yield a desired health outcome (benefit) and adequate capacity for continuation of the elements is maintained for their delivery” (p. 26). This is congruent with Fleiszer et al’s (2015) definition derived from a concept analysis, which defines the concept of ‘healthcare innovation sustainability’ as “a process that emerges from or succeeds innovation implementation, wherein improvements are maintained, new ways of working become routine, surrounding systems are transformed in support and the innovation may even be developed, over a period of time appropriate to a given situation” (p. 1495). Most recently, Moore et al. (2017) defined sustainability as a distinct concept that occurs, “(1) after a defined period of time, (2) the program, clinical intervention and/or implementation strategies continue to be delivered and/or, (3) individual behavior change (i.e. clinician, patient) is maintained, (4) the program (innovation) and individual behavior change may evolve or adapt while (5) continuing to produce benefits for individuals/systems” (p. 116).

For the purpose of this dissertation, an EBP was considered sustained if ‘its original integrity is either fully or partially maintained’ (i.e., includes the maintenance of core elements) (Fleiszer et al., 2015; Rogers, 2003; Wiltsey Stirman et al., 2012). Additionally, the period of time for sustained use in this dissertation was defined as greater than two years post initial implementation, which is aligned with the evidence from two systematic reviews (Gruen et al., 2008; Wiltsey Stirman et al., 2012).

Innovation Development: Adaption and Evolvment

The literature suggests an innovation or EBP, rarely is implemented unchanged, but rather requires ‘adaptation to the local context’(s) (Buchanan et al., 2007; Harrison & Hoek, 2013) and over time can be influenced by several barriers referred to as “fateful factors” by Buchannan, Fitzgerald and Ketley (2007, p. 68). Buchanan et al. (2007) contend the

sustainability of healthcare innovations often is accompanied by some form of ‘ongoing improvement’ or evolution whereby key components survive “while the development of the details of practice to accommodate changing contexts/conditions requires adaption” (p. 227) to achieve an improved outcome. Thus, ‘adaption’ and ‘ongoing evolution or improvement’ of innovations must be considered when examining the sustainability of healthcare innovations. Fleischer et al. (2015) further suggests two differing perspectives currently exist for the definition of ‘innovation development’; namely (i) “the evolution of the innovation itself, and (ii) the building of user capacity or adaptation of user context (abilities and resources) to changing circumstances” (p. 1490). Descriptions about ‘innovation evolution’ are supported in the literature by Davies & Edwards (2013); Chambers et al. (2013); Buchanan, Fitzgerald & Ketley (2007); and Fixsen et al. (2005). The ‘building of user capacity and or adaptation of the user context perspective is evident in the work of Shediak-Rizkallah & Bone (1998); Johnson et al. (2004), Scheirer (2005); Gruen et al. (2008); Scheirer & Dearing (2011); Chambers et al. (2013); Lennox et al. (2018); and Hoben et al. (2021). Chambers et al (2013) posits “ongoing optimisation of the innovation as it is being applied in different contexts over time is necessary”(p. 121) indicating ‘innovation evolution’ verses emphasizing fidelity to an initial protocol is necessary for sustainment. Chambers et al. (2013) further posits ‘innovations are more likely to be maintained when there is a strong fit between the context and the innovation’ (p. 119). In a recent systematic review by Cowie et al. (2020), initiative or innovation development (i.e., adding to or developing the innovation over time) was explicitly acknowledged as a key construct influencing sustainability. Notably, in a theory-based three-arm clinical trial by Hoben et al (2021) findings revealed modifiable elements of contexts and maintaining higher fidelity during the implementation spread period was associated with sustained outcomes (benefits) beyond 2.5 yrs recommending further examination. These

conceptualizations of innovation adaption and evolvement as a component of sustainability; imply “sustainability ultimately comes down to the adaptability of both the innovation and the system” (context) (Davies & Edwards, 2013, p. 243). Understanding how an innovation is adapted to the context and its involvement over time are necessary for innovation survival.

Uneven Results of Innovation Sustainability

Buchanan et al. (2007) contends “the sustainability of EBPs is influenced by interrelated factors that cannot be listed in a simple checklist format nor explained by a set of conventional casual relationships” (p. 67). While sustainability implies such practices are routinized, when such factors are not overcome as part of ongoing efforts during the sustained use phase, the embedding of EBPs into routine practice often “decays” (Buchanan et al., 2007, p. 231) resulting in variable rates of innovation sustainability. Buchanan et al. (2007) describes the decay of such ongoing implementation efforts as the “improvement evaporation effect” (p. 231). Unfortunately, the literature reveals this type of decay continues to plague the efforts of healthcare teams and administrators in a wide variety of healthcare settings (Ament et al., 2015; Cowie et al., 2020; Doyle et al., 2013; Dücker et al., 2011; Geerligs et al., 2018; Gruen et al., 2008; Hoben et al., 2021; Scheirer, 2005; Wiltsey Stirman et al., 2012).

To date, nursing researchers have confirmed variant levels of sustained use of EBPs existing in nursing practice ranging between 3.2 % to 98.5 % (Davies et al., 2006; Davies et al., 2013; Higuchi et al., 2017; Higuchi et al., 2011; Wallin et al., 2003). Three studies (Davies et al., 2006; Davies et al., 2013; Higuchi et al., 2011) concluded variable levels of sustained use of the Registered Nurses Association of Ontario (RNAO) BPGs were self-reported by nurses two to three years after of implementation. Specifically, varying levels two to three years after implementation were reported to be between 43-59 % (Davies et al., 2006). In another study on RNAO guideline implementation which involved 8 sites (e.g., teaching hospitals, a community

hospital, a long-term care facility, and community agencies) varying rates were reported two years after the initial pilot implementation in 75% (6 out of 8) of sites (Davies et al., 2013; Higuchi et al., 2017). In a third study, three years' post implementation varying sustained rates of guideline components designed for adults with asthma and diabetes were reported ranging between 3.2% to 98.5% (Higuchi et al., 2011). In a fourth study conducted by Wallin et al (2003), 61% (51/119) of the nurses who participated in a 4 day basic training course to manage a method for quality improvement (QI) reported they had all discontinued the QI work four years post implementation.

Two recent systematic reviews (Ament et al., 2015; Wiltsey Stirman et al., 2012) also revealed varying adherence rates to EBPs exist among allied professionals post implementation. In the first systematic review of 125 empirical studies that focused on the sustainability of public health and clinical interventions, researchers reported partial sustainability was more common, even when full implementation was originally achieved (Wiltsey Stirman et al., 2012). In fact, only 60% (75 out of 125) of studies reported on changes in implementation levels post implementation. Among these seventy-five studies, lower levels of implementation after initial implementation efforts had ended were reported in 25% (19 of the 75) of studies reviewed, 22% (17 out of 75) of studies reported an increase, 4% (3 out of 75) of studies reported no change or similar level of implementation, and 22% (17 out of 75) of studies reported varying changes in implementation rates across different interventions and program components (Wiltsey Stirman et al., 2012, p. 6). The second systematic review by Ament et al (2015) included 14 studies that reported on 18 sustainability evaluations of medical professionals' adherence to clinical practice guidelines. The mean timeframe for the sustainability evaluations was 2.6 yrs. (i.e., minimum at 1.5 to a maximum of 7 years post implementation). Long term full adherence to clinical practice guidelines was reported to be fully obtained in only 38% (in 7 out of 18) sustainability

evaluations (2015, p. 4). The level of professionals' adherence was not fully sustained in 33% (6 out of 18) of evaluations, and 22% (4 out of 18) reported mixed sustainability results (2015, p. 4).

Another recent systematic review by Cowie et al. (2020) examining the factors influencing sustainability of a variety of hospital based innovations (i.e., interventions) included 32 studies. Cowie et al. (2020) revealed that sustainability was inconsistently reported across 88% (28 out of 32) of studies and ranged from 6 months to 8 years. Innovations were reported to be continued in 56% (18/32) of studies and individual behavior was reported to be maintained in 28% (9/32) of studies (2020, p. 602). Findings highlighted the need for more consistent and complete reporting of sustainability related to hospital innovations to ensure information is available to inform practitioners. Additionally, this review confirmed a previous finding that sustaining of EBPs into clinical practice in acute care is “cogently difficult and implementation programmes continue to produce uneven results” (May et al., 2014, p. 289)

What we know about the Factors Influencing Sustainability

The notion that sustainability appears to be a process which involves managing and supporting the evolution of an EBP or innovation within a changing context (Chambers, 2013) implies the integration of such research findings is never isolated from the social, technical and organizational contexts within which it is implemented, nor is it from the attitudes, beliefs, behaviors and activities of individuals whom it impacts (May, 2013). To date, few reviews exist related to innovation, individuals, and contextual determinants influencing the sustained use of EBPs among healthcare practitioners (Fleischer et al., 2015; Shelton et al., 2018; Squires et al., 2019), especially those related to sustaining hospital base innovations (Cowie et al., 2020; Geerligs et al., 2018). Despite recent additions to the literature, it remains unclear, whether the same determinants known to influence (or not) practitioners in one setting have an influence

across a range of healthcare contexts (Shelton et al., 2018), or even impact sustainment of outcomes (Proctor et al., 2009; Proctor, 2015).

Innovation Determinants Influencing Sustainability

The literature reveals several factors or characteristics about a healthcare innovation that relate to how it becomes routinized or sustained in clinical practice. In a concept analysis conducted by Fleiszer et al. (2015) several innovation specific characteristics related to the sustainability are synthesized based on the evidence found in the literature. They included: effectiveness of the innovation; fit with the organizational and professional mission/strategies/procedures; relevance in addressing a need; nature of the innovation; adaptability; integrity; ease of integration with existing routines/programs/services; scale; and age (Fleiszer et al., 2015). Martin et al. (2012) found “embedding into existing systems, such as care pathways, and proactive responses to changing circumstances can interact to sustain change” (p. 197). Furthermore, Hunter et al. (2015) identified a significant association between “the characteristic of intervention (e.g., complexity) and its sustainment” (2015, pp. 173, 179, 180) when examining the sustainment of an EBP for adolescent substance abuse. Recently, Shelton et al. (2018) added intervention burden/complexity, trialability, and cost to the list of innovation characteristics influencing sustainability across multiple settings and contexts.

Individual Determinants Influencing Sustainability

To date, the following discussion outlines the individual (i.e., adopter or implementor) determinants identified by researchers related to sustainability (Buchanan et al., 2007; Cowie et al., 2020; Fleiszer et al., 2016b; Fleiszer et al., 2015; Fox, 2015; Maher, 2010; Racine, 2006; Shelton et al., 2018).

Individual factors related to sustainability noted by Fox, Gardner & Osborne (2015) highlight nurses’ “perception of the innovation’s need, its’ safety and quality” (p. 73) are

important individual determinants influencing the ongoing use of EBPs among nurses. Maher, Gustafson & Evans (2010) purport key adopter characteristics related to sustainability included: (i) staff's "behavior (feelings, attitudes and beliefs) towards sustaining the change" (p. 35), and (ii) their "involvement and training (acceptance and motivation to participate) to sustain the process"(p. 36) are necessary individual determinants for sustainability. In a recent annual review of 150 studies included in a symposium on Implementation Science and Public Health, implementor characteristics and skills/expertise were similarly identified by Shelton et al (2018) as emerging factors influencing sustainability across multiple settings and contexts. In a recent review of hospital-based interventions by Cowie et al. (2020) staff in 40% (6/15) of studies reported limited experience, a lack of confidence, and/or having poor knowledge-base about the innovation as a barrier to its sustained use. Fleiszer et al. (2016b) further contends the "impact of individual unit nurses' sense of accountability on guideline routinization" (p. 212) is a key determinant for the sustained use of guidelines among nurses in acute care. Individual's commitment to the innovations has also been identified as a key factor influencing sustainment of EBP s in acute care contexts by researchers (Buchanan et al., 2007; Fleiszer et al., 2015; Fox et al., 2015; Racine, 2006).

Context Determinants Influencing Sustainability

Nurses' sustained use of research in clinical practice is not isolated from the impact of internal and external pressures of the organizations they work in. Cowie et al. (2020) found that the most frequently reported barrier that influenced sustained use of hospital-based interventions was "inadequate staff resourcing, such as training on the intervention and capacity building" (p. 603). This finding was cited in 47% (15 /32) of the included studies. Ament et al. (2014) described this barrier as a reoccurring barrier for sustainment given the frequent turnover/ rotations of physicians in hospitals. Further, in a recent review by Hailemariam (2019) the two

most frequently reported hinderances to EBP sustainment were limited or no funding, cited in 48% (11 out of 23) of studies, and limited resources cited in 30% (7 out of 23) of studies. Cowie et al. (2020) also reported a lack of process to measure progress over time cited in 22% (7/32) of studies, and the lack of record keeping of progress cited in 6% (2/32) of studies both as obstacles to sustainment in hospitals. A ‘lack of organizational support’, ‘staff shortages, and or high turnover of staff’ were further identified as barriers by Cowie et al. (2020). These key barriers reported by researchers in their systematic reviews indicate the importance of context for sustainability of EBPs in clinical practice.

Conversely, some facilitating factors associated with sustained use of EBPs in clinical practice are evident in the literature. Findings by Higuchi et al. (2013) conclude activities such as “revising the existing vision/mission or corporate priorities” (2013, p. 1714) along with policies/procedures is effective; there is value in “documenting the processes of implementation” (2013, p. 1714) (good and bad) for further understanding and linking costs to related resource allocations; “educational strategies and policy adjustments are a must” (2013, p. 1714); and “organizational excellence comes with a price tag” (2013, p. 1714) and must be taken into account given the provision of quality care based on best evidence is no longer optional but a “legal and professional expectation of healthcare organizations” (2013, p. 1714). Slaughter (2013) suggests a combination of multiple frequent and intensity reminders are necessary to sustain research use among unit nurses. Most recently, a protocol and study examining the sustained used of a complex intervention 2.5 years post clinical trial revealed similar organizational variables, such as a more supportive work culture, and feedback activities (e.g., evaluation) were associated with intervention sustainment (Berta et al., 2019; Hoben et al., 2021) among healthcare aides in formal communications about resident care (formal interactions). Fleiszer et al. (2016a) further identified five unit level context factors influencing the sustained

use of EBPs guidelines in acute care setting eight years post implementation. Routinization or embedding of EBPs into routine practices was dependent on (i) collaboration among nurses and other interdisciplinary team members, (ii) the existence of a culture of shared accountability among unit nurses, (iii) the stability of staffing on the nursing unit, (iv) the availability of equipment, and (v) access to clinical experts' (2016a, pp. 211-212). A recent systematic review by Hailemariam et al (2019) identified twenty-six facilitating and twenty-three hindering factors that influenced sustainment of EBPs in nursing homes. The two most common facilitators identified were (i) innovation adaption/alignment with internal practices cited in 54% (14 out of 26) studies, and funding cited in 50% (13 out of 26) studies.

Leadership and champions in nursing have been identified as a key contextual factor influencing sustained use of EBPs/guidelines among nurses in clinical practice. According to Lakisha lee Chambers (2015), "the level of dedication and commitment of leadership, at all four levels in an organization (senior executive, project leaders, middle managers & frontline staff) to work together impacts sustainability of innovative evidence-base improvement projects" (p. 90). Maher, Gustafson & Evans (2010) also support a shared responsibility among leaders for sustainability. Fleiszer et al. (2016b) further contends the "attributes of formal unit leaders and the leadership team members" (p. 212), and the "impact of individual unit nurses' sense of accountability on guideline routinization" (p. 212) are key determinants for the sustained use of guidelines among nurses in acute care. Shuman et al (2018; 2019) demonstrated middle managers' leadership behaviors significantly influence unit climate for EBP implementation in acute care settings. These findings are echoed in two recent reviews (Cowie et al., 2020; Geerligs et al., 2018). Cowie et al. (2020) adds that supportive leadership, including strong champions advocating for the use of the intervention is a key facilitator influencing sustainability of hospital-based interventions. Clarke and Marks-Maran (2014) contend "having

champions make a difference” (p. 222) in the sustainability of EBPs. Ploeg et al. (2010) argues “nursing best practice champions have a multidimensional role” (p. 238) to advance positive patient, organizational and system outcomes. As change agents champions are well positioned to facilitate the sustained use of EPBs within a complex changing environment such as the health care system (Ploeg et al., 2010). This is further supported by Chambers (2015) who suggests “a primary responsibility of nurse champions is to ensure that EBP initiatives have changed the practice for ‘all healthcare providers’ and have been ‘deeply rooted’ in the organization’s culture” (p. 92) to improve productivity and outcomes. Contextual barriers and facilitators that exist across a range of diverse healthcare settings are increasingly recognized as important factors to consider in the sustainability of EBPs in clinical practice (Cowie et al., 2020; Shelton et al., 2018).

Moreover, a recent review examining bridging factors that cross the outer-inner context boundaries of an organization looked beyond treating organizations as closed systems (Lengnick-Hall et al., 2020). Lengnick-Hall (2020) identified several bi-directional influences between outer context systems and organizations (inner context) over both implementation and sustainment phases. This study identified several dynamic interactions between outer and inner contexts related to shared experiences such as: negotiations, executing contractual arrangements, changing internal processes to align with contract requirements, and finding additional funding to supplement contract inadequacies over time. These findings draw attention to the potential bi-directional linkages that may impact sustainment of EBPs such as those influencing the management of patient flow in and out of hospitals.

In summary, studies and reviews continue to demonstrate that varying levels of sustained use of EBPs exist in multiple diverse healthcare settings, including acute care, and among a variety of healthcare practitioners. The literature also illuminates factors that influence

sustainability exist among the broad domains of the innovation, individuals, and context. However, there are many gaps in our understanding of the factors that influence sustainability, the relationships among factors, and factor evolution over time in the different settings. For example, the challenge is knowing whether sustained use of EBPs in acute care settings is in part due to a combination of factors associated with the characteristics of the healthcare innovations themselves, the individual users/implementors themselves, and or the context or changing organizational environments the EBPs are being embedded into. Given the lack of evidence related to the factors influencing sustainability, especially within acute care contexts, there is a need for further in-depth research to add to the current knowledge base.

Knowledge Translation Intervention (KTI) vs Clinical Intervention Clarification

One additional clarification pertinent to this dissertation relates to the terms ‘clinical intervention’ and ‘knowledge translation intervention’ (KTI). The term ‘clinical intervention’ refers to the actual *evidence-based practice* being embedded into routine practice such as the Pain P/P. Whereas the knowledge translation intervention (KTI) refers to the *strategies* used to sustain the use of the clinical intervention (Pain P/P) among nurses. Examples of KTIs or strategies used by organizations to facilitate the ongoing use of a clinical intervention may include but are not limited to educational sessions, audit and feedback mechanisms, resources allocations, and or staffing changes (Wensing et al., 2013).

What we know about KTIs Influencing Sustainability

Determining how to sustain the use of EBPs in clinical practice is in part an art. Evidence to date suggests “KTIs need to be tailored to specific determinants of practice, similar to a clinical treatment which is tailored to a diagnosed health problem” (Wensing et al., 2013, p. 150). Despite a recent effort to structure strategies into five classes to aid in reporting implementation research (Leeman et al., 2017), to date, the literature does not provide a listing of

the KTIs that will address each sustainability factor. Instead, evidence suggests to design effective sustainability-orientated KTIs, organizations need to first identify the relevant factors influencing sustainability, select appropriate KTIs to address these factors, and then tailor the KTIs to address the specific challenges related to sustained use of the EBP found in the practice setting. The tailoring of the KTI is seen as the “most creative part of the design process” (Wensing et al., 2013, p. 156). Using a participatory approach to develop effective KTIs promotes ownership for the process being developed to bridge the practice-gap, promoting sustainability over time (Jagosh et al., 2012). Ongoing monitoring and evaluating of adherence to clinical practice recommendations and the impact on relevant outcomes, such as audit and feedback KTIs, is the next critical step in linking the tailored KTIs to address the gap between actual and desired behavior (e.g. use EBPs) in clinical practice (Foy & Eccles, 2013). Given the number of diverse settings and factors influencing healthcare innovation sustainability, evidence reveals it is unlikely that one approach/strategy or KTI will be effective at all contexts (Birken et al., 2020; Chapman et al., 2020; Lennox et al., 2018).

Few studies have examined the effectiveness of KTIs on sustainability of research use in acute care. Fleiszer et al. (2016b) submits higher levels of sustainability were realized when unit leaders operationalized an integrated set of strategies (e.g., maintaining priorities and reinforcing expectations) and activities. Activities included extending initial implementation, education and training, using reminders, communicating & discussing, evaluating unit performance and initiating improvements related to the EBPs, and lastly integrating changes into other new or existing projects or program. Brewster et al. (2015) describe three different approaches or ‘integration mechanisms’ to use to successfully sustain the use of a new practice in 53 hospitals (2015, p. 176) in other words, sustaining them in practice. Depending on the characteristics of the innovation, one of the integrated mechanisms eventually took over the role of holding new

practices in place. First, innovations that provided intrinsic rewards or benefits to staff (e.g., job satisfaction from seeing improved patient outcomes) led to a shift in attitudes and norms and resulted in committed use of the innovation by staff. Second, innovations with complex tasks and few intrinsic benefits to staff led to the need to revise performance standards resulting in compliant use by staff. Third, innovations with simple tasks and few perceived benefits led to integrations through automation. Brewster et al (2015) purports these three integrating mechanisms “transform innovations from a practice imposed on a hospital organizational system, to habits that were reinforced by the system” (2015, p. 175).

A systematic review of KT approaches used to sustain innovations in healthcare settings, conducted by Lennox et al. (2018), revealed forty diverse approaches derived from the sixty-two publications included in the review. This review demonstrated “sustainability approaches have been consistently developed and adapted since the late 1980s with an average of two approaches created every year” (Lennox et al., 2018, p. 30). The forty approaches were categorized into the following six constructs regardless of the innovation, level of application, and setting: (i) the initiative design and delivery, (ii) negotiating initiative processes, (iii) the people involved, (iv) resources, (v) the organizational setting, and (vi) the external environment. Comparisons across approaches revealed no two approaches contained the same combination of constructs. Six approaches were included in over 75% (30/62) of the studies: namely (i) providing general resources, (ii) demonstrating effectiveness of the initiative, (iii) encouraging stakeholder participation, (iv) monitoring progress over time, (v) integrating the initiative within existing programs and policies, and (vi) training and capacity building. Unfortunately, a small number of approaches included were designed for use in acute care, 3% (2/62) of the studies. This latter finding emphasizes the need for further research to identify what KTIs are effective in sustaining EBPs in acute care settings.

A more recent overview identified forty-four systematic reviews that outline knowledge translation strategies that increase capacity to use and apply evidence effectively among health consumers such as patients, providers and the public (Chapman et al., 2020). Their analysis reveals the majority of strategies with sufficient evidence of effectiveness are those that are “combined, frequent, and/or intense over time” (2020, p. 24). Furthermore, Chapman et al (2020) contends tailored interventions are more effective in achieving changes. Thus, when designing or tailoring KTI/strategies, the frequency, intensity and follow up time also needs to be taken into consideration for sustainment of EBPs.

1.3 Pain Assessment and Management

In all settings, nurses are often faced with the challenge of assessing and intervening to manage person’s self-reported pain as part of their nursing practice. To assist nurses with this endeavor the RNAO has undertaken to develop BPGs to guide nurses practice (RNAO., 2007, 2013). From a sustainability perspective, pain in itself is an ongoing condition affecting all ages over time. Whether episodic or chronic, pain care continues to be a priority not only in nursing care, but based on site representative’s recommendation, there was a need for consistent pain care across the center on all units, especially Medicine care. For these reasons, and with the expectation it would have broad application to a variety of nursing environments, especially similar multi-site acute care centers, I chose to examine nurses’ sustained use of the Pain BPG recommendations at the study site.

Unrelieved acute or chronic pain, or poorly managed pain throughout life has been described as a burden on the person, the health-care system, and even society by Lynch (2011). In fact, approximately 18.9 % of the population in industrialized nations live with pain (Choinière et al., 2010). Pain is reported to be one of most common reasons for seeking health care and represents 78% of the chief complaints in emergency departments in Canada (Coalition,

2014). Pain is often described as being subjective and multidimensional with sensory, cognitive and affective aspects (RNAO., 2013).

The Importance of Pain Assessment and Management at the Study Site

Like many other healthcare organizations, the study site undertook a number of quality improvement initiatives, including the use of BPGs, in response to increasing demand to improve patient outcomes. Specifically, in 2007, the Nursing department initiated a Best Practice Guideline Implementation Program (BPG-IP), which involved implementing several BPGs targeting specific patient care needs to improve the quality of nursing care. One key challenge identified by the study site was the need to standardize pain care across ‘all’ inpatient nursing units. To address this challenge, a Pain Assessment and Management Policy and Protocol (Pain P/P) (see Table 1), derived from the RNAO Assessment and Management of Pain BPG (RNAO Pain BPG) (RNAO., 2007, 2013) was established in 2007 and revised in 2013. At the study site, policy creates the expectation that nurses sustain the use of the Pain P/P recommendations. However, the decision to follow the recommendations lies with the individual nurse at the clinical practice level. To date, the Pain P/P remains a ‘corporate priority’ requiring ‘organizational-wide efforts among all disciplines.

Selected Pain P/P Recommendations Measured in this Dissertation

The study site adopted the definitions for *Pain*, *Pain Management*, *Pain Assessment and Inter Professional Care Team*, and eight (2007) to nine (2013) of the 20 recommendations from the RNAO 2007 and 2013 guidelines respectively. In this dissertation, only five (1, 2, 3, 4, and 7) of the 9 chosen recommendations within the Pain P/P were examined based on the following reasons (see Table 1). Firstly, the five target behaviors are supported by one of the highest levels of evidence (e.g., Ib – supported by at least one randomized control trial) ((SIGN), 2012) in the RNAO Assessment and Management of Pain BPG (RNAO., 2013). Secondly, practical

considerations such as the target behaviors are measurable clinically and can be explicitly identified by nurse-specific documentation in the patient record informed selection. Thirdly, the five target behaviors have been the focus of internal implementation efforts and annual monitoring initiatives for the past ten years at the study site. Lastly, selected recommendations are related to policy/protocol adherence rather than dependent on incidence of pain. Evidence for selected Pain P/P recommendations is detailed in the RNAO Pain BPG (RNAO., 2007, 2013).

1.4 Purpose of this Dissertation

The specific objectives of this research were to (i) identify the factors influencing nurses' use (or not) of the Pain P/P over time, and ten years post-implementation; (ii) validate unit nurses' use of the Pain P/P ten years post-implementation, (iii) examine the related KTIs influencing Pain P/P use over time, and ten years post-implementation; and (iv) identify sustainability F/M/Ts, constructs and factors for the sustained use of EBPs within acute care to compare empirical study results.

To achieve the first three objectives a case study was conducted consisting of two components: a descriptive case study at the corporate (department) level, and comparative study of two embedded subcases (unit level) within the same organization using mixed methods, guided by the Dynamic Sustainability Framework (DSF) (Chambers, 2013). The in-depth descriptive case study examined from a nursing departmental perspective; corporate level nurses use of a nursing Pain BPG over a ten-year timeframe. The embedded comparative subcase component included a retrospective chart audit followed by interviews to examine unit level nurses use of a guideline, ten years post initial implementation. To my knowledge, this is the first study to report departmental and unit level nurses' perspective on the factors and KTIs used to sustain a BPG over a ten-year timeframe in an acute care setting. To date, few studies have considered differentiating between levels of the system, and focusing on such long-term

timelines in acute care. Results also revealed insights into the relationship among implementation and sustainability factors and KTIs across both phases, over a ten-year period.

To achieve the fourth objective, a systematic review and theory analysis was conducted. Acknowledging the timelines of the PhD program requirements and the potential limitation of choosing one theoretical framework to guide the case study, I concurrently set out to conduct a systematic review to identify a comprehensive listing of the constructs and factors influencing healthcare innovation sustainability from known F/M/Ts to eventually compare the results from the case study. This systematic review was the first to include a comprehensive analysis of healthcare sustainability F/M/Ts for EBPs with a primary focus on the acute care context.

In the final integrative analysis, I mapped case study findings (e.g., factors and KTIs) identified over time (2007-2017) to the sustainability constructs and factors identified in the systematic review. The final synthesis of theoretical and empirical findings provides a novel comprehensive resource of known sustainability concepts, factors and KTIs to support the advancement of future related theory driven-research aimed at sustaining EBPs within acute care settings to improve nursing practice and related patient outcomes. Results can be used to aide and/or inform future efforts in designing effective KTIs for those planning or currently implementing EBPs to improved patient outcomes. In addition, I was able to generate some theoretical insights that may be considered for future research.

1.5 Methodological Approaches Used in this Dissertation

Case Study Definition, Description and Methodology

Yin (2014) states a case study is “an empirical inquiry that aims to investigate a contemporary phenomenon (the “case”) in depth and within its real-world context” (p. 16). Yin purports a case study inquiry “relies on multiple sources of evidence, with data needing to converge in a triangulating fashion” (p. 17). Embedded in Yin’s (2014) case study designs are

the hallmarks of a post positivist's approach to research: the selection of cases is based on relevance and the use of replication logic: similar findings (literal replication) such as “comparative structures” (p. 189) used in this thesis, or to produce contrasting findings (theoretical replication). Design features are sequentially structured, minimizing subjectivity to manage bias, coupled with detailed data collection and accurate reporting of critical elements (Yin, 2014, pp. 76-83). The unit of analysis in a case study is typically either a single case (within-site study) or involves multiple cases (a multisite study) to allow for a larger comparative analysis (Creswell, 2013). Yin (2014) further encourages the use of both quantitative and qualitative methods within the design.

Case Study Design

A case study approach (Yin, 2014) having two components (corporate and unit level) was used to investigate the factors and KTIs influencing the use of a Pain BPG over time (2007-2017) and at the ten-year timeframe. The first component consisted of a “single case design” (Yin, 2014, p. 50) investigating corporate level nurses' perspective of the factors and KTIs influencing the use of the Pain P/P over time, from a nursing department level to gain a historical perspective. The second component of the case study examined two inpatient units' (bounded subcases within-the same site) (Yin, 2014, p. 50) use of five selected target behaviors within the approved Pain P/P ten years post initial implementation, using a “explanatory mixed method approach” (Creswell & Plano Clark, 2011, p. 121) (Yin, 2014, p. 66). Unit selection was purposeful, to achieve maximum variation, and informed by organizational representatives. A retrospective chart audit followed by interviews of nurses on the two selected units (subcases), ten years post implementation was conducted. Within-in case' descriptions, themes and summaries for each unit (subcase) were analyzed separately, integrating all three respective sources of data (chart audit results, document review and interview findings). The final

integration and interpretation phase, themes from the two subcases were analyzed ‘across cases’ for similarities and differences (Yin 2009; 2014) of the findings and conclusions drawn.

Systematic Review Design and Theory Analysis Methodology

I conducted a systematic review guided by the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) reporting standards (Moher et al., 2009; Shamseer et al., 2015); a 27-item checklist and four-phase approach to identify, screen, determine eligibility and extract sustainability F/M/Ts. I then conducted a comparative analysis of the F/M/Ts using a modified theory analysis approach by Walker and Avant (2005). This approach was used to systematically analysis the concept of sustainability, clarify and define themes and factors known to influence the sustained use of EBPs for acute care. A subjective rating scale was added to both the parsimonious (e.g., full or partial) and language scale (e.g., clear, somewhat unclear, unclear). All factors were then extracted and collated. Qualitative content analysis methodology (Elo & Kyngäs, 2008; Graneheim et al., 2017) was used to inductively identify *core factors* from F/M/Ts. Factors cited in four or more F/M/Ts within each theme were identified as *common factors*.

1.6 Guiding Conceptual Framework for the Case Study

I used the Dynamic Sustainability Framework (DSF) (Chambers, 2013) as the conceptual framework to guide the case study in this dissertation given its proposed constructs, factors, elements and tenets generally aligned with the purposes. Specifically, distinct from other models, I felt the constructs and tenets in the DSF best described the ever-changing, multilevel relationship over time between the use of an innovation (e.g., Pain PBG) within an acute care center (practice setting) and the broader healthcare system (ecological system) it functions within (2013, p. 120).

The DSF contains three main construct levels: (i) the broader ecological system (e.g., healthcare system) within which the practice setting operates; (ii) the practice setting or context (e.g., hospital), and (iii) the innovation (e.g., a nursing best practice guideline or BPG) which includes individual innovation components and an assumed set of characteristics defining *who* should deliver the innovation. All levels are considered to be ever changing over time rendering a continuous dynamic interface between the constructs, much like an acute care setting. Each construct is influenced by several factors as listed in Table 2.

The DSF further posits seven tenets (propositions) for the sustainability of healthcare innovations (e.g., BPGs) in practice which are supported by evidence (Chambers, 2013) (see Table 2). Specifically, with an emphasis on the first three tenets, the seven tenets guided the descriptive case study and the latter tenets, four to seven, guided the embedded comparative case study in this dissertation. Specifically, in this dissertation, I examined whether the Pain P/P was optimized into specific routine practices for use throughout the organization, within the first 2 years (prior to the sustainability phase), at the corporate and/or department/service level (Tenet 1). Second, I examined whether adjustments or refinements were made to the overall Pain P/P over time (between years 2 to present) in-order to sustain its' use in routine processes and or practices (Tenet 2). Third, I sought to identify evidence of measures and or feedback mechanisms used to monitor nurses' sustained use of the Pain P/P at the corporate and unit level (Tenet 3). Fourth, I examined whether a culture of improvement exists at the corporate and unit levels; the culture's influence on nurses' sustained use of selected five recommendations within the Pain P/P and what factors influence the culture (Tenet 4). Fifth, I focused on examining the strategies and factors that influence the 'fit' between the Pain P/P and its sustained use among the unit nurses (Tenet 5). Sixth, I looked for evidence of the problem-solving capacity used to integrate the five recommendations into routine practices to sustain the Pain P/P at both

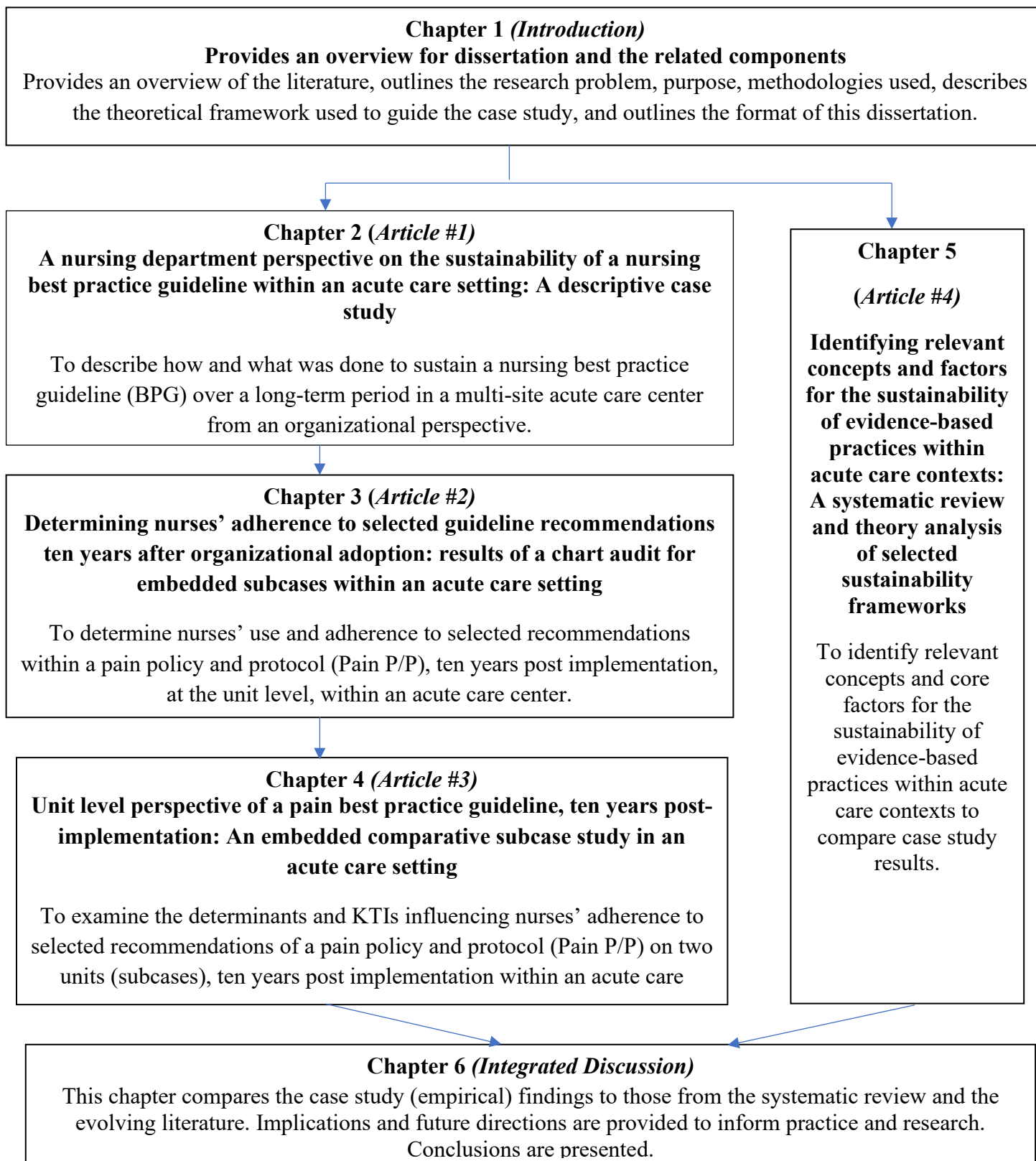
corporate and unit levels (Tenet 6). Seventh, I sought to identify evidence of stakeholder engagement in planning, implementation and adaptation of processes to help increase the fit between the local context and address evolving issues (barriers) that interfere with nurses sustained use of the five recommendations (Tenet 7). These seven tenets are encompassed in the following three elements authors propose are necessary for sustainability: (i) ongoing adaption of the EBP focused on optimizing the ‘fit’ between the EBP and a dynamic context; (ii) expectations for ongoing improvement of the EBP as opposed to diminishing outcomes over time, and (iii) a continued learning and problem-solving culture within a practice setting.

How the DSF Informed the Case Study Design

In keeping with Yin (2014), the DSF constructs (broader system, practice setting, innovation) and the tenets have influenced the overall design of the case study as key components to examine. The DSF was used to logically “link the data to the tenets” (2014, p. 30) and as the “criteria for interpreting the findings” (2014, p. 36) related to the sustained use of the Pain P/P (intervention) on two selected units (subcases) within an acute care center. The DSF was used to orient the approach to data collection, not to prematurely restrict it or bias data analysis, and as a guiding framework for the integration and interpretation of findings for the selected units (subcases). In the final integrated discussion, I compare the case study findings with those derived from a synthesis of known theoretical conceptualizations of healthcare innovation sustainability, which included the DSF.

1.7 Format of the Dissertation

In accordance with the doctoral dissertation regulations of Graduate and Postdoctoral Studies at University of Ottawa, I have elected to present this thesis in a manuscript-based format. The dissertation is composed of four original, scholarly articles (see Figure 1).

Figure 1.1 Schematic of dissertation chapters and articles

1.8 Chapter Outlines

The overall structure and content of the dissertation is as follows:

Chapter 1 provides a general introduction to the dissertation, summarizes the relevant gaps in knowledge, and identifies the overall study purpose. A description is provided outlining how the articles within the chapters and related findings informed the final integrative chapter.

Chapter 2 is a descriptive case study that explored the long-term sustainability of a nursing BPG from a department-wide level perspective, over a ten-year timeframe. **Article #1** is entitled, “*A nursing department perspective on the sustainability of a nursing best practice guideline within an acute care setting: A descriptive case*”. This manuscript has been reviewed by the thesis committee and is formatted for submission to the *Journal of Advanced Nursing*.

Chapter 3 is a retrospective chart audit conducted on two selected Medicine care units (subcases), within the same multi-site acute care center in Canada, to determine nurses’ level of adherence to selected BPG recommendations at a ten-year timeframe. This chapter presents results from the quantitative component of the embedded comparative subcase study using mixed methods. **Article #2** is entitled: “*Determining nurses’ adherence to selected guideline recommendations ten years after organizational adoption: results of a chart audit for embedded subcases within an acute care setting*”. This manuscript has been reviewed by the thesis committee and is formatted for submission to *WORLDViews on Evidence-based Nursing*.

Chapter 4 is conducted at the unit level on two Medicine care units (subcases) to identify the determinants (e.g., facilitators, barriers) and KTIs influencing unit nurses’ use of selected BPG recommendations at a ten-year timeframe. Findings from Article #2 informed **Article #3** entitled “*Unit level perspective of a pain best practice guideline ten years post-implementation: An embedded comparative subcase study in an acute care setting*”. This manuscript has been reviewed by the thesis committee and formatted for submission to *Implementation Science*.

Chapter 5 is a systematic review of sustainability frameworks/models/theories (FMT) using concept analysis approach to identify related constructs and factors. **Article #4** entitled: “*Identifying relevant concepts and factors for the sustainability of evidence-based practices within acute care contexts: a systematic review and theory analysis of selected sustainability frameworks*”, was published in *Implementation Science* (December 19, 2019). This systematic review was concurrently conducted with the case study. Results were used to compare case study findings in the integrated analysis.

Chapter 6 provides an integrated discussion weaving together the findings from all four manuscripts (Articles #1-4) related to the sustainability of a nursing best practice guideline (BPG) in an acute care context. Results from the case study are compared to those from the systematic review of sustainability F/M/Ts to provide a novel comprehensive meta-synthesis (e.g., resource) of the concepts, factors and KTIs influencing sustainability in acute care settings. Implications for nursing leadership and practice, future directions for sustainability research and conclusions are presented.

1.9 References

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TABLES

Table 1.1 Pain P/P target behaviours, RNAO Pain Assessment and Management BPG (RNAO., 2007, 2013) and recommendation and level of evidence (SIGN, 2012)

Site Pain P/P Number.	Pain P/P Target Behavior	RNAO Pain Assessment and Management BPG Recommendation Number Level of Evidence
	Mandatory Pain policy /protocol requirements	
1	Screen inpatients for presence of pain on 1) Each initial contact/admission (2007 & 2013)	Assessment Recommendation - 1.1 Level of Evidence - Ib
2	Ongoing assessments of Pain using standardized tools 1) Once per shift (2007). 2) During hourly rounding (2013)	Assessment Recommendation - 1.2 Level of Evidence - Ib
	Conditional Pain policy/protocol requirements	
3	Establish an individualized goal for pain management with the patient (2007 & 2013).	Planning Recommendation - 2.1 Level of Evidence - Ib
4	Collaborate with the patient in establishing an individualized strategy and interventions to manage the patient's pain based on the best evidence and available resources. (2007 & 2013).	Planning Recommendation - 2.1 Level of Evidence - Ib
7	Educate patient and families about their individualized pain management plan (2007 & 2013)	Implement Recommendation - 3.3 Level of Evidence - Ib
	Pain policy/protocol requirements not selected for study	
5	Assess effects of pharmacological interventions at peak effect following administration and on an ongoing basis. (2007 & 2013)	Implement Recommendation - 3.1 Level of Evidence - Iib
6	Consult with pain management experts (interdisciplinary team members) as required (e.g. in complex situations, and or escalating or unrelieved pain after a reasonable trial of management). (2007 & 2013)	Planning Recommendation - 2.2 Level of Evidence- Ib
8	Ensure ongoing documentation reflects patient goals, pain mgmt. plan, assessment, response to treatment, outcomes, & communicate to inter professional team	Evaluation Recommendation - 4.4 Level of Evidence - Iib
9	Completion of self-learning training modules for nurses and physicians	Education Recommendation - 5.4 Level of Evidence - IV

Key: Level of Evidence

R = Recommendation, CA = Chart Audit, Q = Question, mgmt.= management, hxy= history, txmt= treatment

Ia Evidence obtained from meta-analysis or systematic reviews of randomized controlled trials.

Ib Evidence obtained from at least one randomized controlled trial.

IIa Evidence obtained from at least one well-designed controlled study without randomization.

IIb Evidence obtained from at least one other type of well-designed quasi- experimental study, without randomization.

III Evidence obtained from well-designed non-experimental descriptive studies, such as comparative studies, correlation studies and case studies.

IV Evidence obtained from expert committee reports or opinions and/or clinical experiences of respected authorities.

Reference: Adapted from “Annex B: Key to evidence statements and grades of recommendations”, by the Scottish Intercollegiate Guidelines Network (SIGN), in SIGN 50: A Guideline Developer’s Handbook. Available from <http://www.sign.ac.uk/guidelines/fulltext/50/annexb.html>

Table 1.2 Dynamic sustainability framework (DSF) constructs, factors and tenets

DSF Construct: Innovation/Intervention
<p>DSF Factors: <i>-Innovation/Intervention specific factors influencing behaviour change</i></p> <ul style="list-style-type: none"> • User characteristics (i.e., who should deliver the innovation/intervention)) • Outcomes directly related to usage (i.e., patient centered outcomes) • Delivery platform innovation/intervention is delivered on (i.e., face to face, telephonic, web-based, mobile health application)
DSF Construct: Practice setting (context)
<p>DSF Factors: <i>Contextual factors that effect achievement of desired outcome(s)</i></p> <ul style="list-style-type: none"> • Human resources (i.e., staffing) • Financial resources (i.e., capital resources) • Information systems • Organizational culture/climate and structure • Processes for training staff • Supervision of staff
DSF Construct: Ecological system (broader system)
<p>DSF Factors: <i>System factors within which the practice setting operates</i></p> <ul style="list-style-type: none"> • Other practice settings (i.e., working to incorporate the innovation/intervention) • Policy (i.e., legislative environment) • Regulations • Market forces (i.e., characteristics of local, regional, state, national markets) • Population characteristics (i.e., characteristics of broader population)
DSF 7 Tenets
1. Optimizing of Intervention (Pain P/P) is context specific and should not be optimized prior to implementation (Imp) (0-2 yrs.) and sustainability (Sust) (> 2ys) phase onset.
2. Continual improvements of Intervention (Pain P/P) will boost sustainment
3. Ongoing feedback on the Intervention (Pain P/P) needs to use practical, relevant measures of progress (expected outcomes) and relevance (fit between intervention and context) that are feasible.
4. Voltage drop is not inevitable within a culture of Continuous Quality Improvement (CQI) Definition: Voltage drop = assumes the more diverse and complex a patient population is, the smaller the benefit of the Intervention.
5. Sustainment of an Intervention (Pain P/P) will be maintained when there is a 'strong fit' between the Intervention and the context. Definition: Fit = adaption of the Intervention to the context to sustain it
6. Organizational Learning is a core value for sustainability
7. Ongoing stakeholder involvement is necessary for sustainability

APPENDICES

Appendix A – Signed thesis proposal approval form for University of Ottawa



Approbation du projet de thèse – Thesis Proposal Approval

Nom de l'étudiante* / Student Name <i>LETITIA NADALIN PENNO</i>	Programme / Program <i>PhD in Nursing</i>	# Étudiant / Student # []
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Directrice de thèse /
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DR. JANET SQUIRES
Nom / Name

[]

Co-directrice de thèse/
Thesis Co-supervisor/
(s'il y a lieu / if applicable)

DR. BARBARA DAVIES
Nom / Name

[]
Signature

Autres membres du comité de direction de thèse / Other Thesis Committee Members

DR. IAN GRAHAM
Nom / Name

[]

DR. CHANTAL BACKMAN
Nom / Name

[]

Nom / Name

Signature

Nom / Name

Signature

Rapport d'évaluation / Evaluation Report

- La proposition est acceptée / Proposal accepted *Understanding the Sustainability of selected guideline recommendations for the assessment and management of pain in an acute hospital: A comparative case study using mixed methods.*
La proposition devra être soumise à nouveau aux membres du comité, avec révisions, avant d'obtenir l'approbation finale / Proposal must be resubmitted to Committee members, with revisions, to obtain final approval.
- La proposition est rejetée. L'étudiante doit refaire le processus d'approbation à nouveau. Proposal is rejected. The student must complete the thesis proposal approval process again.

Approuvé par /:
Approved by

[]
Signature de l'étudiante* / Student signature

[]

Directrice adjointe, études supérieures / Assistant Director, Graduate Programs

May 29/17
Date

June 12/17
Date

* le féminin englobe le masculin

Print

Form ID: 6880
Status: Application - New
Created: 05-May-2017
Created By: lpenno
Last Updated: 6/8/2017 12:32:58 PM

Protocol Title: Understanding the sustainability of selected guideline recommendations at the unit level in an acute care hospital: An embedded comparative case study using mixed methods
Review Type: Delegated/Expedited Review
Principal Investigator: Janet Squires

23. Division/Department/Program Approval (This should not be completed by the Principal Investigator, Responsible Site Investigator and/or Co-Investigators)

Hospital and university administrators share responsibility for research activities within their division, department or program. The purpose of this signature section is to ensure that administrators at research sites are aware of: a) the research activities undertaken in their division, department or program and b) the impact of these activities on the resources of their division, department or program and the patients and the communities they serve.

I have reviewed this application and by signing below, I certify that:

a) the study is consistent with hospital/faculty policies and mission

Yes No Not applicable

b) the study resources (budget, space, and support staff) and/or the resources of my division, department or program are adequate to support the study,

Yes No Not applicable

c) there are an adequate number of research participants suitable to be approached for enrolment for this study

Yes No Not applicable

d) this population is not being excessively recruited for clinical research

Yes No Not applicable

e) This Qualified Investigator is entitled to provide health care under the applicable laws and he/she is a member in good standing with his/her respective regulatory authority. The Qualified Investigator is qualified to perform the proposed clinical trial.


Yes No Not applicable (for non-regulated investigations)


Please obtain signature from Division head. Department head signature should be obtained only when the Division head is unavailable or when the Principal Investigator for the application is a Division head.

Name:
 Contact Number:
 Title/Position:

Division/Department/Program Approval - Print Version Only

Page 2 of 2

Department: 

Division: 

Signature: _____

Date: June 12/17

Please Note: Separate copies of Section 23 should be signed by all administrators who have signing authority over the financial cost centre(s) affected by the research study. These would include Administrative Directors of: 1) the clinical program(s) where the research is sited and 2) departments/services/programs that will provide significant services (e.g. Department of Health Records for a chart review study).

Appendix B - Signed data sharing agreement between OHRI and U of O for Ottawa Health Science Network Ethics Board (OHSN-REB) File Number: 20170620-01H and uOttawa health Sciences and Science Research Ethics Board (uOttawa-REB) File Number: A10-17-02.

**Data Sharing Agreement ("Agreement")
Transfer of Data for Research Use**

BETWEEN:	AND
Ottawa Hospital Research Institute ("OHRI") 725 Parkdale Avenue Ottawa, ON K1Y 4E9	University of Ottawa ("uOttawa") 3042-800 King Edward Ave. Ottawa, Ontario K1N 6N5
OHRI Investigator: Dr. Janet Squires (together with Ottawa Hospital Research Institute = "PROVIDER")	uOttawa Investigator: Dr. Janet Squires (together with University of Ottawa = "RECIPIENT")

Name of Study ("Study"): Understanding the Sustainability of Selected Guideline Recommendations at the Unit Level in an Acute Care Hospital: A Comparative Case Study Using Mixed Methods

Ottawa Health Science Network Research Ethics Board ("OHSN-REB") File Number:

20170620-01H

uOttawa Health Sciences and Science Research Ethics Board (uOttawa-REB) File Number:

A10-17-02

Data to be provided: De-identified data per the REB approved Study Protocol, incorporated herein by reference, for the purposes of the Study ("Data").

This Agreement, effective as of the last date of signature below, is entered into between the parties to govern the transfer of the Data from PROVIDER to RECIPIENT for the purposes of the Study, in compliance with applicable laws.

PROVIDER will prepare and furnish to RECIPIENT the Data in accordance with Ontario's *Personal Health Information Protection Act*. Transfer of the Data by PROVIDER will be in compliance with REB approved subject informed consent forms ("ICFs") or terms of an REB Waiver of Consent ("REB Waiver"), as applicable (incorporated herein by reference). The Parties shall use a secure method of provision of the Data by PROVIDER to RECIPIENT. Data will not be transferred until each party's REB provides written approval for the Study. RECIPIENT will not use Data until RECIPIENT receives a copy of the PROVIDER's REB approved ICF or REB Waiver, as applicable.

RECIPIENT shall use the Data in compliance with all applicable laws; and shall specifically only use or disclose the Data for the conduct of the Study in accordance with the permitted uses of the Data specified in the applicable ICFs or REB Waiver, or otherwise as required by law. No right, title or interest in and to the Data is granted or implied to the RECIPIENT hereunder.

RECIPIENT shall use appropriate safeguards to prevent any unauthorized use or disclosure of the Data and shall immediately report to the PROVIDER any unauthorized use or disclosure of which RECIPIENT becomes aware, or of any breach of this Agreement. RECIPIENT shall not use the Data to identify or contact the individuals from whom such Data was collected. RECIPIENT shall securely destroy the Data as required by the Protocol or the PROVIDER and shall provide a written confirmation of the manner of destruction in a form acceptable to PROVIDER. PROVIDER may conduct audits of the RECIPIENT concerning the maintenance of appropriate security safeguards to ensure compliance with this Agreement.

RECIPIENT shall give access to the Data only to its staff with a need to know for the purpose of conducting the Study, and who are bound by RECIPIENT to comply with the terms of this Agreement.

In the event that personal information or personal health information about a Study subject is inadvertently transferred to RECIPIENT or their respective employees or agents, RECIPIENT and their respective employees and agents shall not use or disclose such information and shall 1) immediately notify PROVIDER of receipt of such personal information or personal health information, 2) promptly destroy such personal information and personal health information in a




secure fashion and 3) promptly certify such destruction in writing to PROVIDER. RECIPIENT shall take appropriate care in the disposal or destruction of the information to prevent unauthorized parties from gaining access to it. The parties shall make their employees and agents aware of the importance of maintaining the confidentiality of any collected or transferred personal health information or personal information. These obligations of confidentiality shall survive the expiration or earlier termination of this Agreement.

Data are provided on an "as-is" basis and PROVIDER makes no representations or warranties, express or implied, with respect thereto. RECIPIENT accepts that there are no representations, warranties, conditions or liabilities expressed or implied herewith in relation to the Data by PROVIDER or its trustees, directors, officers, affiliates, investigators, students, employees, servants, authorized representatives or agents.

RECIPIENT assumes all liability for damages which may arise from its use, storage, or disposition of the Data. PROVIDER will not be liable to RECIPIENT for any loss, claim, or demand made by RECIPIENT, or made against the RECIPIENT by any other party, due to or arising from the use of the Data by the RECIPIENT, except to the extent permitted by law when caused by the negligence or willful misconduct of PROVIDER.

The Parties have requested that this Agreement and any related documents be drafted in the English language only. Les parties aux présentes ont exigé que la présente convention et tout document s'y rapportant soit rédigé en anglais seulement.

This agreement must be signed on behalf of RECIPIENT Institution by someone with the authority (under institution policies) to enter into contracts on behalf of RECIPIENT Institution. This Agreement may be signed in counterparts, and each counterpart may be delivered by signed PDF by email. Each counterpart shall constitute an original, and when taken together, shall constitute one and the same instrument.

Ottawa Hospital Research Institute	University of Ottawa
Signature:	Signature: 
I have authority to bind the organization.	I have authority to bind the organization.
Date:	Date: <i>Oct 25, 2017</i>
Name & Title: Marisa Akow Director, Research Administration	Name & Title: Brian Julien Directeur adjoint, SSI Assistant Director, ISS UOttawa
Signature:	
Date:	<i>Oct 26/2017</i>
Dr. Janet Squires	

Appendix C – Signed departmental impact form by Chief Nursing Officer

Departmental Impact Form



Ottawa Health Science Network Research Ethics Board/ Réseau des sciences de la santé d'Ottawa Conseil d'éthique de la recherche

Civic Box 411 725 Parkdale Avenue, Ottawa, Ontario K1Y 4E9 613-798-5555 ext. 14902 Fax : 613-761-4311
<http://www.ohri.ca/ohsn-reb>

DEPARTMENTAL IMPACT

Protocol Title:

Understanding the sustainability of selected guideline recommendations for the assessment and management of pain in an acute care hospital: A comparative case study using mixed methods

Does the protocol require use of Hospital and/or OHRI resources (equipment, staff, space) over and above those normally required in the standard care of a patient?

- Equipment YES NO
- Staff YES NO
- Space YES NO

Will hospitalization or outpatient visits be required beyond what is required for standard care?

- Outpatient Visits YES NO
- Hospitalization YES NO

Indicate impacts associated with this Protocol, by Department:

IF YES is indicated, a signature of an individual authorized to sign for the department must be obtained. (Please see our website for a list of contact names <http://www.ohri.ca/ohsn-reb/>)

	<input type="checkbox"/> YES	<input type="checkbox"/> NO	Signature:
Nursing	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO	<div style="border: 1px solid black; width: 150px; height: 20px;"></div>
Emergency Department	<input type="checkbox"/> YES	<input checked="" type="checkbox"/> NO	<hr/>
Health Records (See Appendix A)	<input type="checkbox"/> YES	<input checked="" type="checkbox"/> NO	Please submit signed Health Records form. www.ohri.ca/ohreb/forms.htm
Laboratory Services	<input type="checkbox"/> YES	<input checked="" type="checkbox"/> NO	Please submit signed Lab Impact form. www.ohri.ca/ohreb/forms.htm
Radioisotopes (See Appendix B)	<input type="checkbox"/> YES	<input checked="" type="checkbox"/> NO	Please submit Radiation Safety form. www.ohri.ca/ohreb/forms.htm
Diagnostic Imaging (See Appendix B and C)	<input type="checkbox"/> YES	<input checked="" type="checkbox"/> NO	Please submit signed Diagnostic Imaging form. www.ohri.ca/ohreb/forms.htm
Pharmacy	<input type="checkbox"/> YES	<input checked="" type="checkbox"/> NO	Please submit signed Pharmacy form www.ohri.ca/ohreb/forms.htm
Nutrition And Food Services	<input type="checkbox"/> YES	<input checked="" type="checkbox"/> NO	<hr/>
Ophthalmology	<input type="checkbox"/> YES	<input checked="" type="checkbox"/> NO	Please submit signed Ophthalmology form www.ohri.ca/ohreb/forms.htm
Space Planning & Management	<input type="checkbox"/> YES	<input checked="" type="checkbox"/> NO	<hr/>

Please submit Clinical Director's Acknowledgment www.ohri.ca/ohreb/forms.htm

Nursing Acknowledgment and Impact Form

Principal Investigator:

Study Title: Understanding the sustainability of selected guideline recommendations for the assessment and management of pain in an acute care hospital: A comparative case study using mixed methods.

Section 13 (e) of the electronic application asked you to specify from which nursing units(s), clinic(s), etc., research participants are being recruited and/or from whom data is being collected. A form must be submitted for **all studies conducted on nursing units/ clinics, etc. or involving nurses.**

Please list which nursing units, clinics, etc. from where you will be recruiting or collecting data:

<p>Whose signature should be collected?</p> <ol style="list-style-type: none"> 1. If the protocol involves one Clinical Director's area of responsibility, then you are required to obtain a signature from that Clinical Director. 2. If the protocol involves more than one Clinical Director's area of responsibility, you are required to obtain the signature of all Clinical Directors from whose areas you will be recruiting or collecting data. 3. If the protocol involves the entire organization, then you are required to obtain a signature from the Chief Nursing Executive and Vice-President Clinical Programs.
--

Clinical Director(s) or Chief Nursing Executive and Vice-President Clinical Programs

By signing below, I acknowledge that the Principal Investigator of this study has notified me of which areas of the hospital data collection is to take place, I am aware of the research protocol, the likely start and end dates, I have assessed whether or not there will be a nursing impact and I have indicated this below.

Unit/Department/Division:		
Is there an impact: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>		
Name:	Signature:	Date: 2017-06-06
Role:		

If more than one signature is required, copy and paste as many signature sections as you require.

Appendix D – Approval from Director Medicine Care

From: [redacted]

Sent: October 6, 2017 6:57 PM

To: Letitia penno

Subject: Research Project - Medicine

Hi Letitia

I am writing in follow-up to the two meetings held with you in August and September, which included the 5 Medicine Care Unit Managers, [redacted] Corporate Coordinator, Nursing Best Practice, a representative from your thesis committee and myself (Clinical Director Medicine) regarding participation in a nursing research study about the sustainability of [redacted] Pain policy/protocol recommendations.

I am pleased to confirm 2 units [redacted] have volunteered to participate in the study. Our selection of these units is based on internal criteria such as willingness to participate, annual surveillance results, site uniqueness and potentially contrasting patterns of findings.

Please contact me when you have REB approval and we can discuss recruitment and scheduling related to data collection (interviews with nurses) on the said units.

[redacted]

[redacted]

Clinical Director | Directeur Clinique

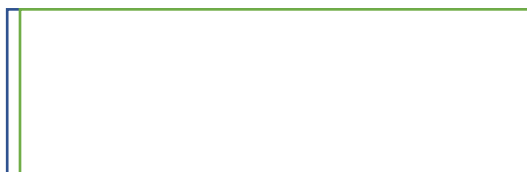
Medicine, Emergency, Admitting & Clinical Administrator's on Site

Médecine, Urgence, Admissions & Administrateur Clinique sur Place

[redacted]

[redacted]

Appendix E – Medical records approval form



Data Specification Form (DSF)
Performance Measurement and Health Records

Protocol title	Understanding the sustainability of selected guideline recommendations at the unit level in an acute care hospital: A comparative case study using mixed methods
REB URL	https://mytoh.otlawahospital.on.ca/irisapp/eREB_App/Part1.aspx?FormID=6880&FID=d6ba4a0c-f42f-4dc5-a195-b6a50f47caa0
Principal Investigator	Janet Squires
Requestor	Letitia Penno
Important external deadlines	

Is this an amendment to a previously approved Data Request? Yes (If yes, please provide REB number)

* Greyed out sections to be filled in by Performance Measurement/Health Records.

CA Service Request ID	7345
Analyst assigned	

A. Cohort Definition

This cohort definition will be used to assess the feasibility of the data request as well as to derive the data specified in section B (Data Table Request). The data source will be determined by Performance Measurement/Health Records staff. The number of records will typically only be filled in by Performance Measurement/Health Records staff during the product preparation phase (after REB approval).

Verbal description of cohort	Simple random sample of 200 patients per medicine unit (2 units) across 2 audit periods. Units to be chosen by researchers.
Start/End Dates	Admissions between Jan 01 2017 and March 31 2017, and August 1 2017 to October 31 2017

	Inclusion/Exclusion Criteria (in order to be applied)	Data Source	# Records
1.	Include patients admitted between the two audit periods (January 01 2017 to March 31 2017, August 01 2017 to October 31 2017)	NhrAbstract	
2.	Exclude patients who do not consent to participate in research-based activities	Npatient	
3.	Exclude patients who stay less than 3 days on the unit	NipCensusHistory	
4.	Exclude patients in the second audit period who are included in the first audit period (ie no overlap), based on MRN	NhrAbstract	

Final # Records	400
------------------------	-----



Data Specification Form (DSF)
Performance Measurement and Health Records

B. Requested Data Table(s)

- Repeat as needed for multiple tables.
- Shaded areas can be completed as much as possible (using information from OHDW Database Map), but will be finalized by Performance Measurement/Health Records staff.
- Columns should include all necessary "concepts" required to complete the analytical plan (e.g. age, sex, mortality, comorbidities, etc.). Be sure to include record / patient identifiers, date/time attributes, and other derived or non-derived concepts.
- ****High risk fields containing sensitive PHI (Patient/Physician identifiers, birth date, postal code, textual reports possibly containing identifying information, etc) are to be identified using a double asterisk preceding the column label**

Table name

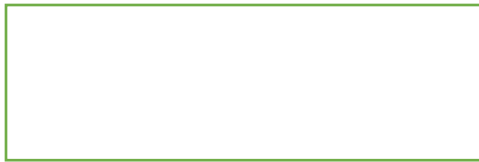
Each row represents

Further exclusions applied to table

Cohort
Patient Encounter
<if applicable>

**** High risk fields containing sensitive PHI are denoted by double-asterisks**

	Column label	Description and derivation details	Variable name	Data Source
1.	**MRN	Patient Medical Record Number	MRN	Npatient
2.	Unit	Name of the nursing unit for analysis	Unit	Nunit
3.	Admit Date	Date of patient admission to hospital	Admit Date	Nencounter
4.	Audit Period	Derived field based on admit date, Jan to Mar = Period 1, Aug to Oct = Period 2	Audit Period	N/A
5.	Admit Age	Derived From Date of Birth	Admit Age	Nencounter
6.	Length of Stay	Patient LOS in hospital	LOS	NhrAbstract
7.	Unit LOS	Derived from Census History Table, how long patient stays on unit	Unit LOS	NipCensusHistory
8.	Admission Type	Elective vs Urgent/Emergent	Admit Type	Nencounter
9.	Admitting Patient Service	Patient service on admission to hospital	Admit Pat Service	Dencounterindicator
10.	Patient Teaching Record	Flag to indicate presence of Patient Teaching Record form (NUR 157) on patient chart (1 = yes, 0 = no)	Pat Teach Record	NhrtService
11.	Patient Admission History	Flag to indicate presence of Patient Admission History form (NUR 71A) on patient chart (1 = yes, 0 = no)	Pat Admit History	NhrtService
12.	Pain Assessment and MAR	Flag to indicate presence of Pain Assessment and Medication Administration Record form (ORA 43) on patient chart (1 = yes, 0 = no)	Pain Assess MAR	NhrtService
13.	Brief Pain Inventory Self-Report	Flag to indicate presence of Brief Pain Inventory Self-Report form (ORA 43E) on patient chart (1 = yes, 0 = no)	BPI Self Report	NhrtService



Data Specification Form (DSF)
Performance Measurement and Health Records

C. Cost estimate

The following is an estimate based on the data requirements outlined herein. This estimate is subject to change if the data requirements change.

The rate of for analyst costs are based on the OHRI Clinical Research Salary Scales for Data Management, Statistical and IT Service Cost Recovery Rates.

Costs for chart pulls completed by Health Records are based on the Health Data & Information Service Fee Structure.

	Hours	Rate / Hr	Cost
Analyst costs (Documentation, Data Querying, QA, Analysis, Delivery)	10	\$75	\$ 750.00
Chart pull costs			

Enter hours then right click on Cost and select "Update Field" to update the cost calculation

Additional details:

D. Sign Off

The Principal Investigator warrants that the data detailed herein meets the requirements of the described project and agrees to the cost estimate.

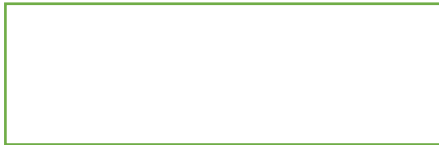
Performance Measurement/Health Records agrees to provide the data detailed herein provided that the project is approved by the REB and where applicable a Data Disclosure Agreement has been signed.

Date July 25th 2017

Janet Squires - Principal Investigator

Date Sep 13, 2017

Deanna Rothwell - Performance Measurement

Appendix F – Participant consent form

uOttawa

PARTICIPANT INFORMED CONSENT FORM

Title of Study: Understanding the sustainability of selected guideline recommendations for the assessment and management of pain in an acute care hospital: A comparative case study using mixed methods

Principal Investigator (PI): Dr. Janet Squires (PI) and
Letitia Nadalin Penno (Co-I)

Funding Agency:

University of Ottawa – PhD Thesis

Participation in this study is voluntary. Please read this Participant Informed Consent Form carefully before you decide if you would like to participate. Ask the study investigator as many questions as you like.

Why am I being given this form?

You are being invited to participate in this research study because you have valuable knowledge and experience to contribute to a nursing research study related to the ongoing use of the pain policy/protocol on your medicine care unit.

Why is this study being done?

The purposes of this study are to (i) to validate unit nurses' use of the selected target behaviors within the Pain P/P on two acute care units; and (ii) to examine the related factors (intervention, context and ecological system) influencing unit nurses' use (or not) of selected target behaviors within the Pain P/P ten years post initial implementation.

Two out of five medicine care units will be selected by internal representatives to participate in this study. It is estimated eight to ten nurses will be recruited to participate in interviews from each of the selected units.

How is the study designed?

This study uses a comparative cased study design, using mixed methods to examine the factors influencing practicing nurses' sustained use of the Pain P/P ten years post initial implementation. The study has three phases. Phase I involves a review of documents and conducting interviews with nurses involved in the use of the Pain P/P at the corporate level at the onset of initial implementation. Phase II involves conducting a chart audit of unit nurses' documented use of

the Pain P/P followed by unit nurse interviews. In Phase III, similarities and differences between unit specific results will be compared and conclusions drawn.

What is expected of me?

If you decide to participate you will be invited to participate in a 30-60-minute audio-taped interview to share your knowledge and experience related to the ongoing use of the Pain Policy/Protocol on your unit. At this time, you will be reminded your participation is voluntary, it will not impact your employment and your responses will be kept confidential. You will also be informed of the possibility of participating in a follow-up interview to review the accuracy of results.

You may skip any questions that make you uncomfortable or that you do not wish to answer.

What are the potential risks I may experience?

There are no known risks associated with this study. Your participation in this study might include expressing some negative opinions and this may cause you to feel some discomfort. These negative opinions will be kept confidential.

Can I expect to benefit from participating in this research study?

You may not benefit directly from participating in this research study. However, ultimately the new knowledge and understanding will be used to enhance the quality of nursing practice in today's hospital work environments. The findings of this study will be prepared for publication in peer reviewed nursing journals.

Do I have to participate? What alternatives do I have?

Your participation in this study is voluntary. If you agree to participate you are free to change your mind about being involved in this research at any time.

How is my personal information being protected?

Data and personal demographic information collected during your participation in this study will be identified with a unique study number (e.g. participant code # AB01), and will not contain information that identifies you. A Master List provides the link between your identifying information (such as your name) and the coded study number. This list will only be available to Dr. Janet Squires (PI) and Letitia Nadalin Penno (Co-Investigator-PhD thesis student) and will not leave this site. Documents leaving the hospital will only contain the coded study number.

If you decide to participate in this study, the investigator will collect only the information needed for this study. Prior to participating in an interview, you will be asked to complete a demographic form, which a unique study number or participant code, will be assigned to maintain your confidentiality. The demographic form includes your age, education training, work experience or the number of years as a registered nurse, and your current position. Interview transcripts will also use the same participant code system to protect you the confidentiality of your responses.

All data related to the study will be kept in a locked cabinet in the locked Nursing Best Practice Research Centre (NBPRC) at the University of Ottawa's School of Nursing. Electronic transcripts and computer files will be password protected on the investigator's computer. The only people with access to the data will be the Co-Investigator PhD Thesis student's supervisors

(Dr. Janet Squires and Dr. Barbara Davies) and thesis committee members Dr. Ian Graham, and Dr. Chantal Backman.

As per [] policy, papers and computer files will be kept in the locked NBPRC at the University of Ottawa, School of Nursing for ten years after data collection. At the end of the storage time, all paper records will be shredded and all electronic records will be securely deleted.

The information you share will remain confidential, unless the release is required by law. The files may be reviewed by the Ottawa Health Sciences Network Research Ethics Board, the Ottawa Health Research Institute and the University of Ottawa.

Your contributions may be quoted by the investigator but with no personal identification information. Your identity will not be revealed in any publications or presentations resulting from the research.

If you require further information regarding confidentiality, please ask the Principal Investigator, Dr. Janet Squires.

Do the investigators have any conflicts of interest?

There are no conflicts of interest to declare related to this study.

Who do I contact if I have any further questions?

If you have any questions or concerns regarding this research study you can contact Letitia Nadalin Penno, Co-Investigator, at [] or by email at []
Or Dr. Janet Squires, Principal Investigator, at [] or by email at

[]

The Ottawa Health Science Network Research Ethics Board (OHSN-REB) has reviewed this protocol. The Board considers the ethical aspects of all research studies involving human participants at [] If you have any questions about your rights as a study participant, you may contact the Chairperson at 613-798-5555, extension 16719.



uOttawa

Understanding the sustainability of selected guideline recommendations for the assessment and management of pain in an acute care hospital: A comparative case study using mixed methods

Consent to Participate in Research

- I understand that I am being asked to participate in a research study about the ongoing use of the pain policy/protocol on my unit.
- This study was explained to me by Letitia Nadalin Penno (Co-Investigator-PhD Thesis student).
- I have read, or someone has read to me, each page of this Participant Informed Consent Form.
- All of my questions have been answered to my satisfaction.
- If I decide later that I would like to withdraw my participation and/or consent from the study, I can do so at any time.
- I voluntarily agree to participate in this study.
- I will be given a copy of this signed Participant Informed Consent Form.

 Participant's Printed Name

 Participant's Signature

 Date

Investigator or Delegate Statement

I have carefully explained the study to the study participant. To the best of my knowledge, the participant understands the nature, demands, risks and benefits involved in taking part in this study.

 Investigator's Printed Name

 Investigator's Signature

 Date

CHAPTER 2**A nursing department perspective on the sustainability of a nursing best practice guideline
within an acute care setting: A descriptive case study**

Authors: Letitia NADALIN PENNO^{1*}, Ian D. GRAHAM^{2, 5}, Chantal BACKMAN³, Jessica FUENTES-PLOUGH⁴, Janet SQUIRES⁵

Manuscript is formatted for submission to the *Journal of Advanced Nursing*

Corresponding author: Letitia NADALIN PENNO

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- 5 Professor, School of Nursing, University of Ottawa, 451 Smyth Road, Ottawa, ON, K1H 8M5,

Abstract

Background: Successful uptake of evidence-based practices (EBPs) such as best practice guidelines (BPGs), does not automatically result in long-term sustained change, nor continued adherence. Few studies exist focusing on understanding what happens after the implementation phase, especially within an acute care context.

Aim: To understand, from an organizational perspective, what was done to sustain a nursing BPG over a ten-year period in an acute care center.

Methods: A descriptive case study design was used to understand what influenced ongoing use of a nursing BPG over a ten-year period at the nursing departmental level. The organization was a large, urban, multi-site acute care center in Canada. The BPG Implementation Program (BPG-IP), initiated in 2007, included a focus on pain assessment and management. A Pain BPG was identified internally as a ‘corporate priority’ and a policy was created to promote its implementation on all 60 inpatient units. Data was collected ten years post initial implementation through document review (29) and corporate level informant interviews (3). The Dynamic Sustainability Framework (DSF) was used to guide data collection and analysis.

Results: Three implementation (0-2yrs.) and twelve sustainability (>2-10yrs.) determinants that influenced use of the Pain BPG across the center were identified. Sustainability determinants included nine facilitators and three barriers. Three facilitators had a continuous influence in both implementation and sustained use phases: need to improve, external demand, and leadership commitment. Barriers were minimized by targeted knowledge translation interventions (KTIs). We identified twelve implementation and twenty-one sustainability KTIs, seven were evident during both phases: embedding of refinements into existing processes, formalizing supervision of BPGs, establishing interprofessional committee(s), support ongoing training, established infrastructure (taskforces), formalized leaders on steering committees, educating champions, and developing a system to monitor adherence to recommendations.

Conclusion: Our research provided insight into the relationship among implementation and sustainability determinants and related KTIs across both phases. Sustainability requires continual efforts monitoring and providing timely feedback to users regarding adherence to guideline recommendations. Linking KTIs/strategies designed specifically to incrementally address low adherence rates facilitates successful sustainment over time.

Keywords: sustainability/sustainment, best practice guidelines, quality improvement, nursing, evidence-based practices/programs/interventions, innovations case study

Impact

- Sustainability determinants included nine facilitators and three barriers for acute care.
- Three facilitators had a continuous influence in both implementation and sustained use phases: a need to improve, leadership commitment, external demand.
- Twelve implementation and twenty-one sustainability KTIs were identified to have influenced sustainment in acute care. Seven KTIs influenced use in both phases
- Linking KTIs designed specifically to incrementally address low adherence rates facilitates successful sustainment over time.

2.1 Background

In healthcare, the aim of integrating and sustaining evidence-based practices (EBPs) into clinical practice is primarily to “improve the quality of patient care” (Ploeg, 2014, p. 122), patient safety (Heslop & Lu, 2014; Kurtzman & Corrigan, 2007), the “logistical systems within the organization” (Straus, 2013, pp. 3-4) and patient outcomes (Doran et al., 2006; Gifford et al., 2013; Heslop & Lu, 2014). In 1997, the National Forum on Health called for a ‘culture of evidenced-based decision making’ and the “term *evidence-based practice* (EBP) thus became a mantra for advocates of contemporary quality health-care systems” (Estabrooks, 2003, p. 53). Subsequently, governments enacted legislation mandating healthcare organizations, including hospitals, to promote the provision of care based upon ‘the best scientific evidence available’ which included recommendations from clinical practice guidelines and protocols (Ministry of Health and Long-Term Care, 2010, section 4.3). Thereafter, professional organizations (e.g., Registered Nurses Association of Ontario) (RNAO) took steps to support organizations incorporate EBPs into decision making processes to ensure patient safety and improved health outcomes. Recent reviews (Ament et al., 2015; Berta et al., 2019; Proctor et al., 2015; Shelton et al., 2018; Tricco et al., 2016) indicate the sustainment of healthcare EBPs remains a persistent translation research challenge across a range of healthcare settings among practitioners. There is

a need to conduct studies aimed at uncovering the “complex and evolving nature of the phenomenon of healthcare innovation sustainability” (Fleischer et al., 2015a, p. 14) over time.

2.2 Literature Review

Factors Influencing Sustainability

The literature defines sustainability of healthcare innovation as a distinct concept that “after a defined period of time, continues to be delivered and/or maintained, it may evolve or adapt while continuing to produce benefits for individuals/systems” (Moore, 2017). Wiltsey-Stirman et al (2012) highlighted the timeframe referred to within most studies (64% or 80 out of 125 studies) for the sustained use of EBPs varies between six months to over two years following initial implementation, indicating partial sustainability. One of the key aspects underlying partial sustainability in healthcare is the nature of the complex ever-changing environments into which the EBPs are being integrated (Chambers, 2013). Managing and supporting the adaptation of an EBP, within a changing context (Chambers, 2013; May, 2013) implies it is never isolated from the context within which it is implemented, nor from the individuals it impacts. Studies have identified, in specific contexts, key innovation (Buchanan et al., 2005; Buchanan et al., 2006; Cowie et al., 2020; Fleischer et al., 2016a; Fleischer et al., 2015b; Johnson et al., 2004; Racine, 2006; Scheirer, 2013; Shediach-Rizkallah & Bone, 1998; Wiltsey Stirman et al., 2012), individual user (Cowie et al., 2020; Fleischer et al., 2015b; Fox et al., 2015; Maher, 2010), contextual (Ament et al., 2014; Cowie et al., 2020; Higuchi et al., 2013; Slaughter et al., 2013), and in some studies, specific leadership factors influencing the sustained use of EBPs among nurses (Chambers, 2015; Clarke & Marks-Maran, 2014; Cowie et al., 2020; Dückers et al., 2011; Fleischer et al., 2016b; Ford et al., 2011; Greenhalgh et al., 2004; Maher, 2010; Ploeg et al., 2010; Scheirer, 2005). Recent reviews highlight the need to examine the factors influencing sustainability in specific healthcare contexts, such as acute care (Cowie et al.,

2020; Shelton et al., 2018). This is particularly important given Ministry (e.g. MOH & LTC) reports indicate expenditures remain the largest in tertiary settings (Information, 2018), and sustained EBPs would likely be of considerable benefit to research and practice, potentially improving the quality of patient care and reducing costs.

Pain Assessment and Management in Acute Care Settings

Evidence demonstrates unrelieved or poorly managed pain is a burden on the person and health-related system throughout the world (Lynch, 2011) and it is estimated that approximately 19% of the population in industrial countries live with some form of pain (Choinière et al., 2010). In Canada, pain is the most common reason health consumers seek assistance and accounts for up to 78% of presenting complaints in emergency departments (Coalition, 2014). Persistent pain appears to increase with age, such that 1.5 million Canadians (9% of men and 12% of women) aged 12 to 44 years report persistent/chronic pain (Ramage-Morin & Gilmour, 2010). Reports further reveal the prevalence of persistent pain exists in 65% of older adults (>65 years of age) (Hadjistavropoulos et al., 2009; Lynch, 2011). Surveys reveal inadequate management of pain remains evident across all age groups (RNAO., 2013) (e.g. neonates during invasive procedures (Johnston et al., 2011), children undergoing painful procedures (Stevens et al., 2011), and adults after surgery (Andersen & Kehlet, 2011)). Effective pain assessment and management involves assessing pain, intervening to ease it, monitoring, preventing and minimizing it (RNAO., 2013). To assist nurses and interdisciplinary team members assessing and managing patients' pain, or those at risk of pain, in 2007 the RNAO developed a best practice guideline that provides practice, education, organizational and policy recommendations, with supporting evidence (RNAO., 2007). This guideline was later updated in 2013 by the RNAO (RNAO., 2013). Both versions were used by the study site to develop its pain policy and protocol (Pain P/P) (see Table 2.1).

2.3 The Practice Gap

Within tertiary care, evidence of variable adherence rates to EBP recommendations (Ament et al., 2015; Fleischer et al., 2016a; Frykman et al., 2017) demonstrates sustainment in clinical practice remains a practical problem for practitioners and healthcare administrators (Fleischer et al., 2016a; Fleischer et al., 2015b; Proctor et al., 2015). Researchers indicate a fundamental challenge still exists between the continued use of an EBP as originally designed and the need to ‘adapt it for use’ in local contexts that may differ from one another (Buchanan et al., 2006; Davies, 2013; Fleischer et al., 2016a; Fleischer et al., 2015b; Scheirer & Dearing, 2011; Shediach-Rizkallah & Bone, 1998; Wiltsey Stirman et al., 2012). For example, sustaining an EBP within a medicine unit, may in fact, differ from that of a specialty unit within the same site, given potential factors, and the related knowledge translation interventions (KTIs) used to sustain its use. Case in point, in 2007, the study site’s Nursing department, which includes approximately 60 inpatient units within the hospital, through a competitive process, partnered with RNAO to implement nine Best Practice Guidelines (BPGs), referred internally as the BPG Implementation Program (BPG-IP). This included the Pain Assessment and Management BPG (Pain BPG) (2007) which unlike the other BPGs, uniquely was implemented across all units. In a meeting with Nursing leaders in 2016, they indicated ongoing monitoring confirmed inconsistent use of the Pain P/P existed across units. Together, we identified an opportunity to examine the factors and KTIs influencing inpatient nurses’ ongoing use of the Pain P/P from a department level over a ten-year timeframe.

2.4 Purpose

The purpose of this case study was to understand from a nursing department level the factors and KTIs that influenced nurses’ use of selected Pain P/P recommendations, over a ten-year period (e.g., 2007-2017), within a large, multi-site, acute care centre. The specific research

questions include (i) What did the organization do to support the use of the Pain P/P over time? (ii) What factors (innovation, context and broader system) influenced its use over time? and (iii) What KTIs affected its use over time?

2.5 Conceptual Framework

The Dynamic Sustainability Framework (DSF) (Chambers, 2013) was used as the theoretical framework to guide the study given its' constructs, elements and tenets aligned with the study purpose. The DSF contains three main construct levels: the innovation (e.g., BPG), the practice setting/context (e.g., hospital) and the broader ecological system (e.g., healthcare system). All levels are considered to be ever changing over time rendering a continuous dynamic interface between the constructs. Each construct is influenced by several factors, listed in Table 2.2. The DSF also proposes three elements for the sustainability of healthcare innovations: (i) ongoing adaption of the EBP focused on optimizing the 'fit' between the EBP and a dynamic context; (ii) expectations for ongoing improvement of the EBP as opposed to diminishing outcomes over time, and (iii) a continued learning and problem-solving culture within a practice setting. These elements are encompassed within the seven DSF tenets (propositions) for the sustainability of healthcare EBPs (see Table 2.3) which we used to guide our data collection and analysis.

2.6 Methods

Study Design

We used a descriptive single-case study design to examine nurses' use of five selected Pain P/P recommendations over time within an acute care setting, a "bounded system"(Yin, 2014, pp. 33,50). From a nursing department perspective, we conducted a review of related data sources and interviewed available corporate nurses involved in the ongoing use of the Pain BPG from its inception. We used the DSF's seven tenets to guide the (i) development of the

qualitative interview questions, (ii) the approach to data collection (e.g., development and use of a master list of tenets/definitions, related questions and codes), (iii) analysis of the determinants and KTIs influencing the use of the selected Pain P/P recommendations over time, and (iv) presentation of findings (e.g., comparing of findings to DSF constructs and factors).

In this study, only five (1, 2, 3, 4, and 7) of the nine recommendations within the Pain P/P were examined for the following reasons. First, the five recommendations were supported by one of the highest levels of evidence, having at least one randomized control trial (e.g., Ib as per Table 2.1) ((SIGN), 2012). Second, practical considerations, such as the recommendations were clinically measurable and include nurse-specific documentation in the patient record. Lastly, recommendations were the focus of internal implementation efforts and annual monitoring.

Setting

The setting was a large Canadian, urban, academic, tertiary care center composed of three sites with approximately 50,860 patient admissions annually, more than 60 inpatient and outpatient units combined, 1122 staffed beds and more than 4500 nurses. The decision point to use the Pain P/P here rests with nurses at the clinical practice level. In 2007, the Nursing department at the study site applied to become a Registered Nurses Association of Ontario (RNAO) Best Practice Spotlight Organization (BPSO), through a provincial wide peer reviewed request for proposal process, funded by the Ontario Ministry of Health and Long-Term Care (MOH & LTC) (Doris Grinspun et al., 2015). Through this competitive process the hospital was selected to partner with RNAO to implement nine RNAO BPGs, which included the RNAO Pain Assessment and Management BPG (RNAO., 2007). As a BPSO, the hospital was offered by RNAO the opportunity to participate in several external KTIs designed to support implementation and build capacity at the individual, organizational and system level; such as BPSO symposia, summer institutes, champion network events, and toolkit training. To date,

Nursing Professional Practice's (NPP) goals within the hospital are to improve patient outcomes and the quality of nursing care. The main strategic objectives remain the same; to support the utilization of EBPs and the evaluation of nurse sensitive indicators hospital-wide. The ongoing approval and use of the Pain P/P provides evidence this EBP remains a 'corporate priority' for nursing in this acute care setting.

Data Sources and Collection

The period of study was ten years (2007-2017). Data collection occurred between 2017-2019. We conducted a review of 29 documents (e.g., internal and external) related to the implementation of the Pain P/P to gain a historical perspective of the determinants and KTIs used to sustain the Pain P/P over time (see Table 2.4). Based on available data, we collated measures used in the biannual prevalence audit for each of the Pain P/P recommendations over time (2010-2015) with education training records (see Additional file 2.1). We then interviewed nurses with department-wide level links to the use of the Pain P/P over time (2007-2017). We compared all data sources (e.g., interviews and documents) to clarify and collate the factors and KTIs influencing Pain P/P use.

Sample

Based on similar studies (Fleischer et al., 2015a; Francis et al., 2010), we purposefully selected key informants who were part of the initial implementation team, involved in promoting the use of the Pain P/P over the ten years, and still available for interview. With the help of an internal gatekeeper, we emailed the three potential informants a study information letter and followed-up via phone and or email. All agreed to participate.

Interview Guide

Interview questions were based on the DSF tenets and the five Pain P/P recommendations. "Pilot testing" (Creswell, 2013, p. 165) to refine the interview guide (see

Additional file 2.2) was undertaken with two Nursing Professional Practice (NPP) representatives having similar demographics not selected for interviews having knowledge of the KTIs used over time related the Pain P/P. Questions during each interview moved from semi-structured to more specific queries to pursue additional detail. Interviews were digitally recorded followed by verbatim transcription.

Data Analyses

Initially, we conducted a review of the changes that occurred over time related to the measures used in the biannual prevalence audit tool with the Pain P/P recommendations and education training records and a table was developed (see Table 2.4). Subsequently, a document review was conducted and a listing of strategies used across all units to promote use of the recommendations (KTIs) was developed (see Table 2.5). We triangulated data sources with interview findings from informants who worked across all units to enhance data completeness (e.g., to determine saturation). We aggregated all data findings to the nursing department level (see Table 2.6).

Specifically, we used NVivo 10 software to organize and facilitate coding of the data. Qualitative content analysis guided our coding and interpretation (Elo & Kyngäs, 2008; Graneheim & Lundman, 2004). This involved deductively separating and coding the interview responses and documents into groupings as per the DSF tenets (e.g. themes) (Yin, 2014, p. 136), then inductively into smaller groupings (e.g. factors and related KTIs) and timelines by two independent reviewers (LNP, JF). The few discrepancies were resolved through discussion and agreement. Factors were considered *determinants* that affected use of the protocol such as *barriers and facilitators*. *KTIs* were considered *strategies/actions* deliberately employed with the intention of promoting the use of the protocol. Coding and synthesis of data sources resulted in a

determinant and related KTI table for both implementation (0 to 2 yrs.) and sustainability phases (>2 to 10 yrs.) (see Table 2.6).

Strategies to ensure Rigor

We used Lincoln and Guba's (In Denzin & Lincoln, 1994, pp. 105-117) criteria for qualitative research to ensure rigor. The main strategies used to ensure *credibility* (e.g., confidence in the truth of the findings) included using multiple types of data sources, debriefing the research team, and seeking substantiation of findings from two knowledge users on the research team (a current and previous employee of the study site). Strategies to ensure *dependability* (e.g., stability of data over conditions and time) included adhering to the study protocol, documenting decision points, maintaining organized paper and electronic databases, composing descriptive reports where necessary, and maintaining a master list of tenets/definitions, related questions and codes. We ensured *confirmability* (e.g., congruence between participants about the data's accuracy, relevance and/or meaning) by sampling available participants who met sample criteria, remaining close to participant verbatim transcripts. We aimed for *transferability* of findings (e.g., have applicability in other settings or groups) by providing site, sample characteristics, and detailed findings using the DSF.

2.7 Ethical Consideration

Prior to the study commencing, we obtained ethical approval from the Research Ethics Boards for the Ottawa Health Science Network (OHSN-REB) and the affiliated University of Ottawa. The participating organization's Chief Nursing Officer provided administrative approval. Informants provided written informed consent prior to participation. Informants' participation was voluntary. To ensure anonymity in the datasets and findings we used unique identifiers (participant codes) and collated findings to the department level. This study adheres to

the Standards for Reporting Qualitative Research (SRQR) (O'brien et al., 2014) guidelines for qualitative research (see Additional file 2.3).

2.8 Results

Characteristics of Data Sources

We retrieved a total N=29 documents, with dates ranging from 2005 to 2016, between 2016 and 2018 (see Table 2.4). These included six reports, twenty-one internal and two external documents related to Pain P/P use over time. The *reports* were generated from in person discussions involving representatives from the nursing department prior to the study. Internal and external documents were retrieved post study approval. *Internal documents* included policies, clinical forms, terms of reference for related BPG committee(s), presentations, strategic plans for BPG adherence, biannual prevalence survey measures, educational training strategies, and the RNAO Best Practice Spotlight Organization (BPSO) annual reports (2005-2016). *External documents* included two RNAO Pain BPGs (RNAO., 2007, 2013).

We interviewed a total of N=3 informants. All were female Registered Nurses, who were part of the initial implementation team. Informants were involved in promoting the use of the Pain P/P over time (2007 to 2017) while holding department-wide leadership positions, working across more than one nursing unit. There was overall consistency between the three interview data sources.

Determinants and related KTIs influencing Pain P/P use

We organized the findings chronologically describing implementation then the sustained use phases' *determinants* (e.g., factors identified in this study) and related *KTIs* (strategies) influencing the use of the Pain P/P over a ten-year timeframe. We used the DSF constructs and factors (broader system, innovation, context) as a structure to present the results (see Table 2.6). We also present supportive participant and document evidence in Table 2.6 and if necessary, in-

text when not represented by Table 2.6. We noted determinants and KTIs having a continuous influence in both phases with a * in the text, and in Table 2.6.

Implementation Phase (2007-2009)

We identified a total of three implementation determinants (two broader system, one context) and twelve related implementation KTIs from informants and document review that influenced the use of the Pain P/P during the implementation phase (0-2yrs.) Three implementation determinants and seven KTIs identified had a continuous influence in the sustained use phase.

Determinants Influencing the Decision to Implement the Pain P/P

Two broader system determinants influenced the hospital's decision to establish the Pain P/P as a 'corporate-wide priority' in 2007: (i) *the need to improve pain care* or to *standardize* or *provide consistent pain care* (innovation /external demand) based on patient satisfaction reports (Rt1), and (ii) a *timely call for proposals* from the RNAO to establish a BPSO which provided guideline recommendations (P1,P3), plus start-up funding to support efforts (P1,P2). The third, a context implementation determinant included (iii) *Nursing leaders' commitment to facilitate implementation*.

KTIs that Affected Pain P/P Use During Implementation

Informants and the document review revealed the following KTIs undertaken by the hospital during the first two years. We viewed the KTIs that optimized the Pain P/P for use at the department level and ultimately into specific unit routine practices throughout the hospital in terms of (i) broader system KTIs, (ii) initial innovation refinements (e.g., Pain P/P), and (iii) context: context processes, structure adjustments, monitoring initiatives.

(i) Broader System Implementation KTIs. Two KTIs used to support the Pain P/P's implementation during the first two years included: *use of frameworks* and *securing external*

financial support. First, informants reported to optimize the use of the Pain P/P across all units during the first two years they used *frameworks* to guide implementation and identify barriers. Initially, they used the RNAO Implementation Toolkit (RNAO., 2002) but recognized they needed a model to follow. They stated “we used models that we were familiar with; the Ottawa Model for Research Use (OMRU) (Logan & Graham, 1998) to guide implementation for all BPGs including the Pain P/P” (P1,P2), and “the Knowledge to Action (KTA) framework (Straus et al., 2009) to assess potential barriers” (P1). Second, securing **external financial support* from the RNAO BPSO grant facilitated and reduced start-up costs, providing access to a combination of external strategies to build capacity at the individual, departmental and system level (e.g. BPSO education symposia, summer institutes, BPG nurse champion network events, toolkit training) (Irmajean Bajnok & Doris Grinspun, 2015). Securing *external capital support* of \$30,000.00 from Canadian Nurse Foundation, funded the development of an electronic point of care prevalence survey monitoring and evaluation system currently in use (Backman et al., 2015).

(ii) Innovation Implementation Refinements. Informants and documents confirmed four KTIs that influenced the initial development and refinement of the Pain P/P between 2006-2008 at the department level. First, when pain care was deemed a corporate priority, the Pain P/P was *established as an interdisciplinary policy* that applied to all healthcare disciplines organization-wide versus only nursing. Second, an interdisciplinary **Pain Council – taskforce was established to facilitate the initial policy development, educational strategies* and provided *future direction* for policy updates/revisions. Specifically, to formulate the initial version, the following strategies were reportedly undertaken by the Pain Council: conducting internal stakeholder consultations across the organization (P1,P2), a rigorous literature review (P2), and use of the RNAO Pain BPG guideline recommendations (ED1) and standards from the Pain

Society (Society, 2005) (P1,P2,P3). Initially, only 8 of the 73 recommendations within the RNAO Pain BPG (RNAO., 2007) (ID5,ED1) were incorporated into the Pain P/P and piloted on selected units (P2,P3). In 2007, informants reported no further refinements were made following senior administration approval (P3,ID5). The taskforce eventually delegated the responsibility to update future Pain P/P revisions to the NPP department. Third, the departmental implementation plan was developed by the *collaboration of human resources from all levels of the Nursing Department* (e.g., Executive to frontline nurses), *jointly with other interprofessional stakeholders*, such as Pharmacists, Occupational and Physio Therapists (OTs, PTs), and Medical Resident. Fourth, taskforce members subsequently worked together to (iv) **embed the Pain P/P recommendations into already established documentation and quality improvement infrastructures* (e.g., clinical pathways, documentation tools, flowsheets, orientation, policies, processes) in preparation for hospital-wide implementation.

(iii) Context: Implementation Context Processes, Structure Adjustments and Monitoring Initiatives. Informants and document review revealed six KTIs used to influence departmental level context processes, structure adjustments and monitoring initiatives during the initial implementation (0-2yrs). First, informants revealed **obtaining buy-in from senior administration/management* (e.g., advanced practice nurses (APNs), clinical managers, nurse educators, nursing professional practice and senior executives) *and formalizing their involvement on a steering committee* positively influenced sustainment. Second, **formalizing BPG-IP Coordinator role* and third, formalizing **taskforces/work groups* for each BPG, within the existing NPP department reportedly “established an enduring central reporting and monitoring structure for ongoing implementation and evaluation” (P1). Fourth, informants indicated nursing administration’s commitment to *allocate internal human resources and time* to participate on the BPG-IP committees and to implement KTI initiatives positively influenced implementation

efforts across all units. Fifth, initially **educating 60 practice change agents* (e.g., champions and nurse educators) as pain practice experts to provide clinical level support to practitioners was perceived to be influential in the ongoing use of the Pain P/P. Lastly, the use of a *multi-modal dissemination approach* to train users on units reportedly advanced implementation. Informants and documents revealed the multi-modal dissemination approach focused on providing pain care and policy (i) education (e.g. orientation sessions included pain care, a day long pain workshops, e-learning modules, BPG booster sessions, pain awareness week) (P1,P2,P3,ID2,Rt3); (ii) tools development (P3,ID2,Rt3) (e.g. assessment and documentation tools); and (iii) monitoring adherence (e.g. establishing a biannual prevalence audit survey, providing feedback on prevalence rates to units, and identifying areas for improvement) (P1,P2,P3,ID2,Rt3). All informants stated the main focus of all these strategies was to improve unit nurses' performance of patient care and documentation practices based on the BPGs (P1,P2,P3).

Sustainment Phase (2009-2017)

We identified twelve sustainability determinants (six broader system, one innovation, five context) and twenty-one related KTIs from informants and document review that influenced the ongoing use of the Pain P/P among nurses' post implementation (see Table 2.6). We viewed the sustainability KTIs in terms of (i) broader system strategies, (ii) ongoing innovation (e.g., Pain P/P) refinements, and (iii) context: context processes, structure adjustments, monitoring initiatives that affected Pain P/P use over time (2-10 yrs.). Sustainability KTIs that extended implementation efforts are noted with a * in text, and in Table 2.6.

Broader System Sustainability Determinants

Informants and document review identified the following six broader system determinants that facilitated the use of the Pain P/P over time. First, alignment of the local *university's research agenda or goal to use EBP facilitated ongoing use*. Pain education sessions

offered onsite during student practicums aligned with curriculum learning outcomes for medical and nursing programs (P1,P3,Rt3). Second, increasing health *consumer (patient) demand* for information on pain management care reportedly resulted in their active participation on several internal committees influencing sustainability. Third, the periodic release of *updated BPGs* from the RNAO; fourth, increasing *external pressures from accrediting agencies and ministry* for patient safety performance measures; and fifth, *formal external recognition* from the BPG association (e.g., RNAO) related to the hospital's prevalence survey system supported ongoing use. Informants and documents indicated external pressures and recognition encouraged ongoing accountability internally for EBPs, related activities and results (P1,P2,P3,ID1,Rt4). Sixth, *increased focus nationally and internationally on Pain Care* over the last ten years has increased the knowledge base for practitioners to draw upon.

Broader System Sustainability KTIs.

We identified three broader system sustainability KTIs reported by informants and evident in our document review related to the external determinants that facilitated ongoing use post implementation. First, *staff participation on a regional network* provided access to new research on pain and related outcomes. Second, NPP led BPG committees focused on *integrating new medication/treatment releases*, such as an opioid into ongoing Pain P/P related education updates, facilitated both awareness and informed use for unit nurses. Third, informants reported learning from and *benchmarking* against other organizations (*external sources*) on best practices for pain assessment and management also facilitate sustainment over time. Overall, these broader system efforts promoted ongoing use of the Pain P/P and opportunities for improvement.

Innovation Sustainability Determinants

We identified one innovation sustainability determinant that facilitated sustainment of the Pain P/P over time: *positive user attitudes and values* related to the use of the Pain P/P. Two

informants reported that “nurses’ positive attitude towards pain management and their commitment to quality and working together has filtered throughout the hospital” (P1,P3).

Innovation Sustainability KTIs

One innovation sustainability KTIs identified by informants and document review included the **ongoing embedding of Pain P/P refinements* into existing processes/practices such as general orientation (P2), the three mandatory eLearn modules (P3) and policy revisions (P1). For example, in 2013, an additional nursing sensitive recommendation (e.g. #9 – mandatory training) was added to the Pain P/P (see Table 2.1), based on stakeholder feedback and the revised 2013 RNAO Pain BPG (RNAO., 2013) (P1,P2,P3,ID5-6, ED1-2). This policy revision requirement was then integrated into the NPP departmental quality processes (P1,ID2). Ongoing dissemination of Pain P/P refinements was facilitated by the transfer of nursing policies to an online version verses binders on units (P1,P2,P3), and having one master electronic binder for all policies maintained by NPP but accessible to all in read-only mode (P1,P2,ID2,Rt5).

Context Sustainability Determinants

We identified five context sustainability determinants (e.g., two facilitators, three potential barriers) influencing sustainment of the Pain P/P over time. Informants and document review revealed two context determinants that facilitate Pain P/P use over time. First, *Board of Directors and senior leadership commitment* to quality and working together on EBPs, such as the Pain P/P, reportedly continues to facilitate use of the Pain P/P. Specifically, senior level support includes the Board of Directors and the VP of Quality who leads a robust multi-disciplinary Quality Framework at the *corporate level*. Second, at the *nursing department level*, commitment by the VP-Chief Nursing Officer (CNO), NPP representatives leading the BPG-IP, and champions trained to provide clinical expertise at the *unit level*, reportedly continue to facilitate use of the protocol (P1,P2,ID1,ID2,Rt3-Rt6).

Informants and document review revealed the following three potential barriers related to the ongoing use of the protocol over time. First, other *corporate priorities*, such as infection control rates, that occasionally arise temporarily refocus attention from guideline adherence initiatives, thus competing with unit BPG priorities (P1,P2,P3,ID2,Rt5). Second, the constant *turnover of students* (e.g. medical and nursing) common in teaching hospitals present challenges in maintaining consistent practices between rotations (P2,ID13). Third, two informants stated “the *bimodal staffing complement* of novice and senior nurses that exists on most inpatient units presents challenges to ongoing use of the Pain P/P” (P1,P2,Rt2,Rt4).

Context Sustainability KTIs

Context Processes, Structure Adjustments KTIs

We identified the following eight context sustainability KTIs used to overcome barriers and promote the ongoing use of the Pain P/P over time (e.g., 2009-2017). Since 2012, (i) *departments determine priorities for EBPs* based on patient needs on the unit and prevalence audit results. With the adoption of EBP care, Managers and Clinical Leaders lead the implementation of (ii) both *department and unit level patient centered EBP care activities into unit routine practices*, the latter varying between units. For example, informants stated departmental patient-centered initiatives include; “integrating pain assessments into hourly rounding patient checks” (P1, Rt3), and unit specific activities include conducting “case study/debriefings to resolve and learn from complex situations” (P1). By 2013, development of (iii) *additional pain assessment tools* for use on all units, reportedly supported ongoing use of the Pain P/P. Tools included: Patient Information Guide-Booklets (P3,ID2,Rt3); verbal bedside shift reports; care boards (with pain scales) in each room to communicate patient pain scores and goals (P1,P2,ID2,Rt3), and unit specific tools such as a post surgery pain management pamphlet (P1,P2,ID2,Rt3). In 2010, these successful Pain P/P practices/procedures and tools were (iv)

shared (e.g., spread to) and embedded into the outpatient clinic department's documentation system and bedside units. Another KTI included (v) **ensuring expert support is available* at all levels. As of 2017, a total of 170 experts existed internally, including unit champions (P2,P3,Rt4,ID1), unit educators (P1, P2,Rt4,ID1), and advanced practice nurses (APNs) who work across units providing clinical pain care expertise (P1,P2,P3,Rt4,ID1). In fact, champions reportedly not only provide pain care expertise one on one with colleagues but play a unique role "by helping change philosophies around pain" (P2, P3). They were described by informants "as 'informal leaders' or 'myth busters' within the unit and work to change misconceptions, striving to enhance commitment among stakeholders" (P2,P3). Efforts to provide (vi) *ongoing pain education* related to Pain Care and Pain P/P updates evolved over time, both at the department and unit level, to include multiple components. For example, some became more tailored for nurses such as APNs providing one on one pain management expertise with staff (P1,P2,P3,Rt3,ID2), and conducting case study debriefing for the whole unit to resolve complex situations and provide feedback on how to improve pain management (P1,Rt3,Rt5-Rt7,ID1-ID2). In 2014, all (vii) **formal and informal pain care education initiatives*, initially led by the Pain Council (e.g., taskforce), became the responsibility of the *NPP department*. Informants and documents indicated the following education initiatives facilitated ongoing use of the protocol: "providing annual pain education days" (P1,Rt3) and "hospital-wide annual national pain week celebrations" (P3,Rt3). An enduring educational KTI, in use since 2013, reported to support novice nurses included the introduction of (viii) *mandatory pain care eLearn training modules*.

Context Monitoring Initiatives KTIs

Informants and documents revealed several ongoing monitoring and evaluative initiatives undertaken by the hospital to sustain the Pain P/P over time. Initially, outcome data, such as biannual prevalence rates, demonstrated a 20-30% hospital-wide improvement in nurses'

documentation of selected Pain P/P recommendations by 2013 (P1,P2,P3,Rt1), adding to the 20% improvement in patient satisfaction rates related to pain management achieved by 2013 (P3,Rt1). Informants suggested that the following nine sustainability KTIs contributed to these positive outcomes. First, the **development of an electronic monitoring system that measured key nursing sensitive indicators* for all nine BPG, including the Pain P/P, was undertaken. Informants believe this system provided the necessary adherence data related to the BPG recommendations critical to determine unit level remedial action plans containing sustainability-orientated strategies (P1,P2,P3,ID2,Rt1,Rt4-7). Second, ongoing *biannual prevalence training of staff to conduct the survey* contributed to building EBP evaluative capacity and to promote ongoing use of the Pain P/P. Specifically, the survey itself consists of three components: instruction on how to conduct the automated chart audit (CA), a patient assessment/interview (PA), and an environmental scan (ES). Approximately 900 patients and their charts are surveyed over an eight hour period (P1,P2,P3,R9,IN13). Informants stated “formal recognition of this evaluation method as a best practice by the RNAO brought prestige to the initiative” (P1,P3,ID1,Rt5), and “encouraged ongoing accountability internally for process activities and results” (P1,P2,P3,ID1). This system continues to provide increased availability and exchange of patient safety data (P1,P3,ID2) which is shared with the Quality and Performance committee of the Board of Directors (P1,P2,Rt4,ID2), and one informant stated “it has become part of the Corporate Score Card” (P2,Rt4,ID2). This provided pressure on organizational leaders to ensure BPG-IP continuation (P2,Rt4). Third, in addition to senior executive monitoring of survey results, corporate level internal committees such as the **Patient Experience Steering committee’s ongoing review* of the clinical tactics support and sustain quality outcomes. For example, one informant stated the Patient Experience Steering committee recommended that “evaluative measures be incorporated into the management performance appraisal system” (P3,Rt3). Fourth,

accordingly, since 2014, Clinical Directors included *BPG-related performance criteria in the evaluations* of their Clinical Nurse Leaders (e.g. Managers) (P2,P3,Rt3), which leaders subsequently included in staff performance reviews (P1,P2). Fifth, additionally the NPP established *regular performance monitoring* of results from the biannual prevalence audit along with the internal incident reporting system. Informants stated this is a key component of the BPG-IP to increase awareness and monitor adherence to BPG recommendations (P3,Rt3, Rt6,ID1). Sixth, with regular monitoring, the **comparing of prevalence audit results among units created a sense of competition* among unit leaders and staff that spurred a chain of activities to improve. Seventh, specifically, the timely exchange of unit level prevalence survey results and how they compare to other units (departmental results) resulted in *three incremental “course-correcting changes”* (Fleischer et al., 2015a, p. 543): (1) Measurement activities (e.g. questions within the prevalence survey) became more focused and sophisticated to target selected BPG behaviours (P1,P2,P3, ID7-11, Rt5, Rt7). Leaders set increasingly specific benchmarks that were incrementally obtainable and modified survey questions to reflect benchmarks (see Table 2.4). Unit level Champions and Educators reportedly “designed KTIs to address targeted BPG behaviours evaluated” (P3). (2) Survey methods expanded over time. Initially, NPP representatives, APNs, champions and educators were the main surveyors. They eventually trained increasing numbers of interprofessional staff to collect data on units not their own (Rt3). Training and surveying reportedly served to “increase awareness of the importance of BPG-IP and expand accountability for patient safety performance among point of care practitioners” (P3). (3) Initially, NPP representative ‘only shared performance data with Clinical Nurse Leaders’, assuming they would act to improve results. Eighth, eventually the **NPP began meeting with Unit Leaders and unit teams to discuss results and support development of formal remedial action plans for under performing units*. An informant reported that “unit teams and

Clinical Nurse Leaders now formally report back to NPP representatives on how they will respond to the results” (P3). Ninth, based on these remedial action plans *unit specific training for staff* began to improve on related Pain P/P survey indicators. Follow-up and education support from NPP representatives included unit-based strategies to increase adherence and enhance documentation (P3,Rt3,Rt5,Rt6). Overall, informants indicated these monitoring and evaluative efforts served to build their problem-solving capacity and support their continued use of the Pain P/P over time (P1,P2,P3).

2.9 Discussion

To better understand what influenced the sustainment of the Pain BPG, over a ten-year period (2007-2017) within an acute care context, we examined the determinants (factors) and KTIs influencing its use from a nursing department level. Results revealed three determinants (e.g. need to improve, external demand, and leadership commitment) and seven KTIs (e.g. embedding of refinements into existing processes, formalizing supervision of BPGs, establishing interprofessional committee(s) to support ongoing training, established infrastructure (taskforces), formalized leaders on steering committees, educating champions, and developing a system to monitor adherence to recommendations) had a continuous influence in both implementation and sustained use phases important to consider for sustainment. Additionally, we identified a sustainability determinant; senior leadership, and two implementation KTIs; use of frameworks and securing external funds, which had an impact over time, congruent with known sustainability frameworks (Nadalin Penno et al., 2019). Findings also revealed that while determinants reflect changing influences over time, the incremental targeting of KTI efforts such as practices/processes, structural adjustments, and monitoring initiatives was paramount to resolving the fit between the innovation (Pain P/P) and the changing context during both the implementation and sustained use phases. Our findings’ further suggested sustainment is

achievable when leaders demonstrate commitment to prioritize EBP care, starting at the top of the organization, and support a user up approach to develop KTIs to promote ongoing use of EBPs and refinements. For example, supporting unit teams' engagement in designing KTIs that bolstered adherence to guideline recommendations and conducting evaluations of the impact on outcomes served to motivate sustainment of EBPs among nurses and other disciplines throughout the hospital. This substantiates that innovation sustainability is broader than just maintaining the fidelity of the original EBP (Pain P/P) but instead one that exhibits ongoing continuous adjustments and refinements to optimize its utility within a changing context (Chambers, 2013). Findings thus support the conceptualization of sustainability as an ongoing "*dynamic process*" (Chambers, 2013, p. 125) proposed in the DSF, and congruent with current literature (Buchanan et al., 2005; Fleischer et al., 2015b; Fox, 2015; Maher, 2010; Nadalin Penno et al., 2019; Slaghuis, 2011).

Determinants (factors)

We identified a total of twelve determinants for sustainment, three had influence in both the implementation and sustained use phases: namely (i) a need to improve pain management care based on consumer demand, (ii) external demand: RNAO support for EBP care aligned with a corporate priority, and (iii) formal leadership commitment. These three determinants are cited in the literature as key factors to consider for sustainment of EBPs (Buchanan et al., 2006; Davies, 2013; Fleischer et al., 2015b; Gruen et al., 2008; Nadalin Penno et al., 2019; Wiltsey Stirman et al., 2012). Moreover, their overlap provides evidence of the potential impact of determinants between the two phases on sustainability suggested in the literature (Nadalin Penno et al., 2019; Proctor et al., 2009). They also illustrated how the same determinant (factor) evolved over time. For example, the level and combination of *leadership commitment* expanded over time to include both department and unit level leaders as the focus of the KTIs used to

sustain the use of the Pain P/P moved from a departmental level (across units) (0-2 yrs.) to the clinical practice level (unit level) post implementation (>2y-10 yrs.). Given current evidence and the influence of these determinants in both use phases of our study, we recommend they be considered when planning and developing sustainability-orientated action plans early in the knowledge to action cycle, as indicated by other researchers (Davies, 2013; Straus, 2013).

One of the twelve sustainability determinants identified in our study: *senior leadership commitment* (Board and VP level), is evident in known sustainability frameworks (Buchanan et al., 2006; Fleiszer et al., 2015b; Maher, 2010; Racine, 2006). This determinant set-in motion a strategic process, which guided internal leaders use of sustainability-orientated KTIs to sustain the use of the BPG in their changing healthcare context, and therefore should be considered a key facilitator. Specifically, senior leaders' commitment to EBP as a shared priority and responsibility among all disciplines had a ripple effect throughout the organization that mobilized action at all levels to standardize pain care. Leadership is a commonly cited determinant influencing sustainability (Buchanan et al., 2005; Chambers, 2013; Fleiszer et al., 2015b; Frykman et al., 2017; Maher, 2010; Racine, 2006; Shuman et al., 2018; 2019; Wiltsey Stirman et al., 2012). Findings confirm the commitment of senior administrators (e.g., VP of Quality) together with *departmental formal leaders' commitment* (e.g., CNO, BPG coordinator, APNs, Educators) to align ongoing KTI with organizational priorities is necessary for sustaining EBPs in acute care settings. Pressures for patient safety performance measures by Board of Directors and accrediting bodies reportedly increased expectations on leaders to ensure the BPG-IP continuation. Subsequently, unit level leaders, primarily responsible for quality on their units, played a significant role ensuring sustainment through monitoring of processes and indicators. Similar leadership roles, which are both managerial and clinical in nature, have been described by Fleiszer (2015a) and Shuman et al (2018; 2019). The working together of several

nursing leaders across organizational levels (departmental and unit) collectively support similar study findings (Fleischer et al., 2015a; Stetler, 2009; Stetler, 2014). In effect, this study demonstrates the cumulative effect of the vertical and horizontal coordinated actions of leaders across levels influenced sustainability of the Pain P/P and the BPG-IP. This dynamic relationship between context determinates on various organizational levels further substantiate the value of shared leadership models for leading EBP sustainability within healthcare contexts (Fleischer et al., 2015a; Stetler, 2009).

The remaining eight determinants identified are congruent with existing sustainability frameworks, align with known DSF factors, and thus should be considered by those planning for sustained use of EBP in changing contexts such as acute care. These factors include three potential barriers and five facilitators (e.g., four broader system and one innovation determinant). Notably, the nursing department's use of frameworks (Logan & Graham, 1998; Straus, 2013) served to help them assess barriers with the aim of establishing effective KTIs to promote adherence to guidelines (Geerligts et al., 2018; Straus, 2013). For example, medical and nursing *student turnover* (Buchanan et al., 2006; Fleischer et al., 2015b; Racine, 2006) and *bimodal staffing complement* (Chambers, 2013; Fox et al., 2015) were countered by education strategies. *Competing corporate priorities* (Racine, 2006) were minimized when departments became accountable to determine EBP priorities based on patient safety and satisfaction reports. Four broader system facilitators identified include the *release of new evidence* by industry (Buchanan et al., 2006; Chambers, 2013; Fleischer et al., 2015b; Racine, 2006) (e.g. national updates on treatments) which promoted the hospital's goal to provide EB care; *goal alignment with educational partners* (Allen, 2013; Buchanan et al., 2006; Maher, 2010) and resultant support extended the hospital's ability to include EB care as part of their clinical placement agreements ensuring BPG sustainment among the next generation of practitioners; *external pressure* from

accrediting agencies and Ministry (Chambers, 2013; Fleischer et al., 2015b; Fox et al., 2015; Racine, 2006), and *external recognition* (Buchanan et al., 2006; Fleischer et al., 2015b; Racine, 2006) of the audit and feedback system established internally spurred further action among stakeholders to sustain the use of the Pain P/P over time. These broader system facilitators demonstrate how linkages between outer and inner context are key to sustainment evident in the literature (Lengnick-Hall et al., 2020). Lastly, *stakeholder/user attitudes and values* related to the innovation is also frequently cited as a key determinant influencing sustainment of hospital-based healthcare innovations (Cowie et al., 2018; Fleischer et al., 2015b; Straus, 2013). Findings confirm these facilitators promoted the fit between the Pain P/P and the unit specific practices/processes.

Knowledge Translation Interventions (KTIs)

We identified a total of twelve implementation and 21 sustainability-oriented KTIs that influenced the ongoing fit between the innovation (the Pain P/P) and the changing context. Seven were evident during both phases: *embedding of refinements* into existing processes, *formalizing supervision* of BPG, establishing an *interprofessional committee(s)* to support *ongoing training*, *establish infrastructure (taskforces)*, *formalize leaders on steering committees*, *educating champions*, and *develop system to monitor adherence* to guideline recommendations. Five key observations about KTIs we perceive fostered changed behaviors and facilitated sustainment over time are: (i) two KTIs had an enduring impact in both phases; (ii) the linking of KTIs to target behaviors (e.g. guideline recommendations) while focusing efforts on one recommendation at time (e.g. an incremental approach) promoted sustainment; (iii) use of a participatory approach to engage point of care users in the development of KTIs to enhance adherence (e.g. user up participatory approach); (iv) development of an infrastructure to monitor

adherence that engaged users, and (v) creating an institutional system that held leadership accountable for EBP outcomes are important KTIs for considerations for sustainment.

Two KTIs, uniquely identified as part of the implementation phase, we consider important for sustainment include: the *use of frameworks* and *securing external financial resources* for the BPG-IP. The *use of frameworks* (e.g. KTA and OMRU)(Logan & Graham, 1998) to facilitate early identification of barriers is well recognized in the literature as an effective means of “linking specific KTIs to barriers” (Straus, 2013, p. 155). Using ‘framework-inspired method’ to tailor interventions is a creative way to provide guidance on how to proceed while promoting stakeholder engagement and interest in facilitating ongoing decision-making over time to ensure sustainability of EBPs (Geerligs et al., 2018; Straus, 2013). Our findings corroborated with the recommendation to use frameworks to guide EBP advocated by researchers (Cowie et al., 2018; Fleischer et al., 2015b; Graham & Tetroe, 2007; Higuchi et al., 2013; Nadalin Penno et al., 2019; Nilsen, 2015). *Securing external financial resources* to develop an “electronic point of care prevalence monitoring system” that measures nursing sensitive indicators beyond implementation was recognized externally as a key sustainability-orientated KTI. Securing external investments to support innovation sustainment initiatives that have impact beyond implementation is congruent with other sustainability frameworks in the literature (Fleischer et al., 2015b; Fox et al., 2015) and current reviews (Hailemariam et al., 2019).

Our findings revealed the adapting and refinement of EBPs to local context over time also requires continual efforts focused on designing KTIs that address changing context influences to promote ongoing use. At the departmental level, engaging users (e.g., nurses) on EBP committees/taskforces initially mandated to develop a multi-modal approach to disseminate BPGs, and later to monitor guideline adherence rates and patient outcomes, reportedly promoted commitment to pain care and its sustainment over time. Additionally, based on departmental

EBP priorities (e.g., prioritized recommendations), the incremental approach used by unit clinical leaders to engage nurses and other interdisciplinary unit team members to collectively develop KTIs promoted adherence to selected targeted behaviors (e.g., recommendations). This strategy effectively built on their successes related to guideline adherence rates while continuing to improve patient outcomes. These findings confirm the notion that to produce real world change over time there is a “need to consider staff and system domains as active components in the change process rather than imposing change” (Geerligts et al., 2018, p. 51). This active participatory and incremental approach to develop strategies by unit level users (Bowen, 2013; Geerligts et al., 2018; Jagosh et al., 2012; Lennox et al., 2018), led by clinical leaders (Fleischer et al., 2015a; Lennox et al., 2018) evidently is an important consideration for sustainment in changing healthcare contexts.

In a recent review of sustainability approaches (KTIs) used to sustain innovations in healthcare ‘monitoring progress over time’ emerged as “a consistent construct across approaches regardless of the proposed innovation, settings or application types” (Lennox et al., 2018). Efforts by the study site to establish a point of care *monitoring and feedback system*, that provided *regular reports* on nurses’ *adherence rates* to BPG recommendations produced the necessary data critical to determine *unit level remedial action plans* (e.g., feedback mechanisms). These audit and feedback loop efforts reportedly contributed to sustainment corroborating evidence in the literature (Berta et al., 2019; Chapman et al., 2020; Lennox et al., 2018; Powell et al., 2015). Additionally, the training of users to conduct the surveys and engage in feedback processes reportedly *enhanced capacity to monitor progress* over time contributing to sustained use. These monitoring and feedback KTIs/initiatives should be considered by those planning or in the process of creating a sustainability monitoring infrastructure system.

Once real-time prevalence data were made available to users from the established monitoring system, a *BPG-related performance criterion* was integrated into the performance evaluation system. Findings highlight embedding accountability for guideline prevalence and patient outcomes formally into performance expectations for leaders created an institutional system that held leadership accountable for the sustained use of EBPs. This KTI had a trickledown effect into user performance expectations, critical to the process of change (e.g., adherence to guideline recommendations) and likelihood of sustained use over time. This KTI focused on obtaining shared accountability (e.g., getting buy-in) to deliver the innovation (e.g., Pain P/P) in support of the corporations' vision for EB care. This finding is congruent with a study wherein front-line nursing leaders promoted shared accountability by reinforcing the expectation of BPG as the practice standard on their units (Fleischer et al., 2016a, 2016b). Consistent reinforcement and evaluation of guideline standards by leaders with teams of nurses is proven KTI consideration for sustained use in acute care.

2.10 Strengths and Limitations

To our knowledge this is the first study to use the DSF as a guide to examine a real-world implementation project that provides theory-informed, in-depth, contextualized evidence about the determinants (factors) and effective KTIs used over a ten-year timeframe to sustain the use of a nursing guideline in acute care. Specifically, this qualitative approach reveals knowledge regarding innovation, context (e.g., processes, structural adjustments, monitoring initiatives) and broader system influences that impacted sustained use of an EBP from a departmental level over time in a multi-site, academic, tertiary setting. For those in similar settings aiming to sustain EBPs the descriptive study design used provides the detail and in-depth information (e.g., site description, sample characteristics) needed to determine the extent or applicability of the findings to their site. We used multiple forms of data, conducted debriefings with the research

team and substantiated findings with two knowledge users on the research team to enhance the credibility of the findings. By adhering to the study protocol, documenting decision points, maintaining organized paper and electronic databases, and maintaining a master list of tenets/definitions, related questions, and codes we enhanced the dependability of the data. By referencing multiple data sources such as participate responses and documents in text, tables and additional files, remaining close to participant verbatim transcripts, and demonstrating congruency between two for more participates regarding data presented confirmability of findings is reassured. Furthermore, our study provides insight into the impact of three implementation determinants and seven implementation KTIs on the sustained use phase.

The retrospective nature of this study design increases the possibility of nonresponse and recall bias. Although the interviews occurred ten years post initial implementation, the informants remembered details from start to present day, given they remain currently engaged in ongoing efforts to support sustainment. We also attempted to compensate for recall bias by the triangulation of the findings from the interviews with the use of internal and external documents. To enhance their awareness of the Pain P/P, copies of the 2007 and 2013 were presented during the interviews. A bias may have occurred if participants' responses to the interview questions indicated what they thought would be acceptable rather than their perspective. Member checking of the qualitative findings was not conducted due to limited access to the site and the imminent retirement of one informant. However, to reduce the researchers' influence on the research outcomes and enhance confidence in the truth of the findings we used multiple data sources and reviewed findings with two knowledge users on the research team from the site to substantiate the findings. Most informants were corporate level nurses actively involved at the departmental level during the BPG-IP and expected to have the greatest knowledge about the implementation

of the Pain P/P across inpatient units over time. Given the Pain P/P is an interdisciplinary policy, relevant perceptions from staff other than corporate level nurses may have been missed.

2.11 Conclusion

Sustainability of EBP in acute care has been recognized as a challenge for some time. Our research provides insight into the relationship between and among implementation and sustainability determinants and related KTIs across concepts (innovation, context, broader system) extending both phases. Findings provide practitioners who are aiming to sustain BPGs in similar acute care settings the determinants and KTIs to consider. Our findings demonstrate sustainability requires continual efforts but if undertaken as an integrated part of improving overall institutional performance, can create a supportive climate/culture for EBP sustainment. Our findings also reinforce that the shared actions of committed leaders across the organization in support of structural processes and user participation on departmental and unit level committees is essential to maintain an infrastructure for monitoring and evaluation of adherence to guideline recommendations. Linking KTIs designed specifically to incrementally address low adherence rates is evidently a proven pathway to facilitate successful sustainment over time. Future research should use qualitative methodologies to further examine the factors and KTIs influencing adherence to EBPs at the unit level, post implementation with the intention of adding to the existing sustainability knowledge base.

List of Abbreviations

APN – Advance Practice Nurse
BPG - Best Practice Guideline
APS - Acute Pain Service
BPG-IP – Best Practice Guideline-Implementation Program
BPSO – Best Practice Spotlight Organization
CNO – College of Nurses of Ontario
CNA - Canadian Nurses Association
DSF – Dynamic Sustainability Framework
EBP – Evidence-based practices
ED# - External document code, numbered 1 to 2
F/M/T – Framework/Model/Theory
ID# - Internal document code, numbered 1 to 20
KTIs - Knowledge translation interventions
NPP – Nursing Professional Practice
P# - Participant informant/code
Pain P/P – Pain policy/protocol
RNAO – Registered Nurses’ Association of Ontario
Rt# - Report code, numbered 1 to 7

Declarations

Ethics approval and consent to participate

We obtained ethical approval from the Research Ethics Boards for the Ottawa Health Science Network (OHSN-REB) and the affiliated Office of Research Ethics and Integrity (file #: A10-17-P2) of the University of Ottawa. The participating institution also granted approval of the study.

Consent for publication

All participants provided written informed consent before participating in the study, which included consent to publish anonymous quotes from individual participants.

Availability of data and material

The datasets generated and analysed during this study will be available from the corresponding author on reasonable request.

Competing interests or conflicts of interest

The authors declare that they have no competing interests, and no conflicts of interest.

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Author's contributions

LNP and thesis committee members (IG, BD, CB JS) contributed to the conceptualization of the study. LNP undertook the primary role in implementing the study; collecting the data, conducting interviews, and leading the analysis and reporting activities. LNP and JF independently conducted the qualitative analysis of the transcripts and LNP produced the tables, figures and additional files. JS, IG, and CB provided input into the data collection, analysis and interpretation. The initial draft of the manuscript was prepared by LNP, then circulated among all coauthors for comments and revision. All coauthors read and approved the final manuscript.

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TABLES

Table 2.1. Pain P/P target behaviours, RNAO Pain Assessment and Management BPG (RNAO., 2007, 2013) recommendation and level of evidence (SIGN, 2012)

Site Pain P/P Number.	Pain P/P Target Behavior	RNAO Pain Assessment and Management BPG Recommendation Number Level of Evidence
Selected recommendations under review		
1	Screen inpatients for presence of pain on 1) Each initial contact/admission (2007 & 2013)	Assessment Recommendation - 1.1 Level of Evidence - Ib
2	Ongoing assessments of Pain using standardized tools 1) Once per shift (2007). 2) During hourly rounding (2013)	Assessment Recommendation - 1.2 Level of Evidence - Ib
3	Establish an individualized goal for pain management with the patient (2007 & 2013).	Planning Recommendation - 2.1 Level of Evidence - Ib
4	Collaborate with the patient in establishing an individualized strategy and interventions to manage the patient's pain based on the best evidence and available resources (2007 & 2013).	Planning Recommendation - 2.1 Level of Evidence - Ib
7	Educate patient and families about their individualized pain management plan (2007 & 2013).	Implement Recommendation - 3.3 Level of Evidence - Ib
Recommendations not under review in this study		
5	Assess effects of pharmacological interventions at peak effect following administration and on an ongoing basis (2007 & 2013).	Implement Recommendation - 3.1 Level of Evidence - IIb
6	Consult with pain management experts (interdisciplinary team members) as required (e.g., in complex situations, and or escalating or unrelieved pain after a reasonable trial of management) (2007 & 2013).	Planning Recommendation - 2.2 Level of Evidence- Ib
8	Ensure ongoing documentation reflects patient goals, pain mgmt. plan, assessment, response to treatment, outcomes, & communicate to inter professional team (2007, 2013)	Evaluation Recommendation - 4.4 Level of Evidence - IIb
9	Completion of self-learning training modules for nurses and physicians (2013)	Education Recommendation - 5.4 Level of Evidence - IV

Key: Level of Evidence

R = Recommendation, CA = Chart Audit, Q = Question, mgmt.= management, hxy= history, txmt= treatment

Ia Evidence obtained from meta-analysis or systematic reviews of randomized controlled trials.

Ib Evidence obtained from at least one randomized controlled trial.

IIa Evidence obtained from at least one well-designed controlled study without randomization.

IIb Evidence obtained from at least one other type of well-designed quasi- experimental study, without randomization.

III Evidence obtained from well-designed non-experimental descriptive studies, such as comparative studies, correlation studies and case studies.

IV Evidence obtained from expert committee reports or opinions and/or clinical experiences of respected authorities.

Table 2.2. Dynamic sustainability framework (DSF) constructs and factors (Chambers, 2013)

DSF Construct: Innovation
<p>DSF Factors: <i>-Innovation/Intervention specific themes influencing behaviour change</i></p> <ul style="list-style-type: none"> • User characteristics (i.e. who should deliver the innovation/intervention)) • Outcomes directly related to usage (i.e. patient centered outcomes) • Delivery platform innovation/intervention is delivered on (ie face to face, telephonic, web-based, mobile health application)
DSF Construct: Practice setting (context)
<p>DSF Factors: <i>Contextual themes that effect achievement of desired outcome(s)</i></p> <ul style="list-style-type: none"> • Human resources (i.e., staffing) • Financial resources (i.e., capital resources) • Information systems • Organizational culture/climate and structure • Processes for training staff • Supervision of staff
DSF Construct: Ecological system
<p>DSF Factors: <i>System themes within which the practice setting operates</i></p> <ul style="list-style-type: none"> • Other practice settings (i.e., working to incorporate the innovation/intervention) • Policy (i.e., legislative environment) • Regulations • Market forces (i.e., characteristics of local, regional, state, national markets) • Population characteristics (i.e., characteristics of broader population)

Table 2.3. Dynamic sustainability framework tenets (Chambers, 2013, pp. 121-122)

1. Optimizing of Intervention (Pain P/P) is context specific and should not be optimized prior to implementation (Imp) (0-2 yrs.) and sustainability (Sust) (> 2ys) phase onset.
2. Continual improvements of Intervention (Pain P/P) will boost sustainment
3. Ongoing feedback on the Intervention (Pain P/P) needs to use practical, relevant measures of progress (expected outcomes) and relevance (fit between intervention and context) that are feasible.
4. Voltage drop is not inevitable within a culture of Continuous Quality Improvement (CQI) Definition: Voltage drop = assumes the more diverse and complex a patient population is, the smaller the benefit of the Intervention.
5. Sustainment of an Intervention (Pain P/P) will be maintained when there is a 'strong fit' between the Intervention and the context. Definition: Fit = adaption of the Intervention to the context to sustain it
6. Organizational Learning is a core value for sustainability
7. Ongoing stakeholder involvement is necessary for sustainability

Table 2.4. List of data sources

Report Number	Title and Dates created or issued
Rt1	Notes from meeting on monitoring and auditing results with NPP Coordinator 2015
Rt2	Teleconference minutes with APN for acute care Nov 18, 2015
Rt3	List of Corporate and Unit level KTIs implemented 2006-2017: summary of strategies
Rt4	Notes during meeting with NPP Coordinator March 31, 2015
Rt5	Notes during meeting with APN Palliative Care -Lead for BPG project initial start-up Oct 20, 2015
Rt6	Minutes from Meeting with NPP Coordinator May 27, 2016
Rt7	Table of prevalence data measures for Pain PP target behaviours and ELM records performance measurement improvements 2011-2015
Internal Document Number	Title and Dates issued
ID1	2015 EBP Implementation power point presentation by NPP
ID2	NPP strategic plan on adherence to Pain P/P Multiple plans -2005/2006, 2007/2008, 2008/2009, 2009/2010, 2010/2011, 2011,2012, 2012/2013, 2013/2014, 2014/2015, 2015/2016
ID3	Terms of Reference Pain Assessment and Management BPG work Group 2006
ID4	10 themes used for Pain P/P development
ID5	2007 Pain Assessment and Management Policy
ID6	2013 Pain Assessment and Management Policy
ID7	Pain Prevalence Audit Tool= Patient Assessment questions & Chart audit questions Nov 2010
ID8	Pain Prevalence Audit Tool= Patient Assessment questions & Chart audit questions Nov 2012
ID9	Pain Prevalence Audit Tool= Patient Assessment questions & Chart audit questions Nov 2013
ID10	Pain Prevalence Audit Tool= Patient Assessment questions & Chart audit questions April 2014
ID11	Pain Prevalence Audit Tool= Patient Assessment questions & Chart audit questions April 2015 and Nov 2015
ID12	Post Discharge Patient Satisfaction Survey tool
ID13	Site Final Report for BPSO on RNAO Pain Assessment and Management BPG implementation Oct 2011 by CB
ID14	Hourly Rounding Policy versions 2012, 2014
ID15	Brief Pain Inventory -Self Report 2005
ID16	24 Nursing Documentation Flowsheet: versions 2008, 2014,2016
ID17	Patient Teaching Record 2009
ID18	Patient Admission History: versions 2013, 2016
ID19	Patient Assessment and Medication Administration Record 2009
ID20	Provisions of Additional Therapy Services by External Providers 2014

External Document Number	Title and Dates issued
ED1	RNAO Pain Assessment and management BPG 2007
ED2	RNAO Pain Assessment and management BPG 2013

Key

Reports (Rt#)

Internal documents (ID#)

External documents (ED#)

Table 2.5. List of KTIs for Pain P/P listing over time (2005-2017)

Pain Management - Knowledge Translation Interventions (KTI) listing		
Date	Target Group	Activity
2005 +ongoing	corporate	Introduction to Brief Pain Inventory (BPI)
2005+ongoing	corporate	Assmt Guidelines for Infusions used for Pain Mgmt
2005	Corporate	Acute Pain Mgmt Policies developed (Epidural, IV PCA, Regional Analgesia, Single Dose Intrathecal)
2006	Corporate	Corporate Nursing Orientation
2006	Corporate	Pain Council
2006 + ongoing	Corporate	Pain Education Days (offered x 2 per year)
2006	Corporate	Best Practice Champions
2007	Corporate	Pain Council
2007	Corporate	Pain Assmt & Mgmt Corporate Policy developed
2007 Oct	Corporate	Pain Awareness Week (education initiative)
2007 + ongoing	Corporate	Pain Education Days (offered x 2 per year)
2008	Corporate	Pain Council
2008	Corporate	Pain Assmt & Medication Admin Record for Infusions used for Pain Mgmt
2008 +ongoing	Corporate Outpt Oncology Clinics	Introduction of ESAS (Self reporting symptom Mgmt screening tool) includes pain in Outpt Oncology clinics.
???? + ongoing	Corporate Outpt Oncology Clinics	On line ESAS Tool (Self reporting symptom Mgmt screening tool) includes pain in Outpt Oncology clinics. Monitoring & Reporting to Cancer Care Ontario
2008 Oct	Corporate	Pain Awareness Week (education initiative)
2008 + ongoing	Corporate	Pain Education Days (offered x 2 per year)
2009 – 2P14	Corporate	Pain Council
2009	Corporate	Dosing of Opioids for Acute Pain in Opioid naïve patients
2009 Oct	Corporate	Pain Awareness Week (education initiative)
2009 + ongoing	Corporate	Pain Education Days (offered x 2 per year)
2010 - 2P14	Corporate	Pain Council
2010 Oct	Corporate	Pain Awareness Week (education initiative)
2010 + ongoing	Corporate	Pain Education Days (offered x 2 per year)
Nov 2010	Corporate	Prevalence training and survey
2011	Corporate	Pain Council
2011 Oct	Corporate	Pain Awareness Week (education initiative)
2011	?	Patient and Family Member Information Guide: Pain Assmt & Mgmt
2011	?	Patient and Family Member Information Guide: Pain Mgmt After Surgery
2011 + ongoing	Corporate	Pain Education Days (offered x 2 per year)
2011 + ongoing	Oncology	Oncology nursing orientation 1/2 day on pain management
Nov 2011	Corporate	Prevalence training and survey
2012 -2014	Corporate	Corporate Scorecard - pain satisfaction
2012 -2014	Corporate	Manager - performance goals
2012- 2014	Corporate	Pain Council

2012	Corporate	Pain eLearning modules - mandatory training
2012 + ongoing	Palliative	Palliative Care education days with one half day on pain - offered twice per year
2012 + ongoing	Corporate	Pain Education Days (offered x 2 per year)
2012 + ongoing	Oncology	Oncology nursing orientation 1/2 day on pain management
Apr 2012	Corporate	Prevalence training and survey
Nov 2012	Corporate	Prevalence training and survey
2013 -2014	Corporate	Corporate Scorecard - pain satisfaction
2013 -2014	Corporate	Manager - performance goals
2013 - 2014	Corporate	Pain Council
2013	Corporate	Hourly rounding/Bedside shift report/care boards= whiteboard
2013	Corporate	Pain Assmt & Mgmt Corporate Policy revised
2013 + ongoing	Palliative	Palliative Care education days with one half day on pain - offered twice per year
2013 + ongoing	Corporate	Pain Education Days (offered x 2 per year)
2013 + ongoing	Oncology	Oncology nursing orientation 1/2 day on pain management
Apr 2013	Corporate	Prevalence training and survey
Nov 2013	Corporate	Prevalence training and survey
2014	Corporate	Corporate Scorecard - pain satisfaction
2014	Corporate	Manager - performance goals
2014	Corporate	Pain Council
2014	Corporate	Nurse Leader Rounding
2014 + ongoing	Palliative	Palliative Care education days with one half day on pain - offered twice per year
2014 + ongoing	Corporate	Pain Education Days (offered x 2 per year)
2014 + ongoing	Oncology	Oncology nursing orientation 1/2 day on pain management
Apr 2014	Corporate	Prevalence training and survey
Nov 2014	Corporate	Prevalence training and survey
2015 + ongoing	Palliative	Palliative Care education days with one half day on pain - offered twice per year
2015 + ongoing	Corporate	Pain Education Days (offered x 2 per year)
2015 + ongoing	Oncology	Oncology nursing orientation 1/2 day on pain management
2015 + ongoing	Oncology	LEAP Mini Oncology - interprofessional day on Palliative Care including pain
Apr 2015	Corporate	Prevalence training and survey
Nov 2015	Corporate	Prevalence training and survey
2016 + ongoing	Palliative	Palliative Care education days with one half day on pain - offered twice per year
2016 + ongoing	Corporate	Pain Education Days (offered x 2 per year)
2016 + ongoing	Oncology	Oncology nursing orientation 1/2 day on pain management
2016 + ongoing	Oncology	LEAP Mini Oncology - interprofessional day on Palliative Care including pain
Apr 2016	Corporate	Prevalence training and survey
Nov 2016	Corporate	Prevalence training and survey
Ongoing	Corporate	NPPC strategic plans, minutes of the pain workgroup,

		Pain Council minutes
Aug 2016	Medicine Portfolio	Medicine education by Acute Pain APN and Palliative APN
Aug 2016	Corporate	Inclusion of pain scores on nursing flow sheet
2017 + ongoing	Palliative	Palliative Care education days with one half day on pain - offered twice per year
2017 + ongoing	Corporate	Pain Education Days (offered x 2 per year)
2017 + ongoing	Oncology	Oncology nursing orientation 1/2 day on pain management
2017 + ongoing	Oncology	LEAP Mini Oncology - interprofessional day on Palliative Care including pain
Apr 2017	Corporate	Prevalence training and survey
Nov 2017	Corporate	Prevalence training and survey

Table 2.6. Implementation and Sustainability determinants and KTIs influence Pain P/P use over time

	Implementation Determinants (0-2 yrs.) (3)	Sustainability Determinants (12) (>2-10 yrs.)	Documents	Implementation KTIs (12) (0-2 yrs.)	Sustainability KTIs (21) (>2-10 yrs.)	Document
Innovation components Characteristics				*Embedding of Pain P/P into existing unit processes (P2,P3)	*Embed ongoing refinements into existing routine practices/processes & Pain P/P (P1,P2,P3)	ID5-6, ID14-20, ID2, Rt4, Rt5, Rt6
Delivery platform						
Outcomes =Effectiveness of innovation for patient, staff, org						
innovation practitioners (set of characteristics defining who should deliver				Pain P/P established Interdisciplinary for all disciplines (P1,P2,P3)		ID1, ID3, ID5, ID20
		Facilitator (P1,P2,P3) Positive user attitudes and values related to the use of the Pain P/P	ID1, ID3, Rt2, Rt4			
Staffing =Human resources & capital resources exists within the practice setting				Joint collaboration of human resources from all levels of nursing plus other disciplines to develop departmental implementation plan (P1,P2,P3)		ID2, ID4, Rt4-6, ID13
				Secure internal financial commitment – time and Human resources to participate on cttees and to implement KTIs (P1,P2,P3)		ID1-2, Rt3-4, Rt6
		Barrier (P1,P2) bimodal staff complement	Rt2, Rt4			
		Barrier (P2) Turnover of students(medical)	ID13			
supervision	Facilitator (P1,P2,P3) *Leadership Commitment (NPP)	Facilitator (P1,P2) *Formal Leadership support at dept (CNO) and unit level (Clinical leaders, Educators & Champions)	ID1, Rt2, Rt3, Rt4, Rt5, Rt6, ID13			

				*Formalize BPG Coordinator role to lead ongoing implementation within NPP dept.(P2,P3)	* NPP comparing survey results among units created a sense of competition among leaders and users to improve (P1,P2)	ID1, Rt4, Rt6
Organization Culture /climate		Barrier (P1,P2,P3) Competing Corporate priorities	ID2, Rt3, Rt5, ID7-ID11		Dept determine EBP priorities (P1,P2,P3)	ID2-3, Rt3, Rt7
Training processes				use multi-modal approach to disseminate (P1,P2,P3)		ID1, Rt4-5, ID13
					Ongoing pain care education support at dept and unit levels becomes tailored over time ie 1 on 1 , case studies (P1,P2,P3)	ID1-2, Rt3, Rt5-7
					Develop unit specific additional resources/tools (P1,P2,P3)	ID2-3, Rt3, Rt5
					Mandatory eLearn training system (P1,P3)	ID2, Rt3, Rt6, Rt7
				*Pain Council established - Interdisciplinary taskforce leads initial policy development, education strategies and future policy revision (P1,P2,P3)	* NPP reps develop formal and informal education initiatives at dept and unit level in 2014 initially performed by the Pain Council. (P1,P2,P3)	ID2, Rt3, Rt6
				*Educating Champions – Education of 60 to be clinical experts on units, with APNs (P2,P3)	*Provides Unit level expertise to support use of Pain P/P a total of 170 experts = Champions, educators, APNs, work across units as clinical resource (P1,P2,P3)	ID1, ID4, Rt4
					Ongoing biannual training of staff to conduct prevalence survey (P1,P2,P3)	Rt3, ID13
Information systems= org communication capacity for monitoring (exchange and feedback)					Unit specific training of staff provided based on audit remedial action plans to improve on related BPG survey indicators (P1,P2,P3)	Rt3, Rt5, Rt6
					NPP Establishes regular performance monitoring: includes results from biannual prevalence audit and internal incident reporting (P1,P2,P3)	ID1, Rt3, Rt6
					Timely exchange of prevalence survey results led to course correcting changes (P1,P2,P3)	Rt5, Rt7, ID7-11
business model structure & system to monitor/manage innovation					*Development of an electronic monitoring system to measure nursing sensitive indicators provide monitoring of BPG adherence (aligns with 14 Imp b) (P1,P2)	ID2, Rt1, Rt4-7
				*Obtaining buy-in and Formalize nurse leaders involvement on Steering Cttee. (P1,P2,P3)	*Corporate level Internal cttees’ support ongoing review of clinical tactics support sustained use ie Patient Experience Steering cttee and Accreditation workgroup.(P2)	ID1, ID3

				*Established Pain BPG taskforce/workgroup in NPP dept – enduring central reporting and monitoring structure for ongoing implementation and evaluation (P1,P2,P3)	*NPP and Unit Leaders facilitate/lead remedial action plan for under performing units (P1,P2,P3)	ID1-3, Rt3-5, ID13
					Unit leaders lead dept and unit level patient centered initiatives for pain care based on unit routine practices -with adoption of EBP care	ID2, Rt3
					Performance Evaluation indicators for monitoring rt innovation = Mangers, + staff (P1,P2,P3)	ID1, Rt1, Rt4, Rt7, ID7-11
					Spread EBP to additional areas (P1,P2,P3)	Rt1,Rt3,Rt4
New DSF Factor		Facilitator (P1,P2,P3) Board of Directors & VP leadership corporate level commitment to EBP as a shared priority	ID1, ID2, ID13			
Market forces	Facilitator (P1, P2, P3) *Timely call from RNAO for BPSO applications	Facilitator (P1,P2,P3) *New updated version release of BPG from RNAO-agency	ID1, ID2, ID3, ID5, ID6, ED1, ED2			
		Facilitator(P1,P2,P3) National and International releases focused on innovation	ID1, Rt5		Staff participation on a regional network- - provide access to new research and related outcomes for pain mgmt (P1,P2,P3)	ID3, ID6, ED2
					Integrating new research/evidence released into BPG and ongoing education(P1,P2,P3)	ID1-3, ID5-6-, ED1-2
Other practice settings		Facilitator (P1,P2,P3) Goal alignment with Education Inst – Facilitator + E1 Education Institution support for innovation in support for EBP	ID13			
		Facilitator(P1,P2,P3) Formal External recognition by related BPG association	ID1, Rt5			
					Benchmarking to external sources best practices (P1,P2,P3)	Rt4, Rt6, ID13, ED1-2
Population characteristic's	Facilitator (P1, P2, P3) *Need to improve (P1, P2) or standardize from Pt satisfaction reports (P2, P3)	Facilitator (P1,P2,P3) *Increasing Consumer demand for pain management	ID4, Rt1, ID13			
legislative environment /regulation		Facilitator(P1,P2,P3) External pressure from accrediting agencies & ministry	Rt4			

policy					
New DSF Factor				Use frameworks to guide implementation and Id barriers (P1, P2)	Rt5, ID13
New DSF Factor				*Secure external funds (P1,P2,P3) a) RNAO PBSO – secure operating funds for initial training and resource s to build capacity (P1,P2) b) CNF- secure capital external financial support - for point of care surveying system (P2,P3)	ID1, ID13

Key:

P# = Participant code, ID# = Internal Document code, ED# = External Document code, Rt# = Report number (document type), DSF = Dynamic Sustainability Framework

* + **pale orange highlight** = factors that had a continuous influence in both the implementation and sustained use phases (over time)

* + **pale green highlight** = KTIs that had a continuous influence in both the implementation and sustained use phases (over time)

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Additional file 2.1. Biannual prevalence survey measures and education training records mapped to the Pain P_P

Pain P/P Target Behavior	Data Sources = CA (Chart Audit) or PA (Pt Assessment)	Nov. 2010	Apr. 2011	Nov. 2011	Apr. 2012	Nov. 2012	Apr. 2013	Nov. 2013	Apr. 2014	Nov. 2014	Apr. 2015	Nov. 2015	Comments
#1 on admission	CA= Q1 (Nov 2010-Apr 2012)	x	x	x	x								4 CA data points
#2 once per shift - documented ongoing pain reassessment within last 24 hrs	CA= Q3 (2010 - Apr 2012)	x	x	x	x								4 CA data points
#2 once per shift	CA =Q11 (2012-Nov 2015)					x	x	x	x	x	x	x	7 CA data points
#2 once per shift	PA Q2 (2013 to 2015)					x	x	x	x	x	x	x	6 PA data points
#3 Documented pain during stay	CA = Q1 (2013 to 2015)						x	x	x	x	x	x	6 CA data points
	PA Q2 & PA Q3 (2010),	x	x	x	x								4 PA data points
	PA Q8 (2012), PA Q1 (2013 to 2015)					x	x	x	x	x	x	x	7 PA data points
#4 documented pain during hourly rounding.	Nil												no data points
#5 Intensity	CA = Q2 (Nov 2010 to Apr 2012)	x	x	x	x								4 CA data points
gives numeric value for pain 0-10	PA Q9 (Nov 2012) and PA Q1a (2013 to 2015)				x	x	x	x	x	x	x	x	8 PA data points
#6 Pain Goal established	CA = Q5 (Nov 2010 only)	x											1 CA data point
	PA Q5 (Apr 2014 to 2015)								x	x	x	x	4 PA data points

#7 Collaborates with pt on pain strategies	CA Q5 (Nov 2010) only	x												1 CA data point
# 8 Reassess pain intensity	PA Q12 (Nov 2012) PA Q4 (Nov 2013 to 2015)					x	x	x	x	x	x	x		7 PA data points
# 9 Assess effect of pharmacological interventions	PA Q7 (Nov 2010) PA Q10.2 (Nov 2012) PA Q2a (Nov 2013) PA Q2b (Nov 2014 & 2015)	x	x	x	x	x	x	x	x	x	x	x		11 PA data points
	PA Q8 (2010) only	x												4 PA data points
	PA Q11 (2012) PA Q3 (2013 to 2015)					x	x	x	x	x	x	x		7 PA data points
#10 Monitor side effects	nil													no data points
#11 Consults with experts	CA = Q6 (Nov 2010 only)	x												1 CA data points
# 12 Educate Pt & Family	CA = Q7 (Nov 2010), CA = Q12 (Nov 2012)	x	x	x	x	x	x							6 CA data points
	PA 4 (Nov 2010)	x												1 PA data point
#13 Ongoing document to comm with IP team	nil													no data points
#14 Ongoing Edu of staff	ELM records (Nov 2011-Nov 015)			x	x	x	x	x	x	x	x	x		9 data points

Key: CA = chart Audit, PA = Patient Assessment conducted during audit, Q# = Question number (#) on audit form/tool, Pt = Patient, Edu = Education, IP = Inter Professional

Additional file 2.2. Corporate Nurse questionnaire**Interview Guide**

- 1) *Complete key information below first...*

Date: _____

Place: _____

Interviewer Name: _____

Participant Code: _____

Position of Participant: _____

Start time of Interview: _____

Finishing Time _____

- 2) *Hello my name is Letitia Nadalin Penno, I am a PhD candidate and I am conducting this study for my thesis. As such I will be asking you a series of questions. This interview is expected to take 40-60 minutes.*

Please know there is no right or wrong answers.

- 3) *To review, the main focus of the study is ...*

To understand nurses' continued use (sustained) or not of the Pain P/P over time

To understand the factors inhibiting and or promoting nurses' sustained use of Pain

P/P

To understand to impact of KTIs efforts on nurses' sustained use of the Pain P/P

- 4) *Please know "your participation in this study is voluntary and you are free to change your mind about being involved in this research at any time"*

- 5) *With your consent, I will audio tape and take notes so I don't miss any key points. Please know your responses will be grouped and coded with all interviewees so they are not identifiable*

- 6) *Please read the **Consent Form** (hand form to participant). If you have no questions please sign you agree to participate. Once signed...*

- 7) *I now will start the tape recorder and timer ...**Start tape recording and timer now...***

- 8) *I now have a few **Demographic questions to ask you** for the purpose of providing context in the analysis phase. This information will be aggregated to maintain your anonymity.*

- 9) **Give Participant Table 8** _ Pain P/P Target Behaviors policy

- 10) *I also would like to take this opportunity to **clarify some terminology***

RNAO BPG,

Pain P/P - Pain policy and protocol,

KTIs efforts or strategies,

Collective social processes (processes and procedures unique to their unit),

Factors (influences that may inhibit or promote your use of the Pain P/P)

Notion of sustainability (long term over time)

11) *Do you have any questions before starting...?*

Demographic Form

Pain Policy/Protocol Study

Participant Code _____

Personal Information

1. What is your age category using 5-year intervals?

- 20 yrs - 25 yrs
 26 yrs – 30 yrs
 31 yrs – 35 yrs
 36 yrs – 40 yrs
 41 yrs – 45 yrs
 46 yrs – 50 yrs
 51 yrs – 55 yrs
 More than 56 yrs

Education training

2. What is your highest level of Nursing education.

- Diploma RP,
 Diploma RN
 Bachelor (BScN)
 Post RN program
 Masters in Nursing
 PhD in Nursing
 Other (Specify type) _____

Work Experience as a nurse

3. How many years of experience in Nursing do you have?

- <2 year
 2-5 years
 6-10 years
 11-15 years
 16-20 years
 Over 20 years

4. What is your current position at Ottawa Hospital and how long have you held this position?

Position _____ Years _____

- Prompts Registered Nurse
 Registered Practical Nurse
 Team/Clinical Leader
 Clinical Educator
 APN
 Program Manager
 Coordinator

Thank you for your participation

Letitia Nadalin Penno

Interview Pain P/P Target Behaviors Guide

Pain P/P Recommendation As per Procedure	Pain P/P Target Behavior
1	Screen inpatients for presence of pain on Each initial contact/admission (2007 & 2013)
2	Ongoing assessments of Pain using standardized tools Once per shift (2007). During hourly rounding (2013)
3	Establish an individualized goal for pain management with the patient. (2007 & 2013)
4	Collaborate with the patient in establishing an individualized strategy and interventions to manage the patient's pain based on the best evidence and available resources. (2007 & 2013)
5	Assess effects of pharmacological interventions at peak effect following administration and on an ongoing basis.
6	Consult with pain management experts as required (i.e. Acute Pain Service, Chronic Pain Service, Palliative Care Service, Pharmacy, Physiotherapy). (2007 & 2013)
7	Educate pt and families about their individualized pain management plan, medications, indications for treatments or unexpected therapeutic effects, possible side effects, and method of pain assessment and to report unrelieved pain. (2007 & 2013)
8	Ensure ongoing documentation reflects patient goals, pain management plan, assessment, response to treatment, outcomes and communication to interprofessional team.
9	Completion of self-learning training modules for nurses and physicians.

Interview will only focus on the shaded part

Maximum sample questions for Corporate Level Nurses

Interview Guide for Corporate Level Nurses (Maximum question)

Questionnaire Corporate Level	DSF Concept Mapping	Reflective Notes – Jottings
<p>Mapping Key INT = Intervention, PS = practice Setting(context), ECO = Ecological system (external to org)</p>		
<p>Corporate Level refinements How did it come about that the hospital decided to implement the RNAO Pain Assessment and Management BPG (Pain P/P)?</p> <p>Who was involved? For example..... (7.0) Who were the stakeholders btwn 0-2 yrs? (7.1) Who are the stakeholders presently?</p> <p>Between 2006-2009, I understand your hospital was involved in being a Best Practice Spotlight Org. (BPSO). Can you tell me if and how this may have influenced the development of the Pain P/P?</p> <p>3 How was the Pain P/P developed at your hospital?</p> <p>How long did it take to finalize the Pain P /P for use hospital wide?</p> <p>5 Can you describe the implementation process to integrate/embed the Pain P/P in the hospital at the onset? (During 0-2 yrs) and how long did it take?</p> <p>Was the Pain P/P refined or adjusted in the first 0-2 yrs? (Prompt- adaptations <i>for unit use within local unit context</i>)</p> <p>If yes Why? _____ and how?</p>	<p>ECO ? PS? Or INT ? driven</p> <p>INT = practitioners PS = staff, leaders, supervisors/educators</p> <p>ECO ? PS ? INT? perspective</p> <p>INT = cpnts PS= org systems/ training /leadership</p> <p>ECO-=Mkt demand, policy makers, funders PS= infrastructure, staffing, org culture</p> <p>INT= delivery platform PS = internal sys</p> <p>INT?</p>	

<p>Corporate Level adaption of INT</p> <p>0 Was the Pain P/P refined or adjusted over the 10 years between 2007-2017 years? If so why ___ and how? OR most recently? <i>(Prompt-This may differ by service, program or by unit because it is based on daily routines, org structure and MD rounds etc.)</i></p> <p>1 Did your hospital consider the use of any continual refinement processes or frameworks to support initial and/or ongoing implementation of the Pain P/P in practice? (0-2yrs and now?) <i>(Prompt-RNAO imp toolkit or slides?)</i></p> <p>Is there a long-term plan for the ongoing refinement of the Pain P/P within the organization?</p> <p>Is there a process for <u>monitoring the need for refinements</u>? <i>(Prompt = Cttee and champions, biannual prevalence training, audit & Feedback process commitments).</i></p> <p>What target behs do you think still need to be integrated into routine practices at the hospital, dept/unit levels?</p>	<p>INT= components, delivery platform, practitioners, outcomes</p> <p>ECO ? external source PS ?internal source</p> <p>INT</p> <p>INT = outcomes PS = infrastructure</p> <p>INT = cpnts</p>	
<p>Ongoing Feedback- Corporate Level</p> <p>Is there a <u>process in place to measure Pain P/P use</u> at the corporate level? <i>(Prompt = use Table 8 for each Target Behs)</i></p> <p>Are there any <u>structures in place to measure Pain P/P use</u> at the corporate level? <i>(Prompt = use Table 8 for each Target Behs)</i></p> <p>Are there any <u>reports</u> (or audits/surveys) helpful to <u>maintain the ongoing use</u> of the Pain P/P or specific target behs?</p>	<p>INT –delivery platform,</p> <p>PS= business model, info systems, policy</p>	

<p><i>(Prompt = use Table 8 for each Target Behs)</i></p>	<p>PS = supervisors, training, staffing</p>	
<p>Corporate Culture & Voltage over time</p> <p>From a corporate perspective or an organizational perspective</p> <p>What <u>internal factors</u> (if any) have influenced the culture/climate of ongoing improvement within the hospital over time? And presently? <i>(Prompt = i.e. leadership, auditing process)</i></p> <p>If No ...can you tell me more or why you feel that way?</p> <p>Do you think any <u>external factors</u> have influenced the culture of ongoing use of the Pain P/P over time? And presently? <i>(Prompt =i.e., accreditation)</i></p> <p>What intervention (Pain P/P) related <u>factors</u> (if any) do you think have influenced a culture of improvement in your hospital/? <i>(Prompt – i.e., RNAO EBP Guideline updates)</i></p>	<p>PS = internal</p> <p>ECO = external</p> <p>INT= outcomes, delivery platform</p>	
<p>Strategies and Factors that influence the current use of the Pain P/P</p> <p>More specifically related to the 6 target behaviors...</p> <p>Are there factors (internal or external) that influence their sustained use corporately within the hospital? at the present time? <i>(Prompt = use Table 8 for each Target Behs)</i></p> <p>What strategies do you think are most helpful to sustain the momentum or use of the 6 target behaviors corporate-wide within the hospital, at the present time? <i>(Prompt = use Table 8 for each Target Behs)</i></p>	<p>PS, ECO</p> <p>INT, PS, ECO</p>	
<p>Learning Org Capacity-Corporate level</p> <p>Can you think of any corporate problem-solving approaches used to support the ongoing use of the Pain P/P?</p>	<p>ECO- factors= other practice settings, policy/regulation, market forces</p>	

<p>Can you think of any unit problem solving approaches used to support the ongoing use of the Pain P/P?</p>	<p>PS –climate structure, business model, or org culture</p>	
<p><i>Ask about the following 7 critical factors if not mentioned in this question to collect historical data related to the 7 key elements the RNAO suggests are critical factors to become a BPSO)</i></p> <p>I recall you indicated ___ Or ___ Do you recall anything about ___</p> <p>the use of a systematic planned approach for guideline selection for implementation?may use a participatory process?</p> <p>treating guideline Implementation as a change process?</p> <p>utilizing formal and informal leaders? (i.e. champions, Imp teams, steering cttees at all stages of BPG Imp)</p> <p>linking BPG Implementation strategies to organizational context? (<i>prompts govt priorities, directives, strategic priorities, QI initiatives, other clinical initiatives</i>)</p> <p>selecting Imp strategies based on assessment of facilitators & barriers of knowledge uptake?</p> <p>integrating the RNAO Pain P/P recommendations into organizational structures and processes to ensure sustained use?</p> <p>become part of the broader network of orgs working to create EBP cultures and Imp BPGs.?</p>	<p>PS or ECO</p> <p>PS</p> <p>PS</p> <p>ECO and PS</p> <p>PS = climate structure</p> <p>PS = business model, info system</p> <p>ECO= other practice orgs/</p>	
<p>Is there anything else we have not covered, you feel I should know about, that influence nurses' sustained use of the Pain P/P at the corporate level.?</p>		

12) *Thank you for your participation in this study*

13) *I may follow up after this interview to clarify or discuss further their ideas if needed*

14) *Stop tape and timer, record.*

Additional file 2.3. Standards for Reporting Qualitative Research (SRQR)

NO.	TOPIC	LINE
Title and Abstract		
S1	Title	Line 3 - 4
S2	Abstract	Line 32 - 78
Introduction		
S3	Problem Formulation	Line 145 - 164
S4	Purpose or research question(s)	Line 165 - 171
Methods		
S5	Qualitative approach and research paradigm	Line 172 - 185
S6	Research characteristics and reflexivity	Line 186 - 202
S7	Context	Line 203 - 221
S8	Sampling strategy	Line 232 - 237
S9	Ethical issues pertaining to human subjects	Line 280 - 288
S10	Data collection methods	Line 222 - 231
S11	Data collection instruments and technologies	Line 238 - 245
S12	Units of study	Line 253 - 254
S13	Data processing	Line 255 - 265
S14	Data analysis	Line 246 - 265
S15	Techniques to enhance trustworthiness	Line 266 - 279
Results		
S16	Synthesis and interpretation	Line 289 - 557
S17	Links to empirical data	Line 558 - 729
Discussion		
S18	Integration with prior work, implications transferability and Contributions to the field (conclusion)	Line 558 - 729 Line 730 - 749 Line 766 - 781
S19	Limitations	Line 750 - 765
Other		
S20	Conflicts of interest	Line 813 No competing interests
S21	Funding	Line 815 NA

Chapter 3

Determining nurses' adherence to selected guideline recommendations ten years after organizational adoption: results of a chart audit for embedded subcases within an acute care setting

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Abstract

Background: In response to the increasing demand to improve patient outcomes, many healthcare organizations have undertaken a number of quality improvement initiatives, including the use of evidence-based practices (EBPs) such as guidelines. However, there is little empirical understanding of the longer-term use of guideline-based practice and how to ensure their survival.

Purposes: To examine and compare subcase nurses documented ongoing use of a Pain Assessment and Management Policy and Protocol (Pain P/P), and to determine levels of adherence to selected Pain BPG recommendations, ten years post implementation.

Methods: We undertook a retrospective audit of nurses' use of five Pain P/P recommendations on two selected subcases (medicine care units) within a multi-site acute care center in Canada. The two units were selected by organizational representatives based on maximum variation, their willingness to participate, their knowledge of annual prevalence results, site uniqueness and potentially contrasting patterns of findings.

Results: Data included 100 inpatient charts per subcase for the selected timeframes of August to October 2016, January to March 2017 and July to October 2017. High adherence rates were evident in both subcases for three out of five recommendations: assessing pain on admission to the unit (R1), once per shift and ongoing hourly assessments (R2), and establishing interventions to manage pain (R4). There was low adherence to the recommendation providing patient education related to pain management (R7) by both subcases. There was a significant difference in the adherence to establishing a Pain Goal for patients who had pain during their hospital stay (over 5 shifts) (R3) with low adherence in subcase 1 and moderate adherence in subcase 2.

Conclusions: At the unit level, Medicine Care nurses' adherence to most (3/5) of the selected recommendations examined within the Pain P/P is met ten-years post implementation. Combined corporate and departmental-level KTIs designed to standardize and monitor nursing documentation practices implemented over time were perceived to be effective at promoting ongoing use of recommendations R1, R2, and R4. Findings indicate further examination of point to care is necessary to uncover factors and informal processes/practices influencing nurses' documentation of recommendations R3 and R7.

Keywords: guideline adherence, best practice guidelines, evidence-based practices/programs, interventions, innovations, methodology, retrospective chart review, routinization

Contributions to the Literature

- Embedding recommendations into standardized documentation forms to prompt nurses to formally document BPG recommendations promotes sustainability.
- Integration of recommendations into daily processes and practice routines (e.g., alongside other routine observations/assessments) supports formal documentation of recommendations
- A focus of organization-wide monitoring and feedback initiatives promotes sustainability
- Uncovering informal processes that influence the accuracy of recommendation documentation of nursing interventions may provide insight for the design of KTIs to promote adherence.

Following the descriptive case study (Article #1), I set out to examine two Medicine care unit (subcases) nurses use and adherence to selected Pain P/P recommendations at the ten-year timeframe within the same acute care setting. This chapter (Article #2) presents results from the quantitative component of the embedded comparative subcase study using mixed methods.

3.1 Background

Systematic reviews (1, 2) reveal partial adherence rates exist among allied healthcare professionals, including nurses, post implementation across interventions and program components at a mean timeframe of 2 to 2.6 years (i.e., minimum at 1.5 yrs. to a maximum of 7 years post implementation). In a recent review by Cowie et al (3) examining the factors influencing sustainability of a variety of hospital based innovations, sustainability was inconsistently reported across 88% (28 out of 32) of studies that ranged from 6 months to 8 years. Evidence demonstrates, implementation success does not guarantee long term full adherence to clinical practice guidelines over time (1-4). In fact, evidence of variable adherence rates to EBP recommendations within acute care contexts (3, 5, 6) demonstrates their sustainment in clinical practice remains a practical problem. Empirical understanding of the longer-term use of guideline-based practice is needed to address varying rates of adherence to EBPs among acute care nurses in practice.

In response to increasing demand to improve patient outcomes, like many other healthcare organizations, our study site undertook a number of quality improvement initiatives, including the use of best practice guidelines (BPGs). In 2007, the Nursing department initiated a Best Practice Guideline Implementation Program (BPG-IP), which involved implementing several Registered Nurses' Association of Ontario's (RNAO) Best Practice Guidelines (BPGs) targeting specific patient care needs to improve the quality of nursing care. One key challenge

identified was the need to standardize pain care across ‘all’ inpatient nursing units. To address this challenge, a Pain Assessment and Management Policy and Protocol (Pain P/P) (see Table 3.1), derived from the RNAO Assessment and Management of Pain BPG (RNAO Pain BPG) (7, 8), was established as a ‘corporate priority’ requiring ‘organizational-wide efforts among all disciplines. Initial efforts were directed towards the development of the Pain P/P, followed by a multi-modal implementation strategy which included corporate and unit level knowledge translation interventions (KTIs) designed to facilitate consistent pain care on all nursing units (see Table 3.2). Nursing departmental goals for the BPG-IP remain: (i) to improve patient outcomes and the quality of nursing care, and (ii) to support the utilization of evidence-based practices (EBPs) and the evaluation of nurse sensitive indicators organization-wide. At the unit level, the goal remains to improve nurses’ performance of evidence-based care and related documentation practices.

Guideline Recommendation-Practice Gap.

Organizational BPG-IP documents and Nursing Professional Practice (NPP) representatives reported a 10-20% hospital-wide annual increase in adherence to selected Pain P/P recommendations (e.g., via monitoring of nurses’ documentation on established pain care tools) was realized between 2007-2010, followed by improved patient satisfaction scores related to pain care by 2013, which then leveled off (see Additional file 3.1., Rt1, ID1). Despite this early implementation success, organizational representatives reported an evidence-practice gap on the Medicine care units, ten years post implementation. Specifically, in 2016, nursing leaders indicated biannual prevalence results revealed Pain P/P recommendations were not being used optimally or not documented on Medicine care units compared to all other inpatient units. Additionally, a review of the data points available related to biannual Pain P/P target behaviours

and related prevalence measures audited over time (e.g., between 2010-2016) changed based on departmental priorities (see Table 3.3). Together, these findings provided an unclear picture of Medicine care unit nurses' use of the recommendations. Nursing representatives recommended an examination of Pain P/P guideline adherence documentation was warranted on the Medicine care units to support ongoing quality improvement.

Measuring Guideline Adherence

One of the challenges in measuring ongoing use of a complex EBP, such as Pain P/P over time is determining what constitutes guideline adherence (9). Researchers have defined guideline or protocol adherence as “the extent to which the EBP or guideline is delivered as intended” (9, 10). Data sources for measuring adherence include practitioner self-reports, abstraction from medical records (MRs), observations of care provided, patient reports of services or administrative data sets (9). The degree to which practitioners continue to adhere to guideline recommendations involves determining indicators for targeted behaviours and computing frequency measurements. Based on similar studies, computed adherence rates to guideline recommendations can be described as high (80% to 100%), moderate (between 50%-80%) or low (less than 50%) for each targeted behaviour (9, 10). In this study, we used these previously determined adherence ratings to compare and describe our aggregated unit level adherence rate for selected guideline target behaviours (9, 10).

3.2 Purpose

The aim of this study was to determine nurses' use and adherence to five selected Pain P/P recommendations, established in 2007, on two selected medicine care units (subcases within the study site), ten years after adoption of the recommendations by the hospital.

3.3 Methods

Study Design

For the quantitative component of the embedded comparative subcase study using mixed methods, we conducted a retrospective chart audit of selected Pain P/P recommendations, ten years post implementation, to determine subcase nurses' use of the recommendations within the study site.

Setting and Pain BPG Recommendations

The setting was a large urban, tertiary center, in Canada composed of three campuses with approximately 50,860 patient admissions annually, over 60 inpatient and outpatient units combined, just over 1122 staffed beds and more than 4500 nurses. In 2007, the Pain P/P was comprised of 8 recommendations (R): “Screen inpatients for the presence of pain on each initial contact/admission (R1) , and assess ongoing pain for inpatients once per shift and during hourly rounding (R2), establish an individualized goal for pain management with patients having pain (R3), collaborate with patients to establish an individualized strategy and interventions to manage the patient’s pain (R4), routinely evaluate patient outcomes and effectiveness of interventions and make changes as required (R5), consult with pain management experts as required (i.e. in complex situations, and or escalating or unrelieved pain after a reasonable trial of management) (R6), educate patients having pain about their individualized pain management plan (R7), and ensure ongoing documentation reflects patient’s goal and pain management plan, assessments, response to treatment, outcomes and communication to inter professional team (R8)” (see Table 3.2). In 2013, the Pain P/P was updated, with the addition of a ninth recommendation based on the 2013 RNAO Pain BPG (8): “R9- nursing staff and physicians are responsible to ensure completion of self learning modules for pain assessment and management

on the electronic learning management (ELM) system located on” the hospital intranet.

Recommendations 1 and 2 are outlined in the policy as required assessments. All remaining recommendations are dependent on patient need. For this study, we examined 5 of 9 Pain P/P recommendations (R1-R4, R7) based on the following reasons:(i) they can all be evaluated clinically using an objective measure (e.g. numeric rating, prescribed intervention, pain goal rating), (ii) they are all explicitly documented in specified locations within inpatient health records, and (iii) they are all supported by one of the highest levels of evidence (1b), namely at least one randomized control trial (7, 8).

Sample

Selection of Units

Two out of the five medicine care units in the hospital were purposefully selected that represented “critical sub-cases” (11) among the existing units. Organization representatives’ recommendations (e.g., Corporate BPG Coordinator, all five Medicine Unit Managers, and the Director–Medicine Care) indicated their selection was based on maximum variation or potentially contrasting patterns of findings, Managers’ knowledge of the history, their willingness to participate, annual prevalence results, site uniqueness such as differing nursing staff, unit Managers and Educators, and ensuring representation from the different campus locations within the multi-site center. Selected units were each comprised of three inpatient wards, not all on the same floor, having approximately 80 beds and similar admission numbers.

Chart Sample. A total of N=200 charts (e.g. 100 charts per subcase) were randomly sampled for this study to compare the recommended best practice to documented practice (12). Sample size was based on 95% percent confidence interval with an approximate width of 0.20 (plus or minus 10 %) and a 50% or less estimate that unit inpatients experienced the measure of

interest (e.g., actions related to adherence recommendations). Sample criteria included charts which contained patient consent to participate in research-based initiatives and a minimum three-day length of stay (LOS) to ensure completeness and avoid gaps in documentation associated with short-stay admissions.

Data Collection

We reviewed 29 documents (e.g., 7 reports, 20 internal, and 2 external) related to the implementation of the Pain P/P to gain a historical perspective of the activities that influenced protocol use over time (see Additional file 3.1). This was followed by an audit of Medicine unit nurses' documentation of their use of selected recommendations within the Pain P/P ten years post initial implementation.

The period of study for this audit was between August 2016 and October 2017, ten years post initial implementation of the Pain P/P. Data collection occurred in January–March 2018. Secondary de-identified inpatient data was obtained with the assistance of the medical records department. One hundred randomly selected 'unique' inpatient charts, for each subcase, were audited for the selected timeframes of August to October 2016, January to March 2017 and July to October 2017. The timeframes used were outside prime holiday periods and preceded established internal biannual audit training and survey processes.

Measures for Recommendation Adherence

Measures were established for each of the selected recommendations under review in this study (see Table 3.4). For each recommendation, we specified inclusion and exclusion criteria and related response options: criteria met or not met. We used the 'first shift on the unit' as a measure of '*on admission*', and the 'next five consecutive shifts' as a measure for '*ongoing assessments*' (during patient stay) to maintain measurement consistency. Documentation sources

were specified for each recommendation. Unit scores were derived by computing the number of yes (met criteria) responses over total possible number of patients for whom the recommendation was relevant.

Quantitative Data Extraction Tools

Data were collected using the following tools developed for this study: (i) process algorithm (see Figure 3.1) (ii) a coding dictionary (see Additional file 3.2), and (iii) an excel data extraction spreadsheet (see Additional file 3.3) based on measures associated with the five selected recommendation (see Table 3.4). To reduce bias, audit tools were subject to “face validity” testing by two clinical representatives from the site and one knowledge user on the research team, previously employed at the study site, through review and feedback (13) then pilot tested. Two reviewers (LNP, DCY) independently assessed the “reliability” of the data extraction spreadsheet and coding dictionary for the first 15 records to ensure accuracy of data extracted from the records (13). Specifically, minimal modification to the instruments were made after 10 records to enhance specification. After achieving 100% accuracy of data extracted from records 11 to 15, the remainder of the audits were completed by LNP. Post audit random testing of data calculations was conducted by another independent reviewer (NG).

Data Analysis Strategy

We analyzed quantitative data derived from audits using descriptive statistical techniques. Percentages for each indicator for the five recommendations were calculated for each subcase, then we compared findings to adherence rate categories (high to low) consistent with previous studies (10). We compared differences in proportions (relative adherence frequencies) between the independent groups (units) using Pearson’s chi-square test (non-parametric test of independence) for each of the recommendations (13) for the ten-year timeframe. We triangulated

findings with available documents listed in additional file 3.1 to validate the interpretation and inferences attained from the adherence scores (14).

3.4 Ethical Consideration

This audit received research ethics approval thorough the Research Ethics Board Council for a network of Health Science Centers, the local affiliated University Research Ethics Board, and the participating organization's Nursing Department's Chief Nursing Officer and Director, Medicine Care as part of this dissertation. The internal research document request review process then was obtained. All extracted data was encrypted and password protected. To ensure rigor, the researcher (LNP) and a site representative, maintained a table linking inpatient charts and a coded reference number for each. Data remains stored in a dedicated file in a secure location. We used the chart audit standards for quality set out by Gregory et al (12).

3.5 Results

Inpatient Demographics

Patient profiles were similar on both subcases (see Table 3.5). Female patient admissions on subcases represented 55% and 58 % of admissions respectively. The average patient age was 72 on both units. All patients were admitted from the emergency department, except 2 for subcase 1, and 6 for subcase 2. On both subcases, the primary admission diagnosis was decline/failure to cope/generalized weakness (referred to as Non specific), followed by a respiratory diagnosis. All other admission diagnoses for both subcases included system related illness (e.g., gastrointestinal, neurological, cardiac, musculoskeletal). Length of stay was 9 days for subcase 1 and 11 days for subcase 2.

Adherence Rates by Recommendations

Adherence ratings for subcase 1 and subcase 2 were similar for all recommendations of interest except R3 (setting pain goal) (see Table 3.6).

Recommendation 1 and 2

We found high adherence of the recommendations: -assessment of pain on admission to the unit R1; and assessment of pain once per shift R2a - and during hourly rounds R2b. Documentation demonstrating adherence to these recommendations was evident by nurses' reporting patients' pain scores using evidence-base tools (e.g., scale of 0-10, Wong-baker face scale). Nurses on both subcases consistently charted pain assessment scores on admission (R1) for nearly all patients (98% of patients on subcase 1 and 99% on subcase 2). Adherence to R2a and R2b was also high. For both subcases nurses consistently documented pain scores 'once per shift' over five consecutive shifts (R2a) (98.5% and 98% of patients on subcases 1 and 2 respectively). Nurses on both subcases also consistently documented they conducted 'hourly rounds' which includes assessing patients for pain (R2b) (98.75% and 99.5% patients on subcases 1 and 2 respectively). Of note, actual patient pain scores were not evident for each hourly check (R2b) on the nursing-specific 24-hour grid form, nor in the interprofessional notes (IPNs). Using chi-square tests, we did not find a significant difference in proportions (by subcase) for the following recommendations: assessing patients on admission-R1, assessing patients once per shift -R2a, and assessing patients during hourly rounds -R2b (see Table 3.7).

Recommendation 4

A total 53 records for subcase 1 and 55 for subcase 2 had pain scores documented during their stay in established nursing documentation forms in the clinical records. We found high adherence rates to recommendation R4 (establishment of interventions to manage pain) for those

patients who had pain score greater than 0 during their stay on both subcases (subcase 1=98% and subcase 2 =100%). We were unable to calculate a chi square test for this recommendation due to the zero frequency in subcase 2. Similarities were noted between the subcases with respect to the type of interventions prescribed to manage pain (e.g., pharmaceutical, non-pharmaceutical or combined). Evidence revealed the most common intervention to manage pain was prescribed pharmaceuticals for both subcases (subcase 1= 35/53 records, subcase 2= 45/55 records). A combination of pharmaceutical and non-pharmaceutical interventions (such as hot and cold compresses, warming blanket, repositioning, TENS, pain blocks, and brandy) were noted for both subcases. On subcase 1, only three patients or 6% (3/53) with pain had pharmaceutical plus methadone interventions prescribed and one patient or 2% (1/53) had no pain management intervention(s) documented. Overall, no evidence was found indicating nurses collaborated with patients to establish the pain management strategies in the IPNs on both subcases.

Recommendation 3

For subcase 1, only 36% (19/53) of the patients with pain had a pain goal documented, reflecting a low adherence to this recommendation. For subcase 2, 58% (32/55) of patients with pain had a pain goal documented, reflecting a moderate adherence to this recommendation. Using chi-square tests, we did find a significant difference in proportions for adherence to R3 - establishing a pain goal for patients with pain scores of 1 or greater between subcases 1 and 2, $\chi^2(df=1, N=108) = 5.401 @ p<.05$. Thus, more patients on subcase 2 had a documented pain goal by nurses than on subcase 1.

Recommendation 7

We found low adherence to recommendation R7 (educate patients/families about their pain management plan as required) during the entire stay. According to the chart (i.e., the

established Patient Education Form and the IPNs), no patients or families received education as part of their pain management plan. We found one Patient Education Form completed by a nurse on subcase 2, but its content was unrelated to pain.

3.6 Discussion

The chart audit revealed high adherence to recommendations R1 (pain assessed on admission), R2 (pain assessed once per shift and hourly rounds), and R4 (establishment of interventions to manage pain) by nurses on both subcases ten years post implementation. We hypothesize there are at least three reasons for this high adherence, all of which stem from the combined corporate and nursing departmental-wide KTI efforts designed to standardize nursing documentation and unit level practices. First, the established standardized nursing documentation forms prompt nurses to formally document the specific required assessments and related pain outcomes for these recommendations. This was evident in a previous study in Sweden where the implementation of a standardized nursing wound care record resulted in improved documentation among nurses (15). Second, the integration of pain assessment into daily processes and practice routines (e.g., alongside other routine hourly observations/assessments) may have positively supported nurses' formal documentation of ongoing assessments and related patient outcomes for recommendations (R2a and R2b). A previous study found medicine care unit nurses improved their pain assessments when they adopted the philosophy that pain was the fifth vital sign and thus began to assess pain as part of their routine hourly checks or vital sign assessments (16). One key aspect related to ongoing assessments (R2b) observed was the lack of documentation of the actual pain scores by nurses during hourly checks. Combining pain assessments with other routine checks may have contributed to the incomplete documentation of these pain related outcomes. Third, these recommendations remain a prime focus of biannual

organization-wide auditing within this study site and as a result ongoing feedback may be reinforcing this practice. In a previous study, audit and feedback were reported to influence or promote pain assessment and documentation practice among hospital nurses (16). It is unclear if one or a combination of all three explanations made the difference or if there are other unknown factors influencing these target behaviours. In reality, over time it is likely that all three played a role.

High adherence to recommendation R4 (establishment of interventions to manage pain) for those patients experiencing pain during their stay was revealed by the audit. Previous studies have demonstrated that pain management interventions should aim to reduce the severity of pain (17, 18) and improve quality of life (16). To achieve this, the RNAO Pain BPG recommends an approach that combines pharmaceutical and non-pharmaceutical interventions to meet patients' needs (7, 8). Our findings reveal subcases used both types of interventions to manage patients' pain. No documentation in the IPNs was available to determine if nurses collaborated with either the patients and or the interprofessional healthcare team members to discuss pain management choices. However, documentation of traditional (e.g. TENS, pain block) and non-traditional non-pharmaceutical (e.g. warming blankets) use was evident and likely based on patient preferences (19, 20).

We found evidence of an evidence-practice gap for recommendations R3 (setting pain goals) and R7 (educating patients/families about their pain management plan) in both subcases ten years post initial implementation. Although we found a significant difference in adherence to R3 (i.e., moderate adherence) establishing pain goals on subcase 2 compared to subcase 1 (i.e., low adherence), there is still room for improvement related to this recommendation on both subcases. Further investigation is warranted to examine unit level factors influencing this

difference (e.g., for R3) and the lack of documentation (e.g., R3, R7) in the clinical records related to these recommendations. Furthermore, it is unknown whether these recommendations were being followed but not documented, or if they were not followed and therefore not documented. We hypothesize three reasons for these practice gaps related to R3 and R7: (i) limited auditing and feedback over time, (ii) accuracy of nurses' documentation, and (iii) the use of related informal nursing practices not documented. A review of the biannual Pain P/P target behaviour prevalence measures audited over time (e.g., between 2010 -2016) revealed limited auditing of R3 since 2010 and R7 since 2013 (see Table 3.3). The "effectiveness of the system to monitor progress" (e.g., establishing audit and feedback processes) (16, 21) is a key factor identified in the literature to sustain the use of clinical guidelines. The lack of ongoing monitoring and reinforcement has likely in part contributed to the low to moderate adherence ratings by nurses for both R3 and R7.

Secondly, the accuracy of nursing documentation among acute care nurses has been studied in similar acute care settings. The authors of these studies have reported low scores on (i) the accuracy of nursing intervention documentation (22, 23) and (ii) that nurses' documented EBP 'assessments of patient status' more frequently than the 'nursing interventions they were performing' (23). Further investigation is needed to examine whether the adherence rates for R3 and R7 are due in part to a lack of accurate documentation. If so, effective KTIs to enhance or formalize documentation are required.

Thirdly, these practice gaps may stem from other unit level practices/interventions that are influencing nurses lack of documentation. For example, in 2013, the use of bedside tools and related processes were implemented to communicate pain scores and pain goals (e.g., whiteboards and bedside shift reports) in Table 3.1. Patient related outcomes communicated on

or by these informal practices/interventions for R3 are not evident in the clinical records. The same reasoning likely applies to R7. We found no documentation indicating that patients received pain education related to their pain management plan in the IPNs or on the 'Patient Education Form' specifically designed for reporting this sort of information. It is unclear whether education is being offered to patients, or not, or if there are other potential informal undocumented practices/processes being used by nurses to educate patients/families. Despite the availability of a nursing specific form to document patient related education, the lack of ongoing monitoring and reinforcement over time likely has played a role in the low adherence to R7 as well. Further investigation is needed to uncover underlying factors and informal processes influencing the accuracy of documentation requiring nursing interventions for R3 and R7 in order to develop affective KTI to promote adherence. Similar combined corporate and departmental level efforts are likely needed to enhance nurses' adherence to these recommendations.

On the basis of our results, unit nurses demonstrated a range of high to low adherence to five selected recommendations within the approved Pain P/P, ten years post implementation. In fact, nurses continue to adhere to Pain P/P recommendations R1, R2a, R2b, and R4. These findings demonstrate standardized documentation practices and ongoing audit and feedback related to guideline recommendations can promote formal documentation of recommendations necessary to accurately measure sustainment. There is room for improvement related to R3 and R7. The significant difference in adherence to R3 among units highlights the need for further investigation at the point of care to uncover factors and informal processes/practices influencing nurses' performing and documenting BPG recommendations in tertiary settings.

3.7 Strengths and Limitations

The retrospective audit approach provided access to readily available data that reflected nurses' documentation related to the recommendations. The measures used to assess adherence to policy recommendations were derived from site established nursing charting policy and procedures designed to improve quality standards and related documentation performance. One of the challenges in measuring nurses use of complex EBPs, such as pain assessment and management, is determining what constitutes adherence. The use of levels of adherence (high, moderate, low) established in previous studies, provided an external benchmark to compare unit findings for each of the recommendations in this study, thereby adding to the current knowledge related to measuring guideline adherence. Our findings further confirm that retrospective auditing of subcase nurses' documentation can be used as a tool to provide partial insight into nurses' adherence to guideline recommendations at a chosen point in time post implementation, such as a ten-year timeframe (10).

The results of this study are the product of design and methodological limitations. For example, participating subcases were not randomized but rather recommended by internal representatives. To address this limitation, two out of the five medicine care units were selected based on the following criteria: maximum variation or potentially contrasting patterns of findings, different nursing staff, different managers, and site location to ensure representation of the units. Given the retrospective nature of an audit we were dependent on information already available in the form of inpatient clinical record which may have led to limited representativeness of data concerning care provided as it relates to the target behaviors within the EBP under study. To address this, all required documentation forms, interprofessional notes and consultation records were reviewed within the medical record. A key element to consider when

verifying nurses' adherence to BPG recommendations is the accuracy of nurses' documentation in clinical records (recording bias). Notably, it is known that medical records, as a secondary data source, provide a rich source of critical information that is considered to be legally and medically accurate and reliable (24). To address the challenge of 'reviewer bias' a coding dictionary was developed apriori and refined during extraction tool testing. To reduce researcher's influence on measurement, 'face validity' testing of the instrument was completed with clinical knowledge users on the research team and site representatives. A pilot was conducted to test the 'reliability' of the extraction tool by two independent researchers. Post audit, random testing of data calculations was conducted by another independent reviewer. Finally, data extraction was limited to records which contained patient consent to participate in research-based initiatives and a minimum three-day length of stay (LOS) to ensure completeness and avoid gaps in documentation associated with short-stay admissions.

3.8 Conclusion

We sought to verify whether or not, at the ten-year timeframe, nurses adhered to five selected recommendations of the Pain P/P. We conclude, Medicine Care nurses are adhering to most (3 out of 5) of the selected recommendations we examined within the Pain P/P, ten-years post implementation. Combined corporate and departmental-wide level KTIs/strategies designed to standardize and monitor nursing documentation practices and processes related to these recommendations implemented over time are perceived to be effective at promoting nurses' documentation of their interventions related to R1, R2, and R4. Our findings reveal the significant differences in adherence to R3 between subcases and the lack of documentation of R7 indicate further examination at point to care is necessary to uncover factors and informal processes/practices influencing nurses' documentation of recommendations R3 and R7.

List of Abbreviations

APN – Advance Practice Nurse
APS - Acute Pain Service
BPG - Best practice guideline
BPG-IP - BPG Implementation Program
BPSO – Best Practice Spotlight Organization
DSF – Dynamic Sustainability Framework
EBP – Evidence based practice
ED# - External document code, numbered 1 to 2
F/M/T – Framework/Model/Theory
ID# - Internal document code, numbered 1 to 20
IPN – Inter-professional notes
KTIs - Knowledge translation interventions
MR - medical record
N1-# Case-1 – participant/informant code
N2-# Case-2 – participant/informant code
P#- Participant informant /code
Pain P/P – Pain policy/protocol
PCS - Palliative Care Service
Rt# - Report code, numbered 1 to 7
R# - Recommendations 1 to 7 within the Pain BPG guideline
RNAO – Registered Nurses Association of Ontario

Declarations

Ethics approval and consent to participate

We obtained ethical approval from the Research Ethics Boards for the Ottawa Health Science Network (OHSN-REB) and the affiliated Office of Research Ethics and Integrity (file #: A10-17-P2) of the University of Ottawa. The participating institution also granted approval of the study.

Consent for publication

All inpatient records obtained from medical records provided prior written informed consent to participate in research-based initiatives and to publish results anonymously.

Availability of data and material

The datasets generated and analysed during this study will be available from the corresponding author on reasonable request.

Competing interests or conflicts of interest

The authors declare that they have no competing interests, and no conflicts of interest.

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Not applicable

Author's contributions

LNP and thesis committee members (IG, BD, CB JS) contributed to the conceptualization of the study. LNP undertook the primary role in implementing the study; developing the extraction tools, conducting the document review and audit, and leading the analysis and reporting activities. LNP and DCY conducted face validity testing of audit extraction tools. LNP independently conducted the quantitative analysis of the results and produced the tables, figures and additional files. JS, IG, and CB provided input into the data collection, analysis and interpretation. The initial draft of the manuscript was prepared by LNP, then circulated among all coauthors for comments and revision. All coauthors read and approved the final manuscript.

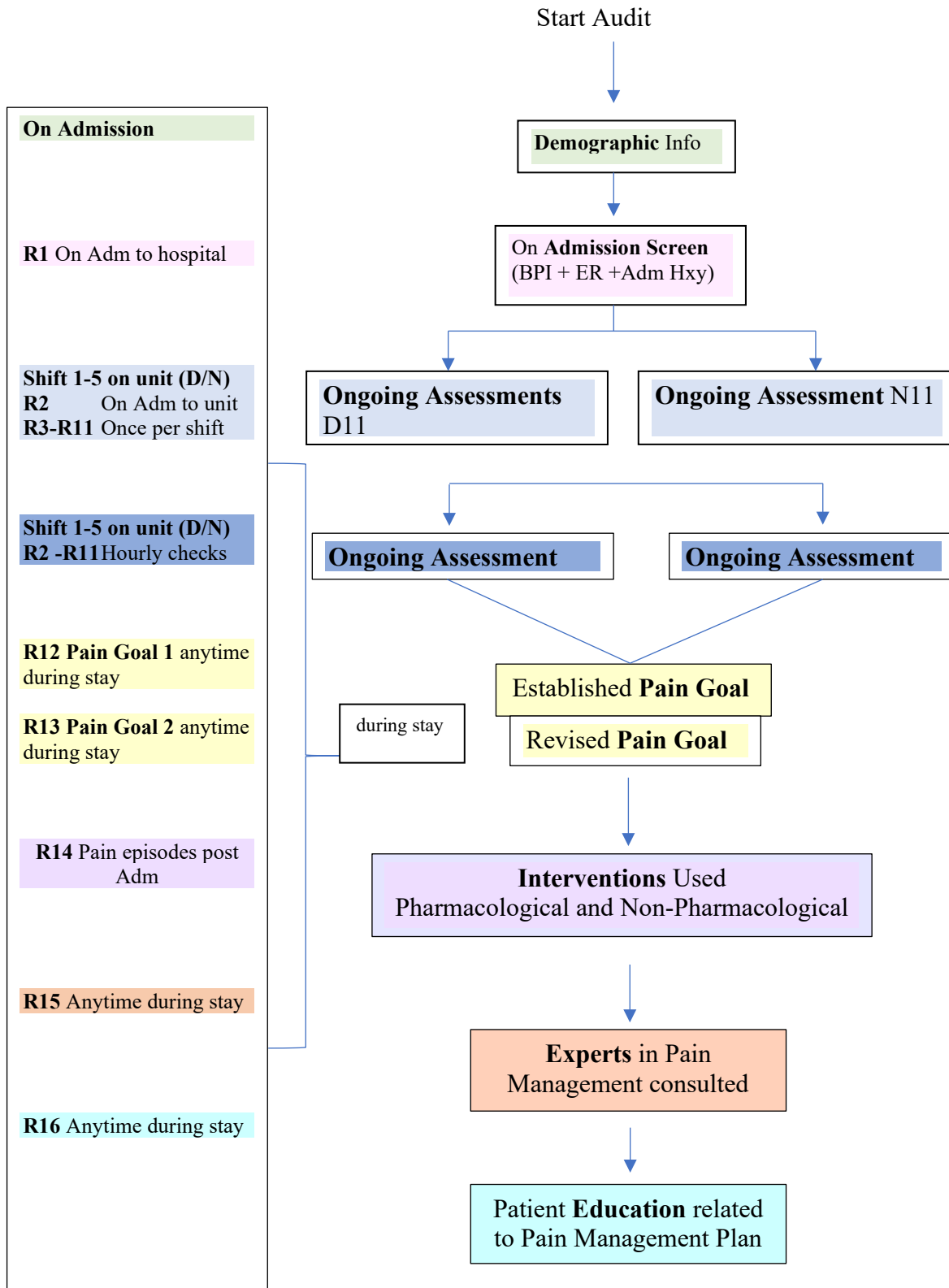
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Figure 3.1. Retrospective Chart Audit Process Algorithm



TABLES

Table 3.1. Listing of KTIs over time for Pain P/P (2005-2017)

Pain Management - Knowledge Translation Interventions (KTI) listing		
Date	Target Group	Activity
2005 +ongoing	corporate	Introduction to Brief Pain Inventory (BPI)
2005+ongoing	corporate	Assmt Guidelines for Infusions used for Pain Mgmt
2005	Corporate	Acute Pain Mgmt Policies developed (Epidural, IV PCA, Regional Analgesia, Single Dose Intrathecal)
2006	Corporate	Corporate Nursing Orientation
2006	Corporate	Pain Council
2006 + ongoing	Corporate	Pain Education Days (offered x 2 per year)
2006	Corporate	Best Practice Champions
2007	Corporate	Pain Council
2007	Corporate	Pain Assmt & Mgmt Corporate Policy developed
2007 Oct	Corporate	Pain Awareness Week (education initiative)
2007 + ongoing	Corporate	Pain Education Days (offered x 2 per year)
2008	Corporate	Pain Council
2008	Corporate	Pain Assmt & Medication Admin Record for Infusions used for Pain Mgmt
2008 +ongoing	Corporate Outpt Oncology Clinics	Introduction of ESAS (Self reporting symptom Mgmt screening tool) includes pain in Outpt Oncology clinics.
???? + ongoing	Corporate Outpt Oncology Clinics	On line ESAS Tool (Self reporting symptom Mgmt screening tool) includes pain in Outpt Oncology clinics. Monitoring & Reporting to Cancer Care Ontario
2008 Oct	Corporate	Pain Awareness Week (education initiative)
2008 + ongoing	Corporate	Pain Education Days (offered x 2 per year)
2009 – 2P14	Corporate	Pain Council
2009	Corporate	Dosing of Opioids for Acute Pain in Opioid naïve patients
2009 Oct	Corporate	Pain Awareness Week (education initiative)
2009 + ongoing	Corporate	Pain Education Days (offered x 2 per year)
2010 - 2P14	Corporate	Pain Council
2010 Oct	Corporate	Pain Awareness Week (education initiative)
2010 + ongoing	Corporate	Pain Education Days (offered x 2 per year)
Nov 2010	Corporate	Prevalence training and survey
2011	Corporate	Pain Council
2011 Oct	Corporate	Pain Awareness Week (education initiative)
2011	?	Patient and Family Member Information Guide: Pain Assmt & Mgmt
2011	?	Patient and Family Member Information Guide: Pain Mgmt After Surgery
2011 + ongoing	Corporate	Pain Education Days (offered x 2 per year)
2011 + ongoing	Oncology	Oncology nursing orientation 1/2 day on pain management
Nov 2011	Corporate	Prevalence training and survey
2012 -2014	Corporate	Corporate Scorecard - pain satisfaction

2012 -2014	Corporate	Manager - performance goals
2012- 2014	Corporate	Pain Council
2012	Corporate	Pain eLearning modules - mandatory training
2012 + ongoing	Palliative	Palliative Care education days with one half day on pain - offered twice per year
2012 + ongoing	Corporate	Pain Education Days (offered x 2 per year)
2012 + ongoing	Oncology	Oncology nursing orientation 1/2 day on pain management
Apr 2012	Corporate	Prevalence training and survey
Nov 2012	Corporate	Prevalence training and survey
2013 -2014	Corporate	Corporate Scorecard - pain satisfaction
2013 -2014	Corporate	Manager - performance goals
2013 - 2014	Corporate	Pain Council
2013	Corporate	Hourly rounding/Bedside shift report/care boards= whiteboard
2013	Corporate	Pain Assmt & Mgmt Corporate Policy revised
2013 + ongoing	Palliative	Palliative Care education days with one half day on pain - offered twice per year
2013 + ongoing	Corporate	Pain Education Days (offered x 2 per year)
2013 + ongoing	Oncology	Oncology nursing orientation 1/2 day on pain management
Apr 2013	Corporate	Prevalence training and survey
Nov 2013	Corporate	Prevalence training and survey
2014	Corporate	Corporate Scorecard - pain satisfaction
2014	Corporate	Manager - performance goals
2014	Corporate	Pain Council
2014	Corporate	Nurse Leader Rounding
2014 + ongoing	Palliative	Palliative Care education days with one half day on pain - offered twice per year
2014 + ongoing	Corporate	Pain Education Days (offered x 2 per year)
2014 + ongoing	Oncology	Oncology nursing orientation 1/2 day on pain management
Apr 2014	Corporate	Prevalence training and survey
Nov 2014	Corporate	Prevalence training and survey
2015 + ongoing	Palliative	Palliative Care education days with one half day on pain - offered twice per year
2015 + ongoing	Corporate	Pain Education Days (offered x 2 per year)
2015 + ongoing	Oncology	Oncology nursing orientation 1/2 day on pain management
2015 + ongoing	Oncology	LEAP Mini Oncology - interprofessional day on Palliative Care including pain
Apr 2015	Corporate	Prevalence training and survey
Nov 2015	Corporate	Prevalence training and survey
2016 + ongoing	Palliative	Palliative Care education days with one half day on pain - offered twice per year
2016 + ongoing	Corporate	Pain Education Days (offered x 2 per year)
2016 + ongoing	Oncology	Oncology nursing orientation 1/2 day on pain management
2016 + ongoing	Oncology	LEAP Mini Oncology - interprofessional day on Palliative Care including pain
Apr 2016	Corporate	Prevalence training and survey
Nov 2016	Corporate	Prevalence training and survey

Ongoing	Corporate	NPPC strategic plans, minutes of the pain workgroup, Pain Council minutes
Aug 2016	Medicine Portfolio	Medicine education by Acute Pain APN and Palliative APN
Aug 2016	Corporate	Inclusion of pain scores on nursing flow sheet
2017 + ongoing	Palliative	Palliative Care education days with one half day on pain - offered twice per year
2017 + ongoing	Corporate	Pain Education Days (offered x 2 per year)
2017 + ongoing	Oncology	Oncology nursing orientation 1/2 day on pain management
2017 + ongoing	Oncology	LEAP Mini Oncology - interprofessional day on Palliative Care including pain
Apr 2017	Corporate	Prevalence training and survey
Nov 2017	Corporate	Prevalence training and survey

Table 3.2. Pain P/P target behaviours, RNAO Pain Assessment and Management BPG (7, 8) recommendation and level of evidence (25)

Site Pain P/P Number.	Pain P/P Target Behavior	RNAO Pain Assessment and Management BPG Recommendation Number Level of Evidence
	Selected recommendations under review	
1	Screen inpatients for presence of pain on 1) Each initial contact/admission (2007 & 2013)	Assessment Recommendation - 1.1 Level of Evidence - Ib
2	Ongoing assessments of Pain using standardized tools 1) Once per shift (2007). 2) During hourly rounding (2013)	Assessment Recommendation - 1.2 Level of Evidence - Ib
3	Establish an individualized goal for pain management with the patient (2007 & 2013).	Planning Recommendation - 2.1 Level of Evidence - Ib
4	Collaborate with the patient in establishing an individualized strategy and interventions to manage the patient's pain based on the best evidence and available resources (2007 & 2013).	Planning Recommendation - 2.1 Level of Evidence - Ib
7	Educate patient and families about their individualized pain management plan (2007 & 2013).	Implement Recommendation - 3.3 Level of Evidence - Ib

Recommendations not under review in this study		
5	Assess effects of pharmacological interventions at peak effect following administration and on an ongoing basis (2007 & 2013).	Implement Recommendation - 3.1 Level of Evidence - IIb
6	Consult with pain management experts (interdisciplinary team members) as required (e.g., in complex situations, and or escalating or unrelieved pain after a reasonable trial of management) (2007 & 2013).	Planning Recommendation - 2.2 Level of Evidence- Ib
8	Ensure ongoing documentation reflects patient goals, pain mgmt. plan, assessment, response to treatment, outcomes, & communicate to inter professional team (2007, 2013)	Evaluation Recommendation - 4.4 Level of Evidence - IIb
9	Completion of self-learning training modules for nurses and physicians (2013)	Education Recommendation - 5.4 Level of Evidence - IV

Key

R = Recommendation, CA = Chart Audit, Q = Question, mgmt.= management, hxy= history, txmt= treatment

Evidence statements and grades of recommendations in RNAO guidelines (25)

Ia Evidence obtained from meta-analysis or systematic reviews of randomized controlled trials.

Ib Evidence obtained from at least one randomized controlled trial.

IIa Evidence obtained from at least one well-designed controlled study without randomization.

IIb Evidence obtained from at least one other type of well-designed quasi- experimental study, without randomization.

III Evidence obtained from well-designed non-experimental descriptive studies, such as comparative studies, correlation studies and case studies.

IV Evidence obtained from expert committee reports or opinions and/or clinical experiences of respected authorities.

Reference: Adapted from “Annex B: Key to evidence statements and grades of recommendations,” by the Scottish Intercollegiate Guidelines Network. In SIGN 50: A Guideline Developer’s Handbook (25). Available from [http://www.sign.ac.uk/guidelines/full text/50/annexb.html](http://www.sign.ac.uk/guidelines/full%20text/50/annexb.html)

Table 3.3. Prevalence data measures and Pain P/P target behaviors, plus education training records

Pain P/P Target Behavior	Data Sources CA (Chart Audit) or PA (Pt Assessment)	Nov.	Apr.	Nov.	Apr.	Nov.	Apr.	Nov.	Apr.	Nov.	Apr.	Nov.	Comments
		2010	2011	2011	2012	2012	2013	2013	2014	2014	2015	2015	
#1 on admission	CA= Q1 (Nov 2010-Apr 2012)	x	x	x	x								4 CA data points
#2 once per shift - documented ongoing pain reassessment within last 24 hrs	CA= Q3 (2010 - Apr 2012)	x	x	x	x								4 CA data points
#2 once per shift	CA =Q11 (2012-Nov 2015)					x	x	x	x	x	x	x	7 CA data points
#2 once per shift	PA Q2 (2013 to 2015)					x	x	x	x	x	x	x	6 PA data points
#3 Documented pain during stay	CA = Q1 (2013 to 2015)						x	x	x	x	x	x	6 CA data points
	PA Q2 & PA Q3 (2010),	x	x	x	x								4 PA data points
	PA Q8 (2012) PA Q1 (2013 to 2015)					x	x	x	x	x	x	x	7 PA data points
#4 documented pain during hourly rounding.	Nil												no data points
#5 Intensity gives numeric value for pain. (0-10)	CA = Q2 (Nov 2010 to Apr 2012) PA Q9 (Nov 2012) and PA Q1a (2013 to 2015)	x	x	x	x								4 CA data points 8 PA data points
#6 Pain Goal established	CA = Q5 (Nov 2010 only)	x											1 CA data point
	PA Q5 (Apr 2014 to 2015)								x	x	x	x	4 PA data points
#7 Collaborate with pt on pain strategies	CA Q5 (Nov 2010) only	x											1 CA data point

# 8 Reassess pain intensity	PA Q12 (Nov 2012) PA Q4 (Nov 2013 to 2015)					x	x	x	x	x	x	x	7 PA data points
# 9 Assess effect of pharmacological interventions	PA Q7 (Nov 2010) PA Q10.2 (Nov 2012) PA Q2a (Nov 2013) PA Q2b (Nov 2014 & 2015)	x	x	x	x	x	x	x	x	x	x	x	11 PA data points
	PA Q8 (2010) only	x											4 PA data points
	PA Q11 (2012) PA Q3 (2013 to 2015)					x	x	x	x	x	x	x	7 PA data points
#10 Monitor side effects	nil												no data points
#11 Consults with experts	CA = Q6 (Nov 2010 only)	x											1 CA data points
# 12 Educate Pt & Family	CA = Q7 (Nov 2010), CA = Q12 (Nov 2012)	x	x	x	x	x	x						6 CA data points
	PA 4 (Nov 2010)	x											1 PA data point
#13 Ongoing documentation to communicate with IP team	nil												no data points
#14 Ongoing edu of staff	ELM records (Nov 2011 -Nov 2015)			x	x	x	x	x	x	x	x	x	

Key: CA = chart Audit, PA = Patient Assessment conducted during audit, Q# = Question number (#) on audit form/tool, Pt = Patient, Edu = Education, IP = Inter Professional

Table 3.4. Pain P/P target behavior recommendation measures

Pain P/P Recommendation Number = R#	Pain P/P Target Behavior	Measures or question	How score is derived	Inclusion criteria	Exclusion criteria
R1 adm to unit	Screen inpatients for presence of pain on 1) Each initial contact/admission (2007 & 2013)	CA Q1= Is there documented evidence that On admission to unit , was there an initial screening for pain completed on the pt hxy?	Chart Audit Q1 Yes or No or NA #Yes _____ Total number of patients	1 st 24hrs Pain score on admission (0-10) documented BPI completed within 72 hrs if pain score >4	
R2 During stay Shifts 1-5 on unit	Ongoing assessments of Pain using standardized tools for all patients 2) Once per shift (2007). 3) During hourly rounding (2013)	CA Q2 - Is there documented evidence of ongoing reassessment within the past 24 hours on the daily flowsheet, a validated tool (BPI), or integrated progress notes or interdisciplinary treatment plans?	Chart Audit Q2 Yes or No or NA #Yes _____ Total number of patients	Documentation within 2 nd 24 hrs of day chart is audited. -At least once per shift D11 and N11 Clarify hrly rounding on unit	
R3 During stay Shifts 1-5 on unit	Establish an individualized goal for pain management with the patients having pain during stay (over 5 shifts). (2007 & 2013).	CA Q3a – A pain management plan in the kardex or inter-professional patient care plan	Chart Audit Q3a Yes or No or NA #Yes _____ Total pts having pain on unit over 5 shifts (during stay)	Occurrence can be any time during stay (over 5 consecutive shifts) Documentation on either ... Kardex or Inter-professional care plan Progress notes, MD progress notes	Document as a Yes if goal is stated in numeric scale Excluded if no numeric scale used Exclude if no documentation anywhere of pt having pain at all Document as a NO if no evidence the goal was established with the client's involvement.
R4 During stay Shifts 1-5 on unit	Collaborate with the patient in establishing an individualized strategy and interventions to manage the patient's pain based on the best evidence and available resources for patients having pain (2007 & 2013).	CA Q 4 – Establishes interventions to manage pain	Chart Audit Q4 Yes or No or NA #Yes _____ Total pts having pain on unit over 5 shifts (during stay not accessed)	Any episode during first 5 consecutive shifts (during stay) adm) Must be documentation on pain mgmt plan or Inter professional care plan ...and on MAR if using pharmaceutical interventions	Do not exclude if only using a single intervention plan Exclude if patient does have pain during stay .
R7 During stay Shifts 1-5 on unit	Educate pt /families about their individualized pain mgmt plan for patients having pain. (2007 & 2013)	CA Q5 - Is there documented evidence of patient education regarding pain mgmt	Chart Audit Q5 Yes or No or NA. #Yes _____ Total pts having pain on unit over 5 shifts (during stay)	Record first event documented during stay ... Must be documented on the Pt Edu record or on the pain mgmt plan?	Exclude if patient does have pain during stay

Key: R = Recommendation, CA = Chart Audit, Q = Question, mgmt= management, hxy= history

Table 3.5. Patient profiles

Subcases		Subcase 1	Subcase 2	
Dates		Aug -Oct 2016, Jan-Mar 2017, Jul-Oct 2017	Aug -Oct 2016, Jan-Mar 2017, Jul-Oct 2017	
Male admissions to unit		45	42	
Female admissions to unit		55	58	
Patient Average Age		72 yrs. old	72 yrs. old	
1st	Other	44	38	*Non specific
2nd	Respiratory	23	21	Respiratory
3rd	NYD	13		
3rd			12	Gastrointestinal
3rd			12	Neurological
4th	Cardiac	10	6	Cardiac
5th	Musculoskeletal	5	4	Musculoskeletal
5th	Gastrointestinal	5		
5th			4	NYD
6th			3	Cancer
ALOS		8.6 days	11.4 days	
Emergency to Medicine		98	94	
Directly to Medicine		0	3	
ICU/Urgent care to Medicine		2	2	
Endoscopy to Medicine		0	1	
*Non specific – decline/failure to cope/Altered LOC/ confusion/general weakness				

Table 3.6. Subcases' adherence rates for selected Pain P/P recommendations (R1				
Recommendation		Subcase 1 (C codes)	Subcase 2 (G codes)	Adherence Rate
R1	Pain assessment on admission to unit (Shift1) Range of pain scores = 0-10	98% (98/100) charts had initial assessment on unit admission history. 2/100 charts had missing data	99% (99/100) charts had initial assessment on unit admission history. 1/100 charts had missing data	High Adherence to R1
R2	Ongoing pain assessment (Shifts 2 to 5)	98.5 % (98.5/100) charts/4shifts had ongoing pain assessment for next 4 shifts 1.5 /100 charts/shift had missing data 98.75% (98.75/100) charts/5shifts had hourly round checks completed	98 % (98/100) charts/4shifts had ongoing pain assessment for next 4 shifts 2/100 charts/shift had missing data 99.5% (99.5/100) charts/5shifts had hourly round checks completed	High Adherence to R2 Once per shift and hourly rounds Hourly rounds – no documented pain scores
R3	Establishes Pain Goal for patients who had pain during stay (over 5 shifts)	R3-19/53 (36%) charts of patients who had pain score >0 had Pain Goal set during stay evidence in IPN and or progress notes. <ul style="list-style-type: none"> • 9/19 collaborated with pt on PG • 10/19 had pain scores ≥4 	R3-32/55 (58%) charts of patients who had pain score >0 had Pain Goal set during stay evidence in IPN and or progress notes. <ul style="list-style-type: none"> • 17/32 collaborated with pt on PG • 22/32 had pain scores ≥4 	R3 C1- Low adherence to setting of Pain Goal 1 on admission hxy R3 C2- Moderate adherence to setting Pain Goal 2 during stay
R4	Establishment of interventions to manage pain for patients with pain	52/53(98%) charts of patients who had pain score >0 had evidence of prescribed interventions to manage pain <ul style="list-style-type: none"> • 35/53 charts only prescribed Pharm • 12/53charts with combo of prescribed Pharm and Non-Pharm interventions • 3/53 charts prescribed Pharm+Methadone • 2/53 charts with prescribed Pharm prn • 1/53 no intervention 	55/55 (100 %) charts of patients who had pain score >0 had evidence of prescribed interventions to manage pain <ul style="list-style-type: none"> • 45/55 charts only prescribed Pharm • 9/55 charts with combo of prescribed Pharm and Non-Pharm interventions • 0/55 charts prescribed Pharm+Methadone • 1/55 charts with prescribed Pharm prn • 0/55 no intervention 	High adherence to establishing pain mgmt interventions
R7	Patient or family education related to pain management for patients with pain	0/53(0%) charts with Pt. Education Form 0 /53 (0%) charts with evidence of pt education on pain mgmt provided in IPN	1/55 (2%) charts with Pt. Education Form (re: Atrovent & neb use) 0 /55 (0%) charts with evidence of pt education on pain mgmt provided in IPN	Low adherence No use of Pt Education Form. No documented evidence of “Pt education” provided on pain management plan in IPN.

Table 3.7. Person Chi-Square tests: Adherence to recommendations in the two units

Recommendation	N of Valid units	Person Chi-Square value	<i>df</i>	P value	Interpretation*
R1 – on admission	200	.338	1	.561	
R2a - once per shift	200	3.009	2	.222	
R2b - hourly rounds	200	1.005	3	.800	
R3 - Pain Goal	108	5.401 *	1	.020	Significant difference in proportions
R4 - Interventions	108	-	-	-	No value
R7- Education	108	-	-	-	No value
*Level of significance at $p < .05$					

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Additional file 3.1. List of data sources

Report Number	Title and Dates created or issued
Rt1	Notes from meeting on monitoring and auditing results with NPP Coordinator 2015
Rt2	Teleconference minutes with APN for acute care Nov 18, 2015
Rt3	List of Corporate and Unit level KTIs implemented 2006-2017: summary of strategies
Rt4	Notes during meeting with NPP Coordinator March 31, 2015
Rt5	Notes during meeting with APN Palliative Care -Lead for BPG project initial start-up Oct 20, 2015
Rt6	Minutes from Meeting with NPP Coordinator May 27, 2016
Rt7	Table of prevalence data measures for Pain PP target behaviours and ELM records performance measurement improvements 2011-2015
Internal Document Number	Title and Dates issued
ID1	2015 EBP Implementation power point presentation by NPP
ID2	NPP strategic plan on adherence to Pain P/P Multiple plans -2005/2006, 2007/2008, 2008/2009, 2009/2010, 2010/2011, 2011,2012, 2012/2013, 2013/2014, 2014/2015, 2015/2016
ID3	Terms of Reference Pain Assessment and Management BPG work Group 2006
ID4	10 themes used for Pain P/P development
ID5	2007 Pain Assessment and Management Policy
ID6	2013 Pain Assessment and Management Policy
ID7	Pain Prevalence Audit Tool= Patient Assessment questions & Chart audit questions Nov 2010
ID8	Pain Prevalence Audit Tool= Patient Assessment questions & Chart audit questions Nov 2012
ID9	Pain Prevalence Audit Tool= Patient Assessment questions & Chart audit questions Nov 2013
ID10	Pain Prevalence Audit Tool= Patient Assessment questions & Chart audit questions April 2014
ID11	Pain Prevalence Audit Tool= Patient Assessment questions & Chart audit questions April 2015 and Nov 2015
ID12	Post Discharge Patient Satisfaction Survey tool
ID13	Site Final Report for BPSO on RNAO Pain Assessment and Management BPG implementation Oct 2011 by CB
ID14	Hourly Rounding Policy versions 2012, 2014
ID15	Brief Pain Inventory -Self Report 2005
ID16	24 Nursing Documentation Flowsheet: versions 2008, 2014,2016
ID17	Patient Teaching Record 2009
ID18	Patient Admission History: versions 2013, 2016
ID19	Patient Assessment and Medication Administration Record 2009
ID20	Provisions of Additional Therapy Services by External Providers 2014

External Document Number	Title and Dates issued
ED1	RNAO Pain Assessment and management BPG 2007
ED2	RNAO Pain Assessment and management BPG 2013

Key

Reports (Rt#)

Internal documents (ID#)

External documents (ED#)

Additional file 3.2. Retrospective Chart Audit _ Coding Dictionary

Demographic Data							
Column	Column header from Excel SS	Column Header Definition	Response Options	Response Option Definition	Where to find data: Best Source	Where to find data: 2 nd source	Rational Comments
A	Pt ID No Site G=GEN P=CIVIC				Pt Information Stamp		Maintain table with Chart ID and Code Assign Unique Id Code to each chart
B	Audit timeframe	Timeframe of chart audit	1=7yrs Jan-Feb (2016) 2=7yrs Aug-Sept (2016)	7yr post Imp			Pt adm must be >2-day LOS Pt chart =consent to participate in research Jan-Mar & Aug-Oct = mons to audit
C	Time of Adm	24 hr clock					
D	Date of Adm	Adm date y/m/d	d/m/y		Admission Hxy		
E	Diagnosis	Pt 1 ^o Dxg whose chart is being audited	1-NYD/investigation 2-Cardiac 3-Respiratory 4-GI 5-Cancerl 6-Muskletal 7-Neuro 8-Gyn 9-ENT 10-Other 98-Unavailable 99-Missing	1= Not Yet Dxg 98 - Unavailable (document not on chart) 99 = Missing Data incomplete documentation	Admission Hxy	Discharge Summary	Dxg categorized by system
F	Age	Date of Birth (DOB) - the age of patient	m/y + (yrs)		Pt. information stamp		
G	Reason for Admission	What was the primary factor contributing to the patient's admission to hospital?	1-NYD/investigation 2-Cardiac 3-Respiratory 4-GI 5-Cancerl 6-Muskletal 7-Neuro	1= Not Yet Dxg 98 - Unavailable (document not on chart) 99 = Missing Data incomplete documentation			

			8-Gyn 9-ENT 10-Other 98-Unavailable 99-Missing				
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Recommendation 1 – Day 1 On Admission Screen Inpatients for risk or presence of Pain..if Pain score >4 is present, pain history (BPI) (must be obtained 1st 24 hrs)							
Column	Column header from Excel SS	Column Header Definition	Response Options	Response Option Definition	Where to find data: Best Source	Where to find data: 2 nd source	Rational Comments
H	On Adm Pain Screen	Screen for the presence or risk of any type of pain on admission	0-No 1-Yes 98-Unavailable?	Yes: a pain assessment was documented on admission history or BPI No: a pain assessment was not documented on admission nor BPI 98 - Unavailable (document not on chart)	Admission Hxy or BPI # NUR 71 A Or ER Flowsheet – Pain section Or OT PT Adm Assesmt on consult form	Flow Sheet Progress Notes	Admission package in patient history section of chart if pain >4 will complete within 72 hours of admission the BPI may be used instead of Adm Hxy Form
I	On Adm Pain score	What was the pain score between 0 and 10 in the pain assessment on admission	0-10	0 = no pain 1-3 = mild pain 4-6 = mod pain 7-10 = severe pain (if range used -round up to highest score)	Admission Hxy Or BPI	Flow Sheet Progress Notes MAR	Admission package in patient history section of chart When a range is given for a pain score, go with the higher number or round up to the nearest whole number (ex: 3-4 would be 4, 4.5 would be 5)
J	Date Pain score charted on Adm	The date the pain score was charted on Adm	Y/M/D	Day month year	Admission Hxy	BPI	d/m/y (must be within 24 hrs of admission)
K	Time Pain Score charted on Adm	Time pain was charted on Adm (use 24 hr clock).	0000- 2400		Admission Hxy	BPI	Use 24 hour clock
L	On Adm Pain score <4 BPI NA		1=yes				
M	On Adm Pain score>4 BPI completed	If Pain Score was >4 on Adm then a BPI should be completed as per policy	0-No 1-Yes	Yes: a pain assessment was documented on BPI No: a pain assessment was not documented on BPI	BPI	Admission Hxy	if pain >4 must complete within 72 hours of admission the BPI BPI may be used instead of Adm Hxy Form

N	Day 1 HCP charted	The health care professional who documented	1=Nurse 2=Nursing student 3=MD 4=Other 98=Unavailable 99=Missing (data or incomplete)	98 - Unavailable (document not on chart) 99= Missing (missing data or incomplete documentation)		Flow Sheet	
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<p>Recommendation 2 – Day 1 Next shift – 1st Assessment Ongoing Assessment of pain using Standardized Tools-(Day 2= 2nd 24 hrs + Day 3= 3rd 24 hrs) Once per shift 2007 -2013 (Day shift = D11 or Night Shift = N11) + Hourly rounds after 2013</p>							
Column	Column header from Excel SS	Column Header Definition	Response Options	Response Option Definition	Where to find data: Best Source	Where to find data: 2 nd source	Rational Comments
O	Day 1 Date Next Shift Pain score charted x1 per shift	The date the pain score was charted	d/m/y		Progress Notes Flow sheet NUR 48 form 2008, 2014, 2016 chgs same number on form	MAR -check sections for... PRN Routine MAR APS MAR	Ongoing assessment must be done once per shift (2007to present)
P	Time	Time Pain score charted in 1 st Day shift			Progress Notes Flow sheet	MAR	Ongoing assessment must be done once per shift (2007to present)
Q	Day 1 Next shift Pain Assmt charted x1 per shift		0D = No Days 1D = yes Days	Assmt completed and documented at least once per shift on Days and on Nights	Progress Notes Flow sheet	MAR	Ongoing assessment must be done once per shift (2007to present)
R	Day 1 Pain score Next shift x1 per shift	What was the pain score (0 and 10) for next shift	D= 0-10	0 = no pain 1-3 = mild pain 4-6 = mod pain 7-10 = severe pain (if range used -round up to highest score)	Progress Notes Flow sheet	MAR	
S	Day 1 Pain score>4 BPI completed	If Pain Score was >4 on Adm then a BPI should	0-No 1-Yes	Yes: a pain assessment was documented on BPI No: a pain assessment was not documented on BPI	BPI		if pain >4 must complete within 72 hours of admission the BPI

		be completed as per policy					BPI may be used instead of Adm Hxy Form
T	HCP charted Pain x1 on shift on D11	The health care professional who documented the episode of pain x1 per shift D11	1=Nurse 2=Nursing student 3=MD 4=Other 98=Unavailable 99=Missing (data or incomplete)	98 - Unavailable (document not on chart) 99= Missing (missing data or incomplete documentation)	Flow Sheet		
U	Day 1 Date Pain score to be charted hourly		y/m/d				
V	Day 1 Number of hourly checks after 1st Assmt		Total number on the shift noted on chart		Flow sheet , MAR		
W	Time on Day 1 of first hourly check						
X	Day 1 Pain Assmt Hourly checks		0 D/N = No 1D/N = Yes	Assmt completed and documented on hourly basis on shift (Days and on Nights)	Progress Notes Flow sheet	MAR	Ongoing assessment must be done hourly per shift (2013)
Y	Day 1 Pain score on 1st hourly check	What was the pain score (0 and 10)	D/N= 0-10	0 = no pain 1-3 = mild pain 4-6 = mod pain 7-10 = severe pain (if range used -round up to highest score)	Progress Notes Flow sheet		
Z	Day 1 Pain score>4 BPI completed	If Pain Score was >4 on Adm then a BPI should be completed as per policy	0-No 1-Yes	Yes: a pain assessment was documented on BPI No: a pain assessment was not documented on BPI	BPI		if pain >4 must complete within 72 hours of admission the BPI

							BPI may be used instead of Adm Hxy Form
AA	HCP charted Pain Next shift Hourly	The health care professional who documented the episode of pain x1 per shift D11	1=Nurse 2=Nursing student 3=MD 4=Other 98=Unavailable 99=Missing (data or incomplete)	98 - Unavailable (document not on chart) 99= Missing (missing data or incomplete documentation)	Flow sheet		
DAY 2 &3 - 1ST AND 2ND SHIFT							
AC AP BD BQ	Day 2 or 3 Date Pain score charted x1 per shift	The date the pain score was charted on 1 st Night	y/m/d	Day month year	Progress Notes Flow sheet	MAR	Ongoing assessment must be done once per shift (2007to present)
AD AQ BE BR	Time Day 2 or 3	Time Pain score charted in 1 st Night shift			Progress Notes Flow sheet	MAR	Ongoing assessment must be done once per shift (2007to present)
AE AR BF BS	Day 2 or 3 1st shift or 2nd shift Pain Assmt x1 per shift		0N = No Nights 1N = yes Nights	Assmt completed and documented at least once per shift on Days and on Nights	Progress Notes Flow sheet	MAR	Ongoing assessment must be done once per shift (2007to present)
AF AS BG BT	Day 2 or 3 Pain score x1 per shift	What was the pain score (0 and 10) for Nights	N= 0-10	0 = no pain 1-3 = mild pain 4-6 = mod pain 7-10 = severe pain (If range used -round up to highest score)	Progress Notes Flow sheet	MAR	
AG AT BH BU	Day 2 or 3 Pain score>4 BPI completed	If Pain Score was >4 on Adm then a BPI should be completed as per policy	0-No 1-Yes	Yes: a pain assessment was documented on BPI No: a pain assessment was not documented on BPI	BPI		if pain >4 must complete within 72 hours of admission the BPI BPI may be used instead of Adm Hxy Form

AH AU BI BV	Day 2 or 3 1st shift or 2nd shift HCP charted x1 on shift	The health care professional who documented the episode of pain x1 per shift	1=Nurse 2=Nursing student 3= MD 4=Other 98= Unavailable 99= Missing (data or incomplete)	98 - Unavailable (document not on chart) 99= Missing (missing data or incomplete documentation)	Flow Sheet		
AI AV BJ BW	Day 2 or 3 Date Pain score to be charted hourly		y/m/d				
AJ AW BK BX	Day 2 or 3 Number of hourly checks after 1st Assmt		Total number on the shift noted on chart		Flow sheet , MAR		
AK AX BL BY	Time Day 2 or 3 of first hourly check						
AL AY BM BZ	Day 2 or 3 Pain Assmt Hourly checks		0 D/N = No 1D/N = Yes	Assmt completed and documented on hourly basis on shift (Days and on Nights)	Progress Notes Flow sheet	MAR	Ongoing assessment must be done hourly per shift (2013)
AM AZ BN CA	Day 2 OR 3 Pain score on 1st hourly check	What was the pain score (0 and 10)	D/N= 0-10	0 = no pain 1-3 = mild pain 4-6 = mod pain 7-10 = severe pain (if range used -round up to highest score)	Progress Notes Flow sheet		
AN BA BO CB	Day 2 OR 3 Pain score>4 BPI completed	If Pain Score was >4 on Adm then a BPI should be completed as per policy	0-No 1-Yes	Yes: a pain assessment was documented on BPI No: a pain assessment was not documented on BPI	BPI		if pain >4 must complete within 72 hours of admission the BPI BPI may be used instead of Adm Hxy Form

AO BB BP CC	HCP charted Pain Next shift Hourly	The health care professional who documented the episode of pain x1 per shift D11	1=Nurse 2=Nursing student 3=MD 4=Other 98=Unavailable 99=Missing (data or incomplete)	98 - Unavailable (document not on chart) 99= Missing (missing data or incomplete documentation)	Flow sheet		
CD							

Recommendation 3 - Establish an individual Pain Goal for management of pain with Pt (occurrence can be any time during admission)							
Column	Column header from Excel SS	Column Header Definition	Response Options	Response Option Definition	Where to find data: Best Source	Where to find data: 2nd source	Rational Comments
CE	Establish Pain Goal 1	Establishes an individualized goal for pain management	0=NO 1=Yes but no pt involvement 99 = Missing 98 no form on chart 96 = doc on chart but only assmt of current pain no goal	0= Nothing in chart 1= some form of goal maintained without pt involvement charted 99 = Missing Data incomplete	2011 – no goal only on MAR MD orders, Progress Notes, Flow Sheet Jan 2016 see Pain goal is on Pt Adm Hxy	Progress Notes Interprofessional care plan Check OT/PT consult sheet write pain goal required to ambulate without pain	Documented evidence of a pain mgmt. plan indicating how to treat pain and what level and or level of relief to aim for. (may be numeric goal (ie 6 out of 10).
CF	Collaborates with Pt to set Pain Goal 1	Collaborates with PT to establish Pain Goal.	0=NO 1=Yes pt involved 99 = Missing	0= Nothing in chart 1=Charted pt aware 99 = Missing Data incomplete			Documented evidence that Pt was involved, requesting higher levels of pain relief or aware of established Pain Goal
CG	Date Pain Goal 1 set (The date the Pain Goal 1 was determined	d/m/y	Day month year			
CH	Time 1	Time Pain Goal was charted	Use 24 hr clock				
CI	Revises & sets Pain Goal 2		0=NO 1=Yes 99 = Missing	0= Nothing in chart 1= some form of goal maintained without pt involvement charted	MAR MD orders Flow Sheet	Progress Notes Interprofessional care plan?	Chart indicates a revision of Pain Goal
CJ	Collaborates with Pt	Collaborates with PT to establish Pain Goal 2.	0=NO 1=Yes 99 = Missing	0= Nothing in chart 1=Charted pt aware			

	to set Pain Goal 1			99 = Missing Data incomplete			
CK	Date Pain Goal 2 revised	The date the Pain Goal 2 was charted as revised.	d/m/y	Day month year			
CL	Time 2	Time Pain Goal 2 charted	Use 24 hr clock				

Recommendation 4 – Pain Episode (1st episode after 48 hrs other than admission) – Establishes Pain Interventions in collaborates with Pt.							
Column	Column header from Excel SS	Column Header Definition	Response Options	Response Option Definition	Where to find data: Best Source	Where to find data: 2 nd source	Rational Comments
CM	Pain Episode Date	Date of pain episode other than admission	d/m/y	Day month year			
CN	Pain Episode Time	Time pain treatment was provided	24 hr clock	The time will be entered using the 24 hr clock	PRN MAR -Reg MAR -APS MAR CADD MAR Flow Sheet Progress Notes	Consult notes	<p>This will be left blank when pt is on a CADD pump with boluses. Pt self-administers according to program however the time is not recorded.</p> <p>If a pt is on a CADD pump and can self-administer but is also given another PRN analgesia in addition to self-administering the time will be written in the column.</p> <p>If a non-pharmaceutical intervention is used the time of the intervention will be written.</p> <p>If multiple times are documented in different locations but are part of one pain episode, the earliest time will be coded.</p>
CO	Pain Intervention used/provided	What kind of intervention was provided to ease the pain of the patient	0= None 1=Pharmacological 2= non-Pharmacological 3= Both 4=No additional Interventions needed 5= Pt not on Pain mgmt. regime	0= No treat provided despite pain score recorded (pt refuses pain txmt or not necessary as pain score tolerable) 1= Pharmacological- an analgesia is given at the time of the pain episode either a regular dose that is due, a PRN or both. 2 = non-pharmacological-some intervention is done that does	PRN MAR MAR	Progress notes CADD MAR #1 CADD MAR #2	<p>Pain P/P indicates must collaborate with the person to identify their goals for pain management and suitable strategies to ensure a comprehensive approach to the plan of care.</p> <p>Time treatment provided will be left blank for CADD medication administration. The time it is administered is not collected as it is</p>

				not involve medications i.e.: repositioning, heat & cold. 3= (1+2) 4. Patient is on a pain management regime and no additional medication (including regular dose or PRN's) are given at that time 5. The patient is not on a pain management regime and no pain medication is provided			continually infusing and has a bolus limit within 30 – 60 minutes.
CP	HCP giving pain intervention	The health care professional who administered the intervention to ease the pain.	1=Nurse 2=Nursing ST 3=MD 4=APN 5=Self 6=Other Prof 7= external providers i.e., holistic, massage chiro, therapists 97=N/A 98=Unavailable 99=Missing	Self – pt self-administered pain medication using a programmed CADD pump or other similar device Other prof = Pharmacy or MD Assistant, therapist N/A – no pain intervention was provided Unavailable – document not on chart Missing -data incomplete	MAR PRN MAR	Progress notes CADD MAR	Physicians who are part of the acute pain service team will be coded as MD Self will be used as the code when pt is on a CADD pump or PCA another device that allows for pt control over medication boluses.
CQ	Heat/Cold	Heat/cold compresses	1-Yes Blank if not used	Yes: a heat compress or a cold compress was used on the patient and evaluated for effectiveness.	Progress notes		Both heat and cold compresses can reduce inflammation and pain.
CR	Touch therapies	Massage, pressure or vibration	1-Yes Blank if not used	Yes massage, pressure or vibration was used on the patient and evaluated for effectiveness.	Progress notes		Massage therapy may reduce stiffness and swelling therefore helping with pain relief. Applying pressure to certain trigger points on the body may help ease pain. Vibration therapy is when vibrations of different frequency, force and amplitude is transferred to a specific body part using an instrument.

CS	Imagery or music	Imagery or music was used to help ease the pain of the patient	1-Yes Blank if not used	Yes The patient was brought through a guided imagery session and/ or they had music playing. These were evaluated for effectiveness.	Progress notes		Guided imagery and music are believed to help with relaxation and may provide pain relief
CT	Relaxation	Relaxation was used to help relieve pain	1-Yes Blank if not used	Yes: Relaxation was used as an intervention to ease pain. It was evaluated for effectiveness.	Progress notes		Relaxation for pain relief has the goal of reducing stress and easing pain. There are various techniques used (ex: progressive muscle relaxation).
CU	Repositioning	Repositioning was used to help relieve pain	1-Yes Blank if not used	Yes: Repositioning was used as an intervention to ease pain.	Progress notes		Proper positioning and changing positions may help with pain relief
CV	Other non-pharmacological interventions for pain	Any non-pharmacological intervention not listed above.	1 Yes Specify _____		Progress notes		Possible examples: TENS, acupuncture, supportive surfaces

Recommendation 6 – Consults with Pain Mgmt Experts as required (Record all consultations during entire stay)							
Column	Column header from Excel SS	Column Header Definition	Response Options	Response Option Definition	Where to find data: Best Source	Where to find data: 2nd source	Rational Comments
CW	Services consulted for pain	Have other services been consulted to assist in pain management	0-No 1-Yes N/A –	Yes – services were consulted for pain No – no services were consulted for pain N/A – pt had no pain during stay so no services consulted	Consults section		RNAO recommendation: Establish a comprehensive plan of care that incorporates the goals of the person and IP team.
CX	Type of services consulted for pain	Type of service consulted to assist with pain management	1=Acute Pain Service (APS) 2=Cancer Pain Service (Cancer PS) 3=Anesthesia (ANA) 4=Chronic pain Service (Chron PS) 5=Surgery (SURG) 6=Palliative Care Team (PCT) 7=Other	Other – any not listed	Consults section	Progress notes	Can be more than one answer At the hospital if Dr. X was consulted for abd pleurex. Pleurex was coded for service consulted.
CY	Date	The date the Pain Consult occurred	d/m/y	Day month year			
CZ	Time	Time Pain Consult occurred	Use 24 hr. clock				

Recommendation 7 - Educate Pt and families about their Pain mgmt. plan (Record first event documented during stay)							
Column	Column header from Excel SS	Column Header Definition	Response Options	Response Option Definition	Where to find data: Best Source	Where to find data: 2 nd source	Rational Comments
DA	Pain education documentation	Documentation of teaching re something about Pain mgmt. plan provided to or family member	0-No 1-Yes	Yes: There was documentation that the patient or family member or caregiver received education on their pain management.	Progress notes	Patient teaching record Consult record	Documentation of teaching the person, their family and caregivers about the pain management strategies in their plan of care and address known concerns and misbeliefs.
DB	HCP who documented pain education	The health care professional who documented the teaching of pain management	1= Nurse 2= Nsg ST 3= MD 4=Consult/Expert 5=Other 97= NA 98- Unavailable 99- Missing	97 – No education document or 98 - Unavailable (document no ton chart) 99 = Missing Data incomplete documentation	Progress Notes	Palliative care consult Patient teaching record	
DC	Date	The date the Pain Consult occurred	d/m/y	Day month year			
DD	Time	Time Pain Consult occurred	Use 24 hr. clock				

Notes:

Missing = Document is present, but documentation is incomplete i.e.: missing signature, initials, pain score in a situation when pain has been documented)

Unavailable = The actual document is not in the chart i.e.: MAR missing

N/A (Not applicable) = i.e.: patient admitted with no dyspnea, so no score is included (N/A), and it is not documented, other examples see definition.

Blank =if there is no reassessment of pain, the column for HCP who reassessed pain will be left blank.

If no non-pharmacological interventions done, non-pharmacological options will be left blank vs. “no”

CADD MAR#1 & #2 = on OACIS is labelled as: Pain Assessment and Medication administration record – operative notes

Flow sheets = on OACIS is labelled as: Medicine/Surgery- Documentation flowsheets- nursing notes

Chapter 4

Unit level perspective of a pain best practice guideline ten years post-implementation: An embedded comparative subcase study in an acute care setting

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Abstract

Background: Ongoing use of nursing best practice guidelines (BPGs), beyond the implementation phase is often sub-optimal in acute care. The aim of this study was to examine the determinants and knowledge translation interventions (KTIs) influencing adherence to selected recommendations of a pain policy and protocol (Pain P/P) on two units (subcases), ten years post-implementation within an acute care setting.

Methods: We conducted an embedded comparative subcase study to compare similarities and differences related to factors and KTIs influencing nurses' use of selected Pain P/P recommendations, across two Medicine care units (subcases), within a multi-site acute care center in Canada. Subcases were purposefully selected by organizational representatives, having different site locations, nursing staff and managers. Data sources included 29 documents, a review of a retrospective audit, and 16 interviews with point-of-care nurses. We used the Dynamic Sustainability Framework (DSF) to guide data collection and analysis. Within-case analysis was conducted separately followed by across case analysis to determine similarities and differences between subcases.

Results: We identified 31 determinants (4 broader system, 6 innovation, 21 practice setting) influencing Pain P/P use at a ten-year timeframe. Sixty-seven percent (21/31) of determinants were common across subcases. All determinants mapped to the DSF constructs and factors, except for one factor: structural layout, adding to the DSF practice setting construct. Nurses reported nine KTIs influenced their use of the Pain P/P at the ten-year timeframe: two relate to innovation and seven to practice setting constructs. Innovation and practice setting KTIs facilitated high adherence rates to 3 out of 5 selected recommendations. Practice setting determinants and KTIs attributed to low to moderate adherence rates for the remaining 2 recommendations.

Conclusion: Findings confirm KTIs used to routinize recommendations into documents and practices/processes continued to positively influence ongoing adherence rates to BPG recommendations. Results highlight the need to establish KTIs designed to formally document existing processes/practices. Continued unit level efforts by supportive stakeholders, clinical leaders, and mentors are required to ensure long-term guideline sustainability in a changing acute care context. Combined education/training and monitoring efforts increases accountability towards sustaining BPGs in clinical practice while building capacity for ongoing use.

Keywords: sustainability, routinization, utilization, best practice guidelines, evidence-based practices/programs/interventions/innovations, quality improvement, case study, nursing

Contributions to the literature

- We identified 31 determinates and 9 KTIs that influenced nurses use of the BPG at the ten-year timeframe.
- One new practice setting factor was identified: physical structure/layout
- KTIs used to routinize recommendations into documents and practices/processes (embedding prompts) continue to positively influence sustainability ten years post implementation.
- Practice setting determinants and KTI influenced low to moderate adherence rates
- Supportive leadership or senior nurse mentors and Interprofessional (IP) team members' continued efforts are necessary and contribute to long-term guideline sustainability.
- Combined education/training and monitoring efforts increases nurses' accountability towards sustaining BPGs in clinical practice while building capacity for EBP use.

4.1 Background

The literature highlights sustained use of evidence-based best practice guidelines (BPGs) over time is sub-optimal in clinical practice, especially in specific healthcare contexts, such as acute care centers (1). Studies reveal sustained use of BPGs vary from none to full adherence, among healthcare practitioners (2, 3), within different settings (3-9), and even among units within the same setting/organization (10). When factors (e.g., barriers) are not overcome as part of ongoing efforts, “the embedding of the BPGs into routine practice decays” (11). Failure to promote facilitators and address factors that inhibit ongoing use of BPGs results in decreased adherence to guideline recommendations over time. Despite early implementation success, variable adherence rates to BPGs are reported in nursing within one year (12-14), two (15), three (16), four (17) and most recently six to seven years (10, 18) post initial implementation. The ongoing use of BPGs over time by nurses continues to be a practical problem for healthcare administrators and practitioners (10, 19). This is particularly important given government reports indicate healthcare expenditures are often the largest in acute care settings such as hospitals (20). Evidence suggests further investigations examining the factors influencing ongoing adherence to

BPGs and how to promote their continuation over the long-term in acute care are needed (1, 2, 8, 18, 19, 21-23).

Pain Assessment and Management in the Study Setting

In 2007-09, the Nursing department at the acute care study site initiated an BPG Implementation Program (BPG-IP), which involved implementing nine Registered Nursing Association of Ontario Best Practice Guidelines (RNAO BPGs), including the Pain BPG (24, 25). Pain care was identified by the Nursing department as a ‘corporate priority’ requiring ‘organizational-wide efforts’ to standardize pain assessment and management across all inpatient units. The first version of the Pain P/P had eight recommendations, derived from the 2007 RNAO Pain BPG (24). The policy was later updated in 2013, based on the revised 2013 RNAO Pain BPG (25), adding a ninth recommendation (see Table 4.1).

The Practice Gap

In 2016, in a research planning meeting, the nursing department and unit level leaders reported that despite early implementation success internal monitoring had demonstrated inconsistent use of Pain BPG recommendations among the Medicine care units compared to other inpatient units. Our review of findings from a 2017 chart audit of nurses’ use of five Pain P/P recommendations on two selected Medicine care units revealed varied adherence rates ranging from high to low adherence. Inconsistencies reported by leaders together with audited findings highlighted the need to further examine point of care processes/practices to uncover factors influencing nurses’ use of selected Pain P/P recommendations. This provided a “natural laboratory of units” (18) to examine the determinants (e.g., facilitators and barriers) and related efforts (e.g., knowledge translation interventions (KTIs) influencing unit level nurses’ use of a BPG in clinical practice, ten years (2017) post-implementation.

4.2 Purpose

We examined subcase nurses' self-reported use of a Pain P/P ten years post-implementation within an acute care setting. The purpose of this component of the study was to understand from a unit level perspective the factors and related KTIs influencing Medicine care unit nurses' use and related documentation of selected recommendations within the approved Pain P/P, at a ten-year timeframe (e.g., 2017) to advance knowledge on the long-term sustainability of a nursing BPG in acute clinical practice. The specific research questions included: (i) What factors (e.g., broader system, innovation, practice setting) are influencing unit nurses' use of the Pain P/P recommendations, and (ii) What KTIs are influencing unit nurses' use of the Pain P/P recommendations, at a ten-year timeframe?

4.3 Conceptual Framework

We used the Dynamic Sustainability Framework's (DSF) (26) as a theoretical framework to guide this study given the proposed constructs, related factors and tenets aligned with the purpose. The DSF contains three construct levels: the *broader ecological system* within which the practice setting operates; the *practice setting* (or context), and the *innovation* (e.g., BPG) which includes individual innovation components and an assumed set of characteristics defining *who* should deliver the innovation (26). Each construct is comprised of factors listed in Table 4.2. This framework posits seven tenets (propositions) for the sustainability of healthcare innovations (e.g., BPGs) in practice. Tenets 1-3 relate to organization-wide implementation of an innovation and tenets 4-7 relate to unit level sustainment of an innovation. Given the focus for this study is to examine the factors and KTIs that influenced nurses' use of a Pain BPG from a unit level perspective, we used tenets 4-7 to guide our data collection and the DSF constructs to present results. Specifically, we focused on nurses expectations for continual improvement of the

Pain P/P (Tenet 4); its ongoing fit (adaption) within the unit context (Tenet 5); the unit's continuous learning environment or problem-solving capacity to integrate the Pain P/P into routine unit processes/practices (Tenet 6); and key stakeholders influencing unit nurses use of the Pain P/P (Tenet 7) (26).

4.4 Methods

Study Design

We used a comparative case study design to compare similarities and differences related to the factors and KTIs influencing nurses use of the Pain P/P, across two representative units (subcases) within a multi-site acute care center (27), at a ten-year timeframe. From a nursing unit perspective, we conducted a review of available data sources related to the Pain P/P implementation over time (2007 to 2017). We then interviewed nurses on two selected inpatient Medicine care units (bounded cases within-a single organization) (27) to examine the factors and KTIs influencing their use and related documentation of the Pain P/P at the ten-year timeframe. We used DSF to guide the (i) development of the qualitative interview questions, (ii) the approach to data collection (e.g., development and use of a master list of tenets/definitions, related questions and codes), (iii) the analysis of the determinants and KTIs, and (iv) to present findings (e.g., comparing of findings to DSF constructs and related factors).

At the ten-year timeframe, we examined 5 of the 9 Pain P/P recommendations (e.g., 1, 2, 3, 4, and 7) for the following reasons. The selected five target behaviours can be clinically measured, are explicitly documented in nurse-specific documentation in the clinical patient record, are supported by one of the highest levels of evidence in the RNAO Pain BPG; namely at least one randomized control trial (24, 25), and the recommendation(s) periodically were the

focus of internal implementation efforts, and auditing (e.g., biannual survey, chart audit) over the past ten years.

Setting

The setting is a large urban, tertiary, academic teaching center in Canada composed of three sites with approximately 51,000 patient admissions annually, over 60 inpatient and outpatient units combined, just over 1122 staffed beds and more than 4500 nurses.

Subcase Selection

Two out of the five medicine care units in the hospital were purposefully selected that represented “critical sub-cases” (27) among the existing units. Organization leaders’ (e.g., Nursing Professional Practice (NPP) Corporate Coordinator; Director Medicine Care, and the five Medicine Care Managers) indicated their selection was based on maximum variation or potentially contrasting patterns of findings, Managers’ willingness to participate, knowledge of annual prevalence results, site uniqueness and ensuring representation from different locations (campuses) within the multi-site center. Each unit had their own Manager, separate Educator and nursing staff which was a mix of novice and senior nurses (i.e., a bimodal staffing mix). The Medicine Care department previously underwent minor restructuring such that both units were comprised of three inpatient wards, not all on the same floor, having approximately the same number of beds (e.g., 80 beds) and similar number of admissions.

Data Sources and Collection

The study period for document collection was ten years (2005-2017). Document collection and review occurred between 2017-2018. We conducted a review of 29 documents (e.g., reports, internal and external) related to the Pain P/P implementation, paying particular attention to efforts directed towards its use at the unit level (see Table 4.3). Reports (Rt) included

minutes from in person meetings with nursing representatives prior to study implementation, and committee reports/minutes/terms of reference. Additionally, we collated two reports: a list of KTIs used by the Nursing department over time (see Table 4.4) and measures used in the biannual prevalence audit pertaining to Pain P/P recommendations and educational records over time (2010-2017) (see Additional file 4.1). Internal documents (ID) included a power point presentation, biannual prevalence data (tools and measures), educational training records, related Professional Practice guideline implementation strategic plans, and a RNAO progress report on BPG-Implementation Project (BPG-IP). External documents (ED) included RNAO BPGs related to pain assessment and management (24, 25). This review provided a historical overview of the ongoing efforts used by the nursing department to sustain its use across all nursing units over time. Additionally, we conducted a review of audited findings, between August 2016 and October 2017, of nurses' documentation to the five selected Pain BPG recommendations to determine levels of adherence ten years post implementation (see Table 4.5). We then conducted interviews on the units separately, between August to September 2019 inclusive, completing one unit before moving onto the second. We triangulated all data sources (e.g., 29 documents, audit results from 200 inpatient charts, and 16 interviews) to clarify and collate the factors and KTIs influencing Pain P/P use on each unit.

Sample Recruitment

An internal gatekeeper for each unit facilitated recruitment by sharing the study information letter with all potential nursing staff who met the inclusion criteria, provided the schedule of dates and times to participate in interviews, and a designated location on the units for the interviews to take place. Unit nurses' participation was voluntary and based on the following inclusion criteria: those with full or part-time status, who have been employed at least two years

or more on the unit and registered with the College of Nurses. Based on similar studies (18), a convenient sample of eight to ten staff nurses per unit were initially recruited. We conducted interviews sequentially, and by the sixth interview for subcase 1 and the fifth for subcase 2, no new themes emerged. Thus, only eight nurses were interviewed for both subcases, as saturation and redundancy of responses was evident within each subcase (e.g., received similar responses by three or more nurses for most questions) (28, 29).

Qualitative Instrument

Semi structured interview questions were developed based on DSF tenets 4 to 7 (see Additional file 4.2). Pilot testing to refine the interview questions was undertaken with nursing representatives (e.g., Educator and NPP representative) not selected for interviews having current knowledge of Pain P/P use on the Medicine care units (28). Prior to commencing the interviews, participants were asked to sign a consent and complete a demographic information form to confirm eligibility for participation based on the inclusion criteria. Interviews were digitally recorded followed by verbatim transcription.

Data Analysis Strategy

We mapped the measures used in the biannual prevalence audit tool with the Pain P/P recommendations and education training records to identify the focus of their monitoring efforts over time (see Additional file 4.1). Following the document review (Article #1), we reviewed, collated, synthesized and revised the list of KTIs implemented by the hospital over time to promote nurses' use of the Pain P/P recommendations (see Table 4.4). We then reviewed findings of a chart audit designed to examine nurses' adherence to five selected Pain P/P recommendations (Article #2) (e.g., based on the selected timeframes between August 2016 to October 2017) to identify areas to focus our investigation (see Table 4.5). We analyzed the

interview transcripts using NVivo software. We then compared data with interview findings to enhance data completeness (e.g., saturation). We aggregated all findings to the unit level.

Specifically, we used NVivo 10 to organize and code data. Qualitative content analysis (30-32) guided our coding and interpretation, relying on DSF theoretical constructs and factors to initially organize relevant findings (27). Initially all informant responses were deductively grouped under each question (based on DSF tenets 4 to 7) creating themes, then inductively coded as factors and KTIs by two independent reviewers (LNP, JF). Factors were considered *determinants* that affected use of the protocol such as *barriers* and *facilitators*. *KTIs* were considered *strategies/actions* deliberately employed with the intention of promoting the use of the protocol. Following consensus, data (document review, chart audit, interviews) were triangulated to create a determinant table (see Table 4.6) and related KTI table (see Table 4.7) for each subcase. Aggregated determinants and KTIs were then aligned with the three DSF construct levels (broader system, innovation, practice setting) separately for each subcase. Finally, we conducted an across-case analysis comparing similarities and differences of the determinants and KTIs reported by nurses in each subcase.

Strategies for Study Rigor

We used Lincoln and Guba's (In 33) criteria for qualitative research to ensure rigor. The main strategies used to ensure *credibility* (e.g., confidence in the truth of the findings) included triangulating data from multiple sources, debriefing the research team, and seeking substantiation of findings from participants during interviews. Strategies to ensure *dependability* (e.g., stability of data over conditions and time) included adhering to the study protocol, documenting decision points, maintaining organized paper and electronic databases, composing field notes during interviews, and maintaining a master list of tenets/definitions, related questions and codes. We

ensured *confirmability* (e.g., congruence between participants about the data's accuracy, relevance and/or meaning) by using the stopping criteria of three or more interviews where no new themes emerged as a measure of saturation and redundancy (29), confirming participants met the inclusion criteria at the start of the interview, remaining close to participant verbatim transcripts, and reviewed findings with two knowledge users on the research team from the site to substantiate the findings. We aimed for *transferability* (e.g., have applicability in other settings or groups) by providing site, sample characteristics and detailed findings using the DSF.

4.5 Ethical Consideration

We obtained ethical approval from the Research Ethics Boards for the Ottawa Health Science Network (OHSN-REB) and the University of Ottawa. The participating organization's Nursing Administration (e.g., corporate and unit level administration) also provided administrative approval for the study protocol. Informants provided written informed consent prior to participation. Participation was voluntary and confidential. We used unique identifiers (participant codes) to ensure anonymity of datasets and findings. This study adheres to the Standards for Reporting Qualitative Research (SRQR) (34) guidelines for qualitative research (see Additional file 4.3).

4.6 Results

The two selected subcases were General Internal Medicine inpatient acute care units, located at two separate sites, having different Managers and nursing staff. Each subcase consisted of three aggregated units physically situated on two floors, with approximately 80 inpatient beds.

Characteristics of Data Sources

Between 2016 and 2018, we retrieved a total of 29 documents, with established/published dates ranging from 2005 to 2016 (see Table 4.3). Seven reports, twenty-one internal and two external documents related to Pain P/P use provided a historical and organizational-wide perspective of the efforts and KTIs used to sustain the use of the Pain P/P across all inpatient units over time (i.e., 2005-2017) (see Table 4.4). Documents provided evidence initial KTIs (2007-10) were focused on policy and procedure development, training champions, assembling departmental infrastructure support for the Pain P/P (e.g., Pain Council and committees), and followed a multi-modal implementation approach led by NPP representatives and unit level champions. Over time, the original 2007 Pain P/P was revised in 2013, based on the RNAO Pain BPG updates, adding one additional recommendation. In 2010, funds were secured to purchase software and develop a point of care prevalence survey tool to evaluate adherence to BPG recommendations. Efforts since 2010 were directed towards increasing unit nurses' adherence to recommendations at the unit level. A review of prevalence data measures for the Pain P/P surveyed between 2010–2015 revealed inconsistent auditing of the same recommendations over time, varying biannually, targeting specific recommendations for short periods of time (see Additional file 4.1).

The 2017 chart audit results (see Table 4.5) (Article #2) provided evidence that subcase nurses maintained high adherence levels to three of the five recommendations: assessing pain on admission to the unit (R1), once per shift and ongoing hourly assessments (R2), and establishing interventions to manage pain (R4). Low adherence rates existed across both subcases to the recommendation: providing patient education related to pain management (R7). There was a significant difference in the adherence rate: to establishing Pain Goal(s) for patients who had

pain during their hospital stay (over 5 shifts) (R3); unit 1 (Subcase 1) having low adherence, and unit 2 (Subcase 2) having moderate adherence.

We interviewed a total of 16 informants (see Table 4.8), eight per subcase, seven female and one male on each unit. All were Registered Nurses, the majority were degree prepared ($n=13$), between age 26 to 30 years of age ($n=9$). Three nurses were also interviewed who were over 41 years of age (Subcase1=3, Subcase2=1). Nurses from both units indicated the average time working in the profession and in their current job on their Medicine care unit was 8 to 9 years, subcase 1 and 2 respectively. To determine if differences exist between these independent groups of nurses; subcase 1 and subcase 2, a Mann-Whitney U test was conducted, which indicated there was no significant difference with respect to age ($p = .599$) or time in their current position ($p=.823$).

Determinants and KTIs Influencing Pain P/P use Ten Years Post-Implementation

We present the findings describing the determinants (facilitators and barriers) and related KTIs influencing Medicine care nurses' use of the Pain P/P at the ten-year timeframe. We highlight those determinants identified across cases by at least half or more of the informants ($N \geq 4$ per unit), and then report on determinants uniquely identified by subcases. Details of determinant and KTIs results are synthesized on Table 4.6 and Table 4.7 respectively, along with supportive participant responses and document evidence. We also present supportive subcase(s) (e.g., C1, C2), participant (e.g., P1 to P8), and document (e.g., reports =Rt, internal documents =ID, external documents = ED) evidence in-text when necessary. We used the DSF constructs and factors (broader system, innovation, practice setting) as a structure to present all results. Overall, we identified a total of thirty-one determinants (4 broader system, 6 innovation, 21 practice setting), twenty-one common to both subcases, three unique to subcase 1 and six unique

to subcase 2. We also identified nine KTIs (2 innovation, 7 practice setting) that reportedly influence case nurses' use of the Pain P/P at the ten-year timeframe.

Broader System Determinants

The majority of informants and document review identified the following four broader system determinants: the (i) *diverse patient population characteristics* on the Medicine care units (website) was identified as a facilitator for nurses' use of the Pain P/P. Approximately half of the informants for each subcase (n=4 out of 8) identified two barriers; (ii) *patient beliefs/cooperation* and (iii) *family beliefs/cooperation* when caring for such diverse populations. Informants indicated assessing pain is challenging when some patients "are afraid of having pain medication" (C2:P1), and "if families don't believe in taking medications, or they are scared to ask for medications for their loved ones...it can be a barrier" (C1:P8). Informants further indicated increasing (iv) *patient acuity levels* was a barrier influencing their use of Pain P/P recommendations. Informants reveal "in the last year, due to changes, we don't have enough time now, ...we are constantly getting new patients that are acutely ill, who have constant medical issues happening" (C1:P5), and these patients "require a lot more attention"(C1: P7).

Broader System KTIs

We did not identify any broader system KTIs used to influence the use of the Pain P/P at the unit level, ten-years post implementation.

Innovation Determinants defined by the DSF

We identified six innovation determinants (3 facilitators and 3 barriers) that influenced Pain P/P use at the ten-year timeframe. Half of each subcase informants (n≥4 out of 8) perceived (i) *nurses' motivation* towards the Pain P/P as a facilitator on their units. Informants stated "nurses are very supportive of the use of EBPs, such as the Pain P/P" (C1:P3) and "like using it"

C2:P6). Additionally, informants reported (ii) *supportive interprofessional team members* facilitated their use of the Pain P/P. Uniquely, subcase 2 informants claimed (iii) *nurses' experience/expertise* with pain care on the unit as a facilitator (C2: N=2) but the (iv) *resistance of a few senior nurses* as a barrier for them (C2: N=2). For example, informants reported the “more experienced nurses help out a lot, because...the questions you ask them, they know the answers” (C2:P3), while some “senior nurses are more stuck in their ways and new nurses are more likely to follow policy” (C2:P7). Half of each subcase informants ($n \geq 4/8$) identified (v) *physician pain medication prescribing preferences* as a potential barrier to the use of the Pain P/P. Informants reported physicians often held hesitations related to nurses' requests for increases in pain medication dosage and use of narcotics for specific patient groups. For example, “doctors are very reluctant to give pain medication” (C1:P4) and especially “new residents, they are a little skittish around narcotics, sometimes that's a barrier and they order a lot less than you need” (C2:P3). Lastly, half of each subcase informants ($n=3-5$ out of 8) identified (vi) *family and patient preferences* for certain pain medications, “such as +++ opioids...make it difficult to adhere to the pain policy” (C2:P3).

Innovation KTIs

Two innovation KTIs identified by informants and document review included *routinizing of the Pain P/P recommendations into nursing forms and practices/process* and *digitalizing the Pain P/P and forms* into the new electronic health record (charting system) (see Table 4.7). Informants indicated embedding prompts into existing unit specific practices, such as admission procedures and ongoing assessment processes (e.g., shift assessments, hourly rounding, care boards/ whiteboards), facilitated use of the Pain P/P recommendations in daily routine practice. Our document review (see Table 4.3) verified that several standardized tools for verbal, non-

verbal, cognitively and visually impaired patients were integrated into existing nursing documentation forms, electronic charting system prompts and informal communication boards in patients' rooms; referenced as care boards or whiteboards.

Practice Setting Determinants

We identified a total of twenty-one practice setting determinants (i.e., 11 facilitators, 10 barriers). We highlight seven facilitators and six barriers commonly identified across subcases and then describe determinants uniquely identified by subcases. First, the support of *multiple stakeholders* (e.g., from top to bottom of the organization) and second, that of *collaborative expert consultants* (e.g., the Acute Pain services (APS) or Palliative Care Services (PCS)) to “deal with difficult situations with pain or when Medicine (MDs) can't control patients' pain themselves” (C1:P1) (ID5, ID6) facilitated nurses use of the Pain P/P use across subcases. Third, informants report *senior nurses* are perceived to be *influencers and mentors* in pain management among nurses themselves. Fourth, informants claimed their *clinical manager(s) support*, and fifth, the existence of a *team culture that embraces new initiatives/approaches* to pain management facilitates their “openness to the use of alternative therapies” (C1:P5) and “new treatment modalities” C2:P2) for pain care on their units. Sixth, *bedside shift reports* and seventh, *in room documentation care boards* (or whiteboards) enhanced communications between nurses related to patients' pain and management strategies.

Six common barriers identified across subcases that influenced use of the Pain P/P include the following. First, most informants indicated the increased *workload* and decreased *staffing* ratios “is a barrier, sometimes one nurse for six patients is not enough to maintain and control pain levels” (C1:P5, C2:P6). Second, *frequent physician rotation* exchanges and their resultant “lack of familiarity with pain management on the unit often can be a detriment when

trying to get things done” (C1:P7, C2:P1). Third, the recommendation to document pain related education on the “Education Form is probably an *unrealistic charting expectation*” (C1:P7). Informants further stated “we do education all the time, but don’t document it” (C2:P2). Fourth, the *utility of the new electronic patient information charting* “(EPIC) system can be a big barrier because of all the steps you have to follow” (C1:P7, C2:P3). Fifth, nurses lack of *familiarity/awareness with the Pain P/P* recommendations was identified as a potential barrier. Specifically, informants expressed “it was told to you at orientation and you just kind of integrate it into your practice but I don’t think many people refer to it” (C1:P5). Another informant indicated, “I’ve never seen the pain policy before, I mean all of these things were taught to me, but I didn’t know this was an actual legit document” (C2:P6). Lastly, the *physical structure/layout* of the units “being on more than one floor” (C2:P8), and “very large, containing more than 80 beds” (C1:P1) reportedly was a barrier.

We identified three practice setting determinants unique to subcase 1 (i.e., 2 facilitators, 2 barriers) and five to case 2 (i.e., 2 facilitators, 3 barriers). Subcase 1 informants claimed their *supportive Clinical Care Coordinators’/Leaders’* (CCL)(C1: N=6) focus on improving pain care, strongly influenced their use of the Pain P/P. Additionally, informants reported having a *culture for doing research* on the unit that supports nurses conducting EBP research as a facilitator (C1:N=3). A barrier uniquely identified by an informant from subcase 1 (C1: N=1) included the *reorganization of wards* and the resultant merging of staff from different units and cultures. Notably, at the time of the study, the informant indicated, “it’s been six months now since we merged and things are finally starting to settle...with a meshing of the two cultures” (C1:P5).

The five practice setting determinants uniquely identified by subcase 2 nurses included the following. Subcase 2 nurses reported *daily interdisciplinary rounds* provided an opportunity

for them to “talk about it (pain management issues) with the team” (C2:P2) which enhanced their pain management skills (C2: N=3). They also indicated being able to call a *nursing shift coordinator* “on nights if there is ever a big issue...for help” (C2:P7) as a facilitator. The three barriers identified by subcase 2 informants include: (i) *time management* (C2: N=4) “to do pain assessments, the pain will be addressed but it could be done better, instead the bare minimum will be done” (C2: P7); (ii) *MD and nurses communications* regarding pain management (C2: N=3), informants indicated, “very rarely do physicians prompt nurses about pain” (C2:P2); and (iii) a *lack of pain management resources available* (C2: N=3) to nurses on the unit such as “a formal guideline or clinical pathway for pain control”(C2:P4) as barriers to Pain P/P use.

Practice Setting KTIs

We identified a total of seven Practice Setting KTIs (6 in Subcase 1, 7 in Subcase 2) used to overcome barriers and promote the use of the Pain P/P at the unit level, ten-years post-implementation. Informant and document review evidence is detailed on Table 4.7.

First, KTIs used by subcases to *engage stakeholder involvement* include encouraging stakeholder participations on quality committees related to inpatient pain care, and consulting with interprofessional (IP)team members (e.g., therapists, pharmacists, nurse colleagues, physicians) on patient pain management strategies when needed. Second, KTIs used by subcase 2 IP team members to *foster an IP and EBP climate/culture on the unit* include maintaining “a close, dynamic family style when communicating or collaborating on pain issues” (C2:P7), discussing pain management issues in daily interdisciplinary rounds, encouraging members to embrace new pain care treatment modalities/improvements, and continuously sharing pain control updates. Third, the use of *mentorship* by senior nurses to support Pain P/P use at the unit level is reported across subcases. Strategies include helping one another, “especially in pain

crisis situations” (C2:P2), and mentor/train novice nurses at the bedside on pain management strategies to relieve pain. For example, “providing teaching tips on non-verbal pain assessment and management techniques to colleagues at bedside” (C1:P4, C2:P2). Fourth, *establishing effective communications* between providers related to Pain P/P recommendations by subcases included establishing unit *reporting practices* to communicate patients’ pain status (e.g., verbal bedside shift reports, documentation on patient care boards and vital sign clipboards).

Fifth, *unit level leadership efforts* reported across subcases were perceived effective in supporting Pain P/P use at point of care. For example, *Clinical Care Leaders’ (CCL) efforts* included helping solve unit wide pain care issues, and supporting use of ongoing improvements. *Manager efforts* included providing daily support related to patient pain care, encouraging nurses to attend pain education days, using staff meetings as learning forums to share new pain care knowledge, getting involved to solve unit wide pain issues, and developing remedial strategies that reinforce use of the Pain P/P.

Sixth, providing *ongoing education and training* at the corporate and unit level was evident in document review and interviews across subcases. NPP representatives reported corporate level training related to pain remains a key component of hospital-wide general orientation for all new nurses. Documents confirm annual 2-day pain education days and half-day IP palliative pain care sessions continue to be offered. We verified the completion of mandatory eLearn pain care modules remain a requirement for nurses during interviews and document review. Specialized training such as Gentle Persuasion Approach (GPA) was reported by nurses “to enhance their pain assessment skills for dementia patients” (C1:P3). Unit level KTIs led by unit Educators reported to have a positive influence on nurses use of Pain P/P include providing “in-services on policy and new medication updates” (C1:P4, C2:P6), offering

“refreshers on policy updates” (C2:P5) and “assessment techniques for target population groups such as stroke patient” (C1:P4, C2:P2), providing “1 on 1 training sessions” (C1:P3, C2:P6), and “working on solutions for reoccurring pain related issues” (C1: P3).

Seventh, we identified *monitoring and evaluation KTIs* used across subcases in the document review and interviews. The *monitoring KTI* used included training approximately 170 BPG interprofessional champions (2-3 per unit), by 2018, who participate in a one 8hr day survey, twice a year, measuring key nursing sensitive indicators related to the BPGs (e.g., Pain P/P target behaviours). Documents and interviews revealed the training of staff to collect prevalence survey data, on units not their own, was designed to increase awareness of the importance of the guidelines among all disciplines and expanded accountability for adherence to recommendations among team members at point of care. A *feedback and evaluation KTI* included “timely sharing of performance data (e.g., prevalence survey and patient satisfactions results) by NPP representatives with clinical leaders and unit nurses” (C1:P1, C2:P5). Then meeting to discuss results and to support “development of remedial action plans to address low adherence rates revealed in the survey results” (C1:4, C2:P5) evidently spurred units to improve. Specifically, ongoing changes in measurement activities (e.g., the questions within the prevalence survey tool) became more focused and sophisticated to target selected BPG behaviours. Unit clinical leaders and teams set increasingly specific benchmarks that were incrementally obtainable and modified survey questions to reflect benchmarks (ID3-11). Our review of prevalence survey measures used over time confirm these efforts continue to date (see Additional file 4.1).

4.7 Discussion

Summary of Main Results

To examine sustainability of a Pain BPG, from a unit level perspective, we used the DSF as a theoretical framework to understand the factors and related KTIs influencing nurses' use and adherence to selected Pain P/P recommendations, at a ten-year timeframe on two embedded subcases within the acute care study site. We identified thirty-one determinants (15 facilitators and 16 barriers) and nine KTIs influencing nurses' use of the Pain BBG at the ten-year timeframe. All results mapped to the DSF constructs, except one factor we identified, which is not included in the DSF: physical layout/structure, which adds to the DSF. There was consistency in perceptions across subcases regarding 21 out of 31 (67%) identified determinants (4 broader system, 4 innovation, 13 practice setting) impacting unit nurses use of the Pain P/P and 8 out of 9 (89%) KTIs being used to promote Pain P/P use. Practice Setting determinants and KTIs identified by subcases reflect unique unit level influences impacting sustainability. Across subcases we discuss determinants and KTIs contributing to both high and low adherence rates related to the five selected Pain P/P recommendations.

Similar Determinants Across Subcases

We identified *similarities among determinants within the innovation and broader system constructs* across subcases that reportedly influenced nurses' use of the Pain P/P. Across subcases nurses' *motivation* was reportedly viewed to positively influence Pain P/P use. Implementation phase research suggests a nurse's attitude towards research is a key individual characteristic that predicts research use (35). In our study, nurses indicated they "are very supportive of the use of EBPs such as the Pain P/P "(C1-P3) "and are using it all the time" (C2-P6). These findings confirm nurses maintain a positive attitude towards the use of research

(BPG) and continue to be motivated to use it in their clinical practice ten-years post implementation. This is an important finding for sustainability. We recommend future internal efforts build on nurses' existing positive attitude towards research use and their motivation to use BPGs in their clinical practice.

Common broader system determinants identified by nurses across subcases can be attributed to the similar patient population admitted to both units. In a recent review related to context attributes and their features (36), population characteristics were identified as a key determinant influencing healthcare professionals' use of research in clinical practice. In our study nurses across subcases reported the *diverse population needs/ characteristics* of patients admitted to their units positively influence their use of the Pain P/P. Additionally, nurses reported *patient preferences, beliefs, cooperation (or resistance)* and *acuity levels* often inhibited their use of the Pain P/P recommendations. Shelton et al (8) suggests "contextual factors such as differences in population can influence the ways in which innovations evolve after implementation and are sustained across time in real-world settings" (8). We believe this determinant provides further insight into understanding nurses varied use of BPGs on different units, with different or similar patient populations, within the same setting. Although no KTIs targeted broader system determinants in our study, the importance of population characteristics should not be underestimated related to acute care nurses point of care use of BPGs in hospitals.

Similar KTIs Across Subcases

We identified two ongoing KTIs that nurses across subcases reported continue to promote their use and adherence to the Pain BPG recommendations:(i) providing *ongoing education and training for staff*, and (ii) conducting *prevalence monitoring and evaluation*. Developing and providing ongoing education and training initiatives for staff to promote BPG use positively

influenced unit level nurses use of the Pain P/P. This finding is consistent with previous research in which training is identified as a key construct and mapped as a key strategy in sustainability of innovations in healthcare (6, 26, 37, 38). Additionally, collaboration by unit leaders and NPP representative to provide timely feedback on audit results and to assist units in the development of remedial plans for low adherence results positively influenced nurses Pain BPG use. In a previous review, monitoring progress using a standardized mechanism over time was identified in 84% (52 out of 62) of studies as a key strategy for the sustainability of innovations in healthcare (6). Moreover, the combined training of nurses to be surveyors to conduct the biannual audits (e.g., monitoring) reportedly served to increase nurses' accountability towards sustaining BPGs in clinical practice while building their capacity for EBP use within the setting. A recent review suggests, given the ever-changing nature of acute care contexts, it is important to routinely monitor the factors and KTIs that facilitate or inhibit BPG use for sustainment (1). This combination of KTIs (e.g., education and monitoring) is an important consideration for the sustainment of BPGs among unit level nurses in changing acute care contexts.

Unique Determinants and KTIs Across Subcases

Differences identified across subcases lie within the *practice setting construct*. Specifically, practice setting determinants reportedly stem from linkages/interactions between and attributes of unit level leaders, senior nurses and interprofessionals team members within the units. Subcase 1 nurses strongly emphasized a supportive Manager and Clinical Care Leader as key factors influencing their adherence. Similar leadership efforts have proven effective in other sustainability studies (1, 8, 10, 18). Our findings highlight how the mid-level management role can be critical to enacting a sustainability-orientated operational tie between the unit level leaders and frontline. Consistent reinforcement and feedback on maintaining BPGs by unit level

leaders contributed to a sustainability-promoting culture of shared accountability evident in other studies (10, 18, 39-41).

Subcase 2 nurses described the *mentorship* from experienced, knowledgeable senior nurses and the close, dynamic *IP team* style (e.g., culture/climate) used on their unit to address pain issues promoted their adherence to the Pain P/P recommendations. This finding provides further support for the value of provider collaboration, a contextual factor identified in other studies (3, 15, 18). Dynamic elements of context, such as increasing complexity and acuity of inpatients, often requires interdependence among nursing colleagues and other interprofessional team practitioners to maintain BPGs (42). Although the guideline in our study is a corporate policy its was considered primarily a nursing practice-oriented policy by the nursing department. To date, the literature reveals evidence that provider collaboration is a key determinant influencing the implementation of BPGs in hospitals (42, 43). Findings reinforce how nursing work is dependent on linkages between an ensemble of clinical practices and persons within the network of care it is located in, the integrity of which impacted sustained use of a Pain BPG in our study (18). Thus, despite differences in supervision (e.g., unit leaders) and organization culture/climate (mentors and IP team members) determinants, the linkages/interactions between and attributes of these key individuals are important for sustainability, adding to current knowledge.

Determinants and KTIs Influencing High Adherence

We identified *innovation and practice setting determinants and KTIs* that facilitated *high adherence rates* to 3 out of 5 selected recommendations important to consider for sustainability of BPGs in clinical practice. In our study, we highlight effective *innovation KTIs* underscoring nurses' adherence to the Pain P/P in clinical practice consistent with previous studies (3, 6, 11,

42, 44, 45). For example, where documented evidence demonstrated high adherence rates at the ten-year timeframe, the integration (or ‘fit’) of guideline recommendations into nursing forms and daily routines and or processes/practices was positively influenced by the use of approved EB measurement tools, and the embedding of prompts in nursing forms and routine assessments. These KTIs supported formal documentation of patient outcomes and thus facilitated high adherence rates for two out of five Pain P/P recommendations. They include: recommendation 1 (R1): assessment on admission to the unit, and recommendation 2 (R2): ongoing pain assessments, including hourly rounds. These findings align with Chambers et al DSF (26) and recent reviews (1, 3, 46) wherein innovation factors such as ‘fit’ and “adaptability’ were commonly identified as being key to sustainability. Additionally, results from a recent review of approaches used in healthcare to sustain an innovation demonstrate the integration of an innovation into existing policy and practice as a common construct across approaches regardless of the proposed interventions, setting or application type (6). Our findings further support the previous research that the integration and embedding of EB recommendations into routine practices/processes is an important consideration for sustainability (6, 11, 42, 44).

We identified three *practice setting determinants* across subcases that encouraged a *high adherence rate* to the Pain P/P recommendation 4 (R4): establish interventions to manage pain. First, having *supportive multiple stakeholders* for the use of the Pain P/P such as frontline nurses, educator, MDs, manager, pharmacist or advance practice nurses (APNs) (6, 37, 42, 43) positively influenced Pain P/P use. Previous sustainability studies suggests stakeholder participation is a key construct for sustainability of innovations in clinical practice (6) and the routinization of BPGs is dependent on collaboration among nurses, between nurses and interdisciplinary team members (18, 43). Our finding is consistent with previous research.

Second, nurses indicated being able to rely on *senior nurse mentors*, from whom they “have learnt about pain control” (C2-P6), to “help when patients end up in a pain crisis” (C1-P5) influence their use of the Pain P/P. Previous research suggests a key mechanism to assist nurses in sustaining EBP, especially when priorities place constraints on their use of EBPs such as a pain crisis, is an EBP mentor (47) or a clinical expert nurse (18). More recently, from a KTI perspective, a hospital-based mentorship program on EBPs further suggests frontline nurses’ knowledge, attitude and practice of EBP increase with mentorship (48). Third, across cases nurses indicated having access to *collaborative expert services* for patient pain management issues on their unit influenced their use of recommendation 4 (R4). For example, when “patients are in excruciating pain” (C2-P2) or experiencing “pain medication control difficulties” (C1-P1) that nurses ‘efforts can not overcome, collaborating with experts on additional pain management interventions influenced their use of recommendation 4 (R4). Implementation research suggests when “members of a community of practice enrol each other into group processes that specify their engagement”(42) such as when to call upon experts, guidelines become normalized into clinical practice. Our finding suggests this determinant is important for sustainment as well.

Determinants and KTIs Influencing Low Adherence

We identified determinants and KTIs underlying the low adherence rates to recommendation 3 (R3): setting of Pain Goals, and recommendation 7 (R7): providing pain education to patients/families (Article #2). Across subcases nurses *reported informal clinical practices* being used to communicate a patient’s pain status and the impact of pain interventions to manage pain between nurses and other practitioners. For example, bedside whiteboards have been used for several years by patients and nurses to record pain scores and set pain goals, clipboards are used to document vital signs and pain levels to share with charge nurse on

morning shifts, and verbal bedside shift reports to exchange patient pain status data. Our document review revealed these KTIs were initiated in 2013 (Rt3) and continue to partially influence the lack of formal documentation related to R3. Future efforts need to focus on KTIs that will formalize documentation of practices not recorded in the health record so adherence to recommendation 3 (R3) may be accurately captured.

We identified three determinants that nurses indicated contribute to a lack of documentation related to recommendation 7 (R7): providing pain education to patients/families revealed in the chart audit results (see Table 4.5). Determinants include increasing *workloads*, *time* and *unrealistic charting expectations*, all likely contributing to the low adherence rates. Across subcases nurses indicated increasing workloads (e.g., 6 patients to 1 nurse) make it difficult to keep on top of things (C1: N=5, C2: N=7). Subcase 2 nurses claim time management to assess pain is a challenge (C2: N=4). Furthermore, across subcases nurses claimed they “do education all the time but don’t document (C2-2,5). Others described the Education Form as “an unrealistic form” ... these policies are made for ideal situations that don’t occur anywhere in real clinical settings” (C1-P7). The assumption nurses are not providing pain education can not be drawn based on low adherence rates. Instead, our findings provide further credence that sustained use of BPGs is enhanced when providers recognize the benefits beyond directly helping patients achieve desired outcomes (11, 49). Future KTIs need to identify clear and visible benefits related to documenting existing pain education efforts that are flexible, easy to use, and motivational for nurses to carry out, despite heavy workloads so adherence to recommendation 7 may be accurately captured.

4.8 Strengths and Limitations

This study provided in-depth, contextualized evidence related to sustainment of EBPs in acute care from a unit level perspective at a ten-year timeframe, adding to current knowledge. We focused our research on one guideline and selected recommendations implemented throughout the entire hospital over a ten-year timeframe, requiring all disciplines to follow. This provided a unique opportunity to examine the influences impacting sustainment of an EBP at both department and unit levels. We used a sustainability framework (DSF) as a guide to examine the determinants and KTIs being used to influence nurses use of an BPG in a multi-site acute care setting. Specifically, this study reveals insights and knowledge regarding broader system, innovation, and practice setting influences that impact nurses use of an EBP at the point of care in an acute care setting. The comparative case study design used provides the detail and contextual descriptions to determine the applicability of the determinants and related KTIs necessary for sustainment in similar settings aiming to sustain EBPs. We enhanced dependability of the data by adhering to the study protocol, documenting decision points, maintaining organized databases, and maintaining a master list of tenets/definitions, related questions, and codes. We used multiple data sources, conducted several briefings with the research team, and substantiated findings with two knowledge users on the research team to ensure credibility of the findings. Confirmability of results is reassured by remaining close to the transcripts, referencing participate responses and documents presented in the text, tables and additional files.

The main limitations include examining nurses' use of the Pain P/P on two units within the Medicine care department, potential participant response bias, potential researcher bias, and sampling. We focused our research on selected guideline recommendations implemented on two of the five Medicine care units within one department. Given the capacity limitation of one

researcher, sample selection was limited, however it was based on maximum variation criteria providing potentially contrasting patterns of findings established by internal representatives and voluntary participation. Results suggest broader system (e.g., population characteristics) and several practice setting determinants and related KTIs influence nurses sustained use of an EBP. Thus, including additional units in future sampling would provide further insights and expand generalizability. A response bias may have occurred if participants' responses to the interview questions indicated what they thought would be acceptable rather than their perspective.

Including unit clinical leaders, educators and managers in future research would provide an alternative perspective/insight into EBPs use at the unit level which was beyond the scope of this study. Given limited access to the site member checking was not conducted due to limited access to the site. However, to reduce the researchers' bias, we used multiple data sources and reviewed findings with two knowledge users on the research team from the site to substantiate the findings. Furthermore, given the EBP is an interdisciplinary policy, relevant perceptions from allied health professionals other than unit level nurses were missed.

4.9 Implications for Practice

We identified several facilitators and barriers underscoring unit nurses' ongoing adherence to BPGs and highlight potentially effective KTIs to inform future quality improvement initiatives to sustain BPG use in clinical practice. For similar multi-site tertiary settings aiming to sustain EBP at the point of care level, the thirty-one determinants and nine KTIs identified can be used as a checklist to examine use of a BPG post-implementation. Our findings confirm continued department and unit level efforts directed towards embedding prompts into daily practices/processes is an effective way to influence long-term sustainability on nursing units. Attention to established practices/processes used by nurses at point of care not

recorded in the health record related to BPG recommendations (e.g., use of in room care boards to record pain scores) may provide insight into how best to design KTIs to address low adherence rates. Future KTIs need to identify benefits related to documenting existing pain education efforts that are flexible and motivational for nurses to carry out. To avoid the potential of decay of BPG use over time and promote unit capacity, KTIs need to continue to target stakeholder engagement such as the IP team members. Promoting collaboration among IP team members and by senior nurse mentors to use BPG recommendations positively influences sustainability among unit nurses. We recommend clinical leaders provide consistent feedback/reinforcements on maintaining adherence to guideline recommendations, promote ongoing education of staff, and promote staff participation in prevalence monitoring given these KTIs reportedly have a direct influence on nurses use of the Pain BPG. Ongoing internal efforts that build on nurses' existing positive attitude towards research use and their motivation to use BPGs in their clinical practice are recommended.

4.10 Conclusion

To reduce the gap in our understanding about the long-term sustainability of a BPG at the unit level in routine practice in acute care, we used the DSF (26) to guide our investigation. We identified thirty-one-unit level determinants (facilitators and barriers) and nine related KTIs that nurses perceived influenced their use of the Pain BPG, ten years post implementation. We identified one new factor, not included in the DSF, structural layout, which adds to the DSF. Our findings demonstrate common broader system (e.g., population characteristics) and innovation (e.g., individuals' motivation) determinants, and practice setting KTIs across subcases that promote nurses use of BPGs are necessary influences to consider for the sustainment of BPGs at the unit level. Our findings highlight despite some unique differences in practice setting

determinants, such as supportive leadership or senior nurse mentors and IP team members, their continued efforts are required to ensure long-term guideline sustainability especially in a changing healthcare context, such as acute medicine care units. Examining factors and KTIs underscoring guideline adherence rates in this real-world setting revealed effective innovation KTIs (e.g., embedding of prompts) that influenced high adherence rates. It also provided insight into practice setting factors and KTIs, not documented in the health record, influencing low adherence rates. Future KTIs need to identify clear and visible benefits related to documenting ongoing use efforts that are flexible, easy to use, and motivational for unit nurses to carry out. Further research is needed in other settings to uncover unit level factors and KTIs underlying nurses' adherence to BPG recommendations to further our understanding of sustainability.

List of Abbreviations

APS - Acute Pain Service
BPG - Best practice guideline
BPG-IP - BPG Implementation Program
C1:P# - Subcase-1 – participant /informant code
C2:P# - Subcase-2 – participant /informant code
CCL – Clinical Care Leader
DSF – Dynamic Sustainability Framework
ED# - External document code, numbered 1 to 2
EBP – Evidence-based Practices
F/M/T – Framework/Model/Theory
ID# - Internal document code, numbered 1 to 20
IPN – Inter-Professional Notes
KTIs - Knowledge translation interventions
Pain P/P – Pain policy/protocol
PCS - Palliative Care Service
Rt# - Report code, numbered 1 to 7
R# - Recommendations 1-7 within the Pain BPG guideline
RNAO – Registered Nurses Association of Ontario

Declarations

Ethics approval and consent to participate

We obtained ethical approval from the Research Ethics Boards for the Ottawa Health Science Network (OHSN-REB) and the affiliated Office of Research Ethics and Integrity (file #: A10-17-P2) of the University of Ottawa. The participating institution also granted approval of the study.

Consent for publication

All participants provided written informed consent before participating in the study, which included consent to publish anonymous quotes from individual participants.

Availability of data and material

The datasets generated and analysed during this study will be available from the corresponding author on reasonable request.

Competing interests

The authors declare that they have no competing interests and no conflicts of interest.

Funding

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Author's contributions

LNP and thesis committee members (IG, CB JS) contributed to the conceptualization of the study. LNP undertook the primary role in implementing the study; collecting the data, conducting interviews, and leading the analysis and reporting activities. LNP and JF independently conducted the qualitative analysis of the transcripts and LNP produced the tables, figures and additional files. JS, IG, and CB provided input into the data collection, analysis and interpretation. The initial draft of the manuscript was prepared by LNP, then circulated among all coauthors for comments and revision. All coauthors read and approved the final manuscript.

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TABLES

Table 4.1. Pain Policy/Protocol target behaviors, RNAO Pain Assessment and Management BPG recommendations (24, 25) and level of evidence (50)

Site Pain P/P Number.	Pain P/P Target Behavior	RNAO Pain Assessment and Management BPG Recommendation Number Level of Evidence
	Mandatory Pain policy /protocol requirements	
1	Screen inpatients for presence of pain on 1) Each initial contact/admission (2007 & 2013)	Assessment Recommendation - 1.1 Level of Evidence - Ib
2	Ongoing assessments of Pain using standardized tools 1) Once per shift (2007). 2) During hourly rounding (2013)	Assessment Recommendation - 1.2 Level of Evidence - Ib
	Conditional policy/protocol requirements	
3	Establish an individualized goal for pain management with the patient (2007 & 2013).	Planning Recommendation - 2.1 Level of Evidence - Ib
4	Collaborate with the patient in establishing an individualized strategy and interventions to manage the patient's pain based on the best evidence and available resources. (2007 & 2013).	Planning Recommendation - 2.1 Level of Evidence - Ib
7	Educate patient and families about their individualized pain management plan (2007 & 2013)	Implement Recommendation - 3.3 Level of Evidence - Ib
5	Assess effects of pharmacological interventions at peak effect following administration and on an ongoing basis. (2007 & 2013)	Implement Recommendation - 3.1 Level of Evidence - IIb
6	Consult with pain management experts (interdisciplinary team members) as required (e.g., in complex situations, and or escalating or unrelieved pain after a reasonable trial of management). (2007 & 2013)	Planning Recommendation - 2.2 Level of Evidence- Ib
8	Ensure ongoing documentation reflects patient goals, pain mgmt. plan, assessment, response to treatment, outcomes, & communicate to inter professional team	Evaluation Recommendation - 4.4 Level of Evidence - IIb
9	Completion of self-learning training modules for nurses and physicians	Education Recommendation - 5.4 Level of Evidence - IV

Key: R = Recommendation, CA = Chart Audit, Q = Question, mgmt.= management, hxy= history, txmt= treatment

Evidence statements and grades of recommendations in RNAO guidelines (25)

Ia Evidence obtained from meta-analysis or systematic reviews of randomized controlled trials.

Ib Evidence obtained from at least one randomized controlled trial.

IIa Evidence obtained from at least one well-designed controlled study without randomization.

IIb Evidence obtained from at least one other type of well-designed quasi- experimental study, without randomization.

III Evidence obtained from well-designed non-experimental descriptive studies, such as comparative studies, correlation studies and case studies.

IV Evidence obtained from expert committee reports or opinions and/or clinical experiences of respected authorities.

Reference: Adapted from “Annex B: Key to evidence statements and grades of recommendations,” by the Scottish Intercollegiate Guidelines Network. In SIGN 50: A Guideline Developer’s Handbook (50). Available from [http://www.sign.ac.uk/guidelines/full text/50/annexb.html](http://www.sign.ac.uk/guidelines/full%20text/50/annexb.html)

Table 4.2. Dynamic sustainability framework (DSF) constructs, factors and tenets (26)

DSF Construct: Innovation/Intervention
<p>DSF Factors: <i>-Innovation/Intervention specific factors influencing behaviour change</i></p> <ul style="list-style-type: none"> • User characteristics (i.e., who should deliver the innovation/intervention)) • Outcomes directly related to usage (i.e., patient centered outcomes) • Delivery platform innovation/intervention is delivered on (i.e., face to face, telephonic, web-based, mobile health application)
DSF Construct: Practice setting (context)
<p>DSF Factors: <i>Contextual factors that effect achievement of desired outcome(s)</i></p> <ul style="list-style-type: none"> • Human resources (i.e., staffing) • Financial resources (i.e., capital resources) • Information systems • Organizational culture/climate and structure • Processes for training staff • Supervision of staff
DSF Construct: Ecological system
<p>DSF Factors: <i>System factors within which the practice setting operates</i></p> <ul style="list-style-type: none"> • Other practice settings (i.e., working to incorporate the innovation/intervention) • Policy (i.e., legislative environment) • Regulations • Market forces (i.e., characteristics of local, regional, state, national markets) • Population characteristics (i.e., characteristics of broader population)
DSF Tenets
1. Optimizing of Intervention (Pain P/P) is context specific and should not be optimized prior to implementation (Imp) (0-2 yrs.) and sustainability (Sust) (> 2ys) phase onset.
2. Continual improvements of Intervention (Pain P/P) will boost sustainment
3. Ongoing feedback on the Intervention (Pain P/P) needs to use practical, relevant measures of progress (expected outcomes) and relevance (fit between intervention and context) that are feasible.
4. Voltage drop is not inevitable within a culture of Continuous Quality Improvement (CQI) Definition: Voltage drop = assumes the more diverse and complex a patient population is, the smaller the benefit of the Intervention.
5. Sustainment of an Intervention (Pain P/P) will be maintained when there is a ‘strong fit’ between the Intervention and the context. Definition: Fit = adaption of the Intervention to the context to sustain it
6. Organizational Learning is a core value for sustainability
7. Ongoing stakeholder involvement is necessary for sustainability

Table 4.3 Listing of data sources

Report Number	Title and Dates created or issued
Rt1	Notes from meeting on monitoring and auditing results with NPP Coordinator 2015
Rt2	Teleconference minutes with APN for acute care Nov 18, 2015
Rt3	List of Corporate and Unit level KTIs implemented 2006-2017: summary of strategies
Rt4	Notes during meeting with NPP Coordinator March 31, 2015
Rt5	Notes during meeting with APN Palliative Care -Lead for BPG project initial start-up Oct 20, 2015
Rt6	Minutes from Meeting with NPP Coordinator May 27, 2016
Rt7	Table of prevalence data measures for Pain PP target behaviours and ELM records performance measurement improvements 2011-2015
Internal Document Number	Title and Dates issued
ID1	2015 EBP Implementation power point presentation by NPP
ID2	NPP strategic plan on adherence to Pain P/P Multiple plans -2005/2006, 2007/2008, 2008/2009, 2009/2010, 2010/2011, 2011,2012, 2012/2013, 2013/2014, 2014/2015, 2015/2016
ID3	Terms of Reference Pain Assessment and Management BPG work Group 2006
ID4	10 themes used for Pain P/P development
ID5	2007 Pain Assessment and Management Policy
ID6	2013 Pain Assessment and Management Policy
ID7	Pain Prevalence Audit Tool= Patient Assessment questions & Chart audit questions Nov 2010
ID8	Pain Prevalence Audit Tool= Patient Assessment questions & Chart audit questions Nov 2012
ID9	Pain Prevalence Audit Tool= Patient Assessment questions & Chart audit questions Nov 2013
ID10	Pain Prevalence Audit Tool= Patient Assessment questions & Chart audit questions April 2014
ID11	Pain Prevalence Audit Tool= Patient Assessment questions & Chart audit questions April 2015 and Nov 2015
ID12	Post Discharge Patient Satisfaction Survey tool
ID13	Site Final Report for BPSO on RNAO Pain Assessment and Management BPG implementation Oct 2011 by CB
ID14	Hourly Rounding Policy versions 2012, 2014
ID15	Brief Pain Inventory -Self Report 2005
ID16	24 Nursing Documentation Flowsheet: versions 2008, 2014,2016
ID17	Patient Teaching Record 2009
ID18	Patient Admission History: versions 2013, 2016
ID19	Patient Assessment and Medication Administration Record 2009
ID20	Provisions of Additional Therapy Services by External Providers 2014

External Document Number	Title and Dates issued
ED1	RNAO Pain Assessment and management BPG 2007
ED2	RNAO Pain Assessment and management BPG 2013

Key

Reports (Rt#)

Internal documents (ID#)

External documents (ED#)

Table 4.4. Revised List of KTIs used for Pain P/P over time 2005-2017

Pain Management - Knowledge Translation Interventions (KTI) listing					
Date	Target	KTI Activity			
		Policy/Guideline/Tools & Form development	Training	Infrastructure support	Auditing/ quality performance monitoring
2005 +ongoing	Corporate wide	Introduction to Brief Pain Inventory (BPI)			
2005+ongoing	Corporate wide	Assmt Guidelines for Infusions used for Pain mgmt			
2005	Corporate wide	Acute Pain Mgmt Policies developed (Epidural, IV PCA, Regional Analgesia, Single Dose Intrathecal)			
2006	Corporate wide		Corporate Nursing Orientation		
2006	Corporate wide			Pain Council	
2006 + ongoing	Corporate wide		Pain Education Days (offered x 2 per year)		
2006	Corporate wide		Best Practice Champions (60 trained)		
2007	Corporate wide			Pain Council	
2007	Corporate wide	Pain Assmt & Mgmt Corporate Policy developed			
2007 Oct	Corporate wide		Pain Awareness Week (education initiative)		
2007 + ongoing	Corporate wide		Pain Education Days (offered x 2 per year)		
2008	Corporate wide			Pain Council	
2008	Corporate wide	Pain Assmt & Medication Admin Record for Infusions used for Pain Mgmt			
2008 +ongoing	Corporate wide Outpt Oncology Clinics	Introduction of ESAS (Self reporting symptom Mgmt screening tool) includes pain in Outpt Oncology clinics.			
???? + ongoing	Corporate wide Outpt Oncology Clinics	On line ESAS Tool (Self reporting symptom Mgmt screening tool) includes pain in Outpt Oncology clinics. Monitoring & Reporting to Cancer Care Ontario			
2008 Oct	Corporate wide		Pain Awareness Week (education initiative)		

2008 + ongoing	Corporate wide		Pain Education Days (offered x 2 per year)		
2009 – 2014	Corporate wide			Pain Council	
2009	Corporate wide	Dosing of Opioids for Acute Pain in Opioid naïve patients			
2009 Oct	Corporate wide		Pain Awareness Week (education initiative)		
2009 + ongoing	Corporate wide		Pain Education Days (offered x 2 per year)		
2009-2010	Corporate wide				Development of electronic software for prevalence auditing
2010 - 2014	Corporate wide			Pain Council	
2010 Oct	Corporate wide		Pain Awareness Week (education initiative)		
2010 + ongoing	Corporate wide		Pain Education Days (offered x 2 per year)		
Nov 2010	Corporate wide		Prevalence training and survey		
2011	Corporate wide			Pain Council	
2011 Oct	Corporate wide		Pain Awareness Week (education initiative)		
2011	?	Patient and Family Member Information Guide: Pain Assmt & Mgmt			
2011	?	Patient and Family Member Information Guide: Pain Mgmt After Surgery			
2011 + ongoing	Corporate wide		Pain Education Days (offered x 2 per year)		
2011 + ongoing	Oncology		Oncology nursing orientation 1/2 day on pain management		
Nov 2011	Corporate wide		Prevalence training and survey		
2012 -2014	Corporate wide				Corporate Scorecard - pain satisfaction
2012 -2014	Corporate wide				Manager - performance goals
2012- 2014	Corporate wide			Pain Council	
2012	Corporate wide		Pain eLearning modules - mandatory training		
2012 + ongoing	Palliative		Palliative Care education days with one half day on pain - offered twice per year		
2012 + ongoing	Corporate wide		Pain Education Days (offered x 2 per year)		

2012 + ongoing	Oncology		Oncology nursing orientation 1/2 day on pain management		
Apr 2012	Corporate wide				Prevalence training and survey
Nov 2012	Corporate wide				Prevalence training and survey
2013 -2014	Corporate wide				Corporate Scorecard - pain satisfaction
2013 -2014	Corporate wide				Manager - performance goals
2013 - 2014	Corporate wide			Pain Council	
2013	Corporate wide	Hourly rounding/Bedside shift report/care boards= whiteboard			
2013	Corporate wide	Pain Assmt & Mgmt Corporate Policy revised			
2013 + ongoing	Palliative		Palliative Care education days with one half day on pain - offered twice per year		
2013 + ongoing	Corporate wide		Pain Education Days (offered x 2 per year)		
2013 + ongoing	Oncology		Oncology nursing orientation 1/2 day on pain management		
Apr 2013	Corporate wide				Prevalence training and survey
Nov 2013	Corporate wide				Prevalence training and survey
2014	Corporate wide				Corporate Scorecard - pain satisfaction
2014	Corporate wide				Manager - performance goals
2014	Corporate wide			Pain Council	
2014	Corporate wide	Nurse Leader Rounding			
2014 + ongoing	Palliative		Palliative Care education days with one half day on pain - offered twice per year		
2014 + ongoing	Corporate wide		Pain Education Days (offered x 2 per year)		
2014 + ongoing	Oncology		Oncology nursing orientation 1/2 day on pain management		
Apr 2014	Corporate wide				Prevalence training and survey
Nov 2014	Corporate wide				Prevalence training and survey
2015 + ongoing	Palliative		Palliative Care education days with one half day on pain - offered twice per year		
2015 + ongoing	Corporate wide		Pain Education Days (offered x 2 per year)		

2015 + ongoing	Oncology		Oncology nursing orientation 1/2 day on pain management		
2015 + ongoing	Oncology		LEAP Mini Oncology - interprofessional day on Palliative Care including pain		
Apr 2015	Corporate wide				Prevalence training and survey
Nov 2015	Corporate wide				Prevalence training and survey
2016 + ongoing	Palliative		Palliative Care education days with one half day on pain - offered twice per year		
2016 + ongoing	Corporate wide		Pain Education Days (offered x 2 per year)		
2016 + ongoing	Oncology		Oncology nursing orientation 1/2 day on pain management		
2016 + ongoing	Oncology		LEAP Mini Oncology - interprofessional day on Palliative Care including pain		
Apr 2016	Corporate wide				Prevalence training and survey
Nov 2016	Corporate wide				Prevalence training and survey
Ongoing	Corporate wide			NPPC strategic plans, minutes of the pain workgroup, Pain Council minutes	
Aug 2016	Medicine Portfolio		Medicine (A5/B5) education by Acute Pain APN and Palliative APN		
Aug 2016	Corporate wide	Inclusion of pain scores on nursing flow sheet			
2017 + ongoing	Palliative		Palliative Care education days with one half day on pain - offered twice per year		
2017 + ongoing	Corporate wide		Pain Education Days (offered x 2 per year)		
2017 + ongoing	Oncology		Oncology nursing orientation 1/2 day on pain management		
2017 + ongoing	Oncology		LEAP Mini Oncology - interprofessional day on Palliative Care including pain		
Apr 2017	Corporate wide	Prevalence training and survey			Prevalence training and survey
Nov 2017	Corporate wide	Prevalence training and survey (champions =170)			Prevalence training and survey (champions=170)

Table 4.5. Subcases' adherence rates for selected Pain P/P recommendations (R) (n=100 per case)				
Recommendation		Subcase 1 (C codes)	Subcase 2 (G codes)	Adherence Rate
R1	Pain assessment on admission to unit (Shift1) Range of pain scores=0-10	98% (98/100) charts had initial assessment on unit admission history. 2/100 charts had missing data	99% (99/100) charts had initial assessment on unit admission history. 1/100 charts had missing data	High Adherence to R1
R2	Ongoing pain assessment (Shifts 2 to 5)	98.5 % (98.5/100) charts/4shifts had ongoing pain assessment for next 4 shifts 1.5 /100 charts/shift had missing data 98.75% (98.75/100) charts/5shifts had hourly round checks completed	98 % (98/100) charts/4shifts had ongoing pain assessment for next 4 shifts 2/100 charts/shift had missing data 99.5% (99.5/100) charts/5shifts had hourly round checks completed	High Adherence to R2 Once per shift and hourly rounds Hourly rounds – no documented pain scores
R3	Establishes Pain Goal for patients who had pain during stay (over 5 shifts)	R3-19/53 (36%) charts of patients who had pain score >0 had Pain Goal set during stay evidence in IPN and or progress notes. <ul style="list-style-type: none"> • 9/19 collaborated with pt on PG • 10/19 had pain scores ≥4 	R3-32/55 (58%) charts of patients who had pain score >0 had Pain Goal set during stay evidence in IPN and or progress notes. <ul style="list-style-type: none"> • 17/32 collaborated with pt on PG • 22/32 had pain scores ≥4 	R3 C1- Low adherence to setting of Pain Goal 1 on admission hxy R3 C2- Moderate adherence to setting Pain Goal 2 during stay
R4	Establishment of interventions to manage pain for patients with pain	52/53(98%) charts of patients who had pain score >0 had evidence of prescribed interventions to manage pain <ul style="list-style-type: none"> • 35/53 charts only prescribed Pharm • 12/53charts with combo of prescribed Pharm and Non-Pharm interventions • 3/53 charts prescribed Pharm+Methadone • 2/53 charts with prescribed Pharm prn • 1/53 no intervention 	55/55 (100 %) charts of patients who had pain score >0 had evidence of prescribed interventions to manage pain <ul style="list-style-type: none"> • 45/55 charts only prescribed Pharm • 9/55 charts with combo of prescribed Pharm and Non-Pharm interventions • 0/55 charts prescribed Pharm+Methadone • 1/55 charts with prescribed Pharm prn • 0/55 no intervention 	High adherence to establishing pain mgmt interventions
R7	Patient or family education related to pain management for patients with pain	0/53(0%) charts with Pt. Education Form 0 /53 (0%) charts with evidence of pt education on pain mgmt provided in IPN	1/55 (2%) charts with Pt. Education Form (re: Atrovent & neb use) 0 /55 (0%) charts with evidence of pt education on pain mgmt provided in IPN	Low adherence No use of Pt Education Form. No documented evidence of “Pt education” provided on pain management plan in IPN.

Table 4.6. Determinants, quotes and documents mapped to DSF constructs and factors

<u>DSF Factors</u>	Determinant Code	Facilitators		Barriers		Quotes	Documents
		Subcase 1 N=8	Subcase 2 N=8	Subcase 1 N=8	Subcase 2 N=8		
Innovation/Intervention							
<u>Innovation outcome effectiveness</u>	Family /Pt Preferences			N=3 C3, C6, C7	N=5 G1, G2, G3, G4, G8	"Family and patient preferences for opioid medications is a factor" (C3,C7) "Pts with addictions have preferences for +++opioids or they come in and they're on IV or sub-q Dilaudid then it's time for them to go home so we switch them to a pill and then they're not happy about that as well...so you know it's all these different situations where it's very difficult to not adhere to the pain policy but kind of take it in stride" (C2-P3)	
<u>Innov practitioners defining characteristics</u>	MD Prescribing Preferences			N= 5 C3, C4,C5, C6, C7	N=4 G1, G3, G6, G8	"the Medicine doctors are very reluctant to give pain medication sometimes...if something is not effective, and you're saying you know this isn't really working, I've gotten a lot of like push back, they might eventually do it but if they're not really familiar with the patient they're really hesitant" (C1-P4). "new residents are a little skittish around narcotics , sometimes that a barrier and they order a lot less than you need" (C2-P3), or you are waiting for the order and its kind of like chasing them (MDs) (C2-P6)	

	Nurses Motivation to use Pain P/P		N=4 C3,C6,C7, C8	N=5 G1,G3,G5, G6,G7		<p>"They (<i>Nurses</i>)accept it (pain policy) 100%. I think it's like I said, I think it is ingrained in us and it has been ingrained in us for a long time" C2-P1; "Nurses are very supportive of the use of evidence--based practices such as the Pain P/P "(C1-P3); "I think people are very one with the policy, I think that pain management is a big deal here or a concern for everybody for sure" (C1-P7).</p> <p>"I'm using it (<i>Pain P/P</i>) all the time " (C2-P3); " I'm front line right? I'm the one interacting. Ultimately, I think that I can make the most difference ... noticing if my patient's in pain, advocating for my patient, making sure I'm following through with the PRNs and everything" (C2-P4); " I guess just actively like using it (<i>Pain P/P</i>), like making sure that I follow the policy and reviewing it, making sure that I've read this policy" (C2-P6).</p>	
	Supportive IP Team members		N=2 C2,C6	N=3 G3,G6,G8		<p>"...we have a very supportive IP care team working to manage pain and we're really open to using other services to help us out with pain care and not just medications" C1-P2).</p> <p>"it's a very family dynamic style on the unit, everyone's very close. If someone sees you drowning, they're really good at stepping up and trying to take on your load even if it's just you know, a quick check in on your patients to see if they're okay. "(C2-P8), "we are good at communicating and collaborating with each other on pain issues" (C2-P6)</p>	
	Senior nurse resistance					<p>N=2 G7,G8</p> <p>" senior nurses are stuck in the older school nursing and rarely use alternative therapies"(C2-P8) ...and "Some nurse are stuck in their ways and new nurses are more likely to follow policy "(C2-P7)</p>	

	Nurses experience/experience			N=2 G3,G8			"...more experience nurses also help out a lot, because you know, the questions you ask them they know the answers" (C2-P3).	
Practice Setting (Context)								
<p><u>Staffing =Human resources & capital resources exists within the practice setting</u></p>	Supportive Multiple stakeholders			N=8 C1,C2,C3, C4,C5,C6, C7,C8			<p>Key stakeholders influencing Pain P/P use are: "frontline nurses do assessments, refer to MDs, consult and advocate for patients" (C1-P2, P4 -8); "nurse educator is very involved and helpful" (C1-P1, P3-8); "MDs do as well" (C1-P2, P5-6); "we have acute pain service experts for people who have difficult situations with pain" (C1-P1, P4-5, P7); "patient, /family get involved" (c1-P2, P4,,P7-8); "our manager brings feedback information to use regarding biannual survey result" C1-(P4,P8); "we use palliative care experts mainly for palliative patients" (C1-1,P7); "pharmacists do review of medications and answer questions you have" (C1-P8); "We always reach out to Physiotherapists whenever there is some kind of mobility or if patients have difficulty mobilizing" (C1-P2).</p> <p>"Nurses model use of pain P/P " (C2-P1, P5); "we rely on our senior nurses a lot" (C2-P3); "doctors are consulted by nurses when they can't control the patient's pain" (C2-P8); "if I had any questions about the policy it's our educator that I would go to, and she's good at like taking time with us, reviewing it, and answering our questions" (C2-P6); "the palliative care team are amazing for chronic pain" (C2-P1); "our manager is helpful , if she sees we are busy and a bell is going off she will go in to see what is going on, and if the patient is having pain she will then come to notify us" (C2-P8); "I call APS when I</p>	ID1, ID5, ID6, Rt4, Rt6

					<p>don't know what else to do for patients with excruciating pain" (C2-P2) ; " we use Anesthetist if post op pain" (C2-P5); " In our nursing rounds, I find OT, PT, all of the pain services I think, like everybody gets involved" A(AC2-P1, P8); " Pharmacists have been really good with helping us too, they spend time on our unit, they go through all the charts, make recommendations" (C2-P8); "others like health care aids are helpful" (C2-P4); "Sometimes just having family visitors in to distract them, you know like it can decrease their pain because it occupies their mind" (C2-P5,P8).</p>	
	Senior nurse as mentor or influencer		N=2 C4,C5	N=8 G1,G2,G3, G4,G5,G6, G7,G8	<p>" a lot of the time with new nurses particularly, we'll have patients that wind up in a pain crisis and we try and help each other" (C1-P5)</p> <p>" Everything I've learned about pain control has come from other nurses " (C2-P6)."I was trained by senior nurses and the knowledge gets passed and then I think I do it the same way " (C2-P5).</p>	
	Collaborative pain expert consult/resource		N=7 C1,C2,C3, C4,C5,C6, C7	N=7 G1,G2,G3, G4,G5,G6, G8	<p>"We usually consult Advanced Practice Pain Service when we have people who have difficult situations with pain or medicine can't control their pain themselves, so then they will consult them to come in" (C1- P1). "The APS team is a specialty and I think it's a really good resource for us" (C1-P6).</p> <p>"We have the palliative pain care service which is amazing and they teach things that you don't think about often, like what maybe is causing the pain" C2-P1).</p>	ID5, ID6

	Workload/ staffing				N=5 C2,C4,C5, C6,C7,C8	N=7 G1,G2,G3 G4,G6,G7, G8	<p>" if the floor's busy, or we are short staffed, this obviously is a barrier" (C1-P6,P8). " I try and keep on top of things. But for sure, it has an influence, I mean you try to get in there and get their pain meds exactly when they need them, but you can't always. It's just a reality of our hospital situation" (C1-P7). "Sometimes one nurse for six patients is not enough to maintain and control pain levels" (C1-P5).</p> <p>"Barriers, I'd say are how busy the unit is, staffing levels, and sometimes we just like can't get there" (C2-P2, P6). " We have such a quick turnover in patient load that you could have a perfect assignment and within 30 seconds all of a sudden you've got three people leaving and three new ones are going to be coming and you don't know what's coming through that door next and now hourly rounding becomes every couple hours because you just, you can't get there in time" (C2-P8).</p>	
	Frequent MD/Resident rotation changes				N=4 C5,C6,C7, C8	N=3 G1,G2,G3	<p>"I mean when (physicians) they're on board and they're knowledgeable about the patient it's all good, but we have a frequent rotation. In between is a difficult time. Things still can be done, but you need to chase people and that's when things can get a little difficult because you are busy and it's not just the one patient that is having a new staff, a new resident looking after them, or even student, but rather it's all of them at once and everybody who has an issue, things have to be dealt and it can take some time and it can take a lot of phone calls, a lot of sitting waiting for answers, so yeah, absolutely. I do enjoy the teaching aspect of the hospital and I think it's necessary, but sometimes it can be a detriment when trying to get things done" (C1-P7).</p>	

						"They just changed maybe two weeks ago on my stretch that I had off. I come back; I knew nobody" (C2-P2). " You just get them (Residents) the way they like them and then away they go " (C2-P1)	
	Time management				N=4 G3,G5,G7, G8	"In terms of time, I think the pain will be addressed but it could be done better, the bare minimum will be done, sometimes you just don't have the time to do the pain assessment" (C2-P7).	
<u>supervision</u>	Supportive Leadership – Manager		N=7 C2,C3,C4, C5,C6,C7, C8	N=4 G5,G6,G7, G8		"Our manager is very supportive of us doing initiatives trying to improve the general care provided on the unit" (C1-P5). "my manager is good at encouraging us to go on the education days, and hear about the new meds, new techniques, new ways to control pain" (C2-P6).	ID2, Rt4, Rt5
	Supportive Nursing Dept Shift Coordinator			N=1 G7		" on nights too if there's ever a big issue you can call the nursing coordinator for help" (C2-P7).	ID2, Rt4, Rt5
	Supportive Clinical Care Leader		N=6 C1,C2,C3, C4,C5,C8			"The Pain P/P is always reinforced with our Clinical Care Leaders" (C1-P2)	ID2, Rt4, Rt5
<u>Org culture/climate</u>	Reorganization of wards into 1 - Merged staff & cultures				N=1 C5	"In terms of barriers I would say with the merge between our units that we've recently had, the two different Medicine units became one, and then with the change of having less of the long-term care type of patients and having more acute medical need patients, I think it's taken a back seat to just urgent patient care. So, we've had staffing issues, like we just don't have staff. Also, we were two very different cultures. Two very different approaches to patient management on the unit and it's been I think about six months now since we merged and	Website, Rt4, Rt5, Rt6

						things are finally starting to settle, they're starting to kind of be a meshing of the two cultures, but there was a lot of head butting when it first happened" (C1-P5).	
	Culture of doing research (Colleague doing research on Pain indicators		N=3 C4,C5, C8			"One of our nurses is doing part of her Master's project on our unit re: use of non-verbal pain indicators and how that was working on the unit, so that did bring a lot of awareness to it (Pain P/P) when she was going around doing a survey and she did send out an actual tool and she asked people to use it and if this would be helpful and if they found it gave any better indication for pain" (C1-P5).	
	*Lack of Familiarity/awareness (or lack) with Pain P/P			N=1 C5	N=3 G4,G5,G6,	"I would say lack of awareness of the Pain Policy, I mean everybody knows it's supposed to be part of the hourly rounding and that we're supposed to be collaborating with them and all of that but I don't think nurses actually read anything on it, it's was told to you in your orientation and you just kind of integrate into your practice but I don't think many people refer to it" C1-P5) "I've never seen this pain policy before, I mean all of these things were taught to me but I didn't know that this was an actual legit document" (C2-P6).	

	Team culture embraces new initiatives/approaches		N=2 C2,C5	N=5 G3,G4,G5, G6,G8		<p>"...our team approach on the unit is very supportive with new initiatives" (C1-P5); "...and open to the use of alternative therapies" (C1-P2).</p> <p>"our team has a culture that accepts new treatments modalities, I think we're always updating ourselves in terms of pain control, we're using a lot more things like alternative therapies, we have people come in a do acupuncture now, and we are bundling up meds too now for the different kinds of pain, like for neuropathic pain" (C2-P3).</p>	
<u>Training processes</u>	Lack of Pain mgmt resources available					<p>" a formal guideline or protocol (<i>clinical pathway</i>) for pain control would be helpful " (C2-P4); "or pain standing orders" (C2-P3)."we don't really have too many in-services anymore, like on different medications by pharmaceutical companies...also we have limited posters and resources on pain conferences and alternative therapies on the unit, so things like that would be really great" (C2-P8).</p>	ID5, ID6

<p><u>Information systems= org communication capacity for monitoring (exchange and feedback)</u></p>	<p>Unrealistic Charting expectations</p>			<p>N=2 C7, C8</p>	<p>N=7 G1,G2,G4, G5,G6,G7, G8</p>	<p>"As far as pain goals are concerned, I don't really think it is established. The pain goals themselves, I mean you're generally trying to get them comfortable and get them to the point where they can mobilize and have daily activities so they're not going to be impaired by their immobility. I don't know of anybody who has actually gotten an actual goal and says ok we're going to get you to a 3.5 pain score, you know" C1-P7; "the Education Form is probably an unrealistic form. Like again, time. A lot of these policies are made for ideal situations that don't occur anywhere that I've ever worked" C1-P7; "I realize now that I don't chart my teaching on the use of pain medications but I do document in the teaching when I'm discharging a patient on their pain medications, how often they should take it, when their last one was"(C1-P8).</p> <p>" I can't say I've ever even written pain goal. Patient states 'wants pain goal to be whatever', I can't say I've ever written that" C2-P2); "we do education all the time, sometimes we don't even know we're educating, but I can't necessarily say I'd write I educated patients regarding pain in this way" (C2-P-2); " you just chart the issues, the problems so if it doesn't present a problem that I have to solve on my shift, I don't think of doing this or take a specific note for that" (C2-P5); "</p>	<p>ID5, ID6, Rt1(charting practices)</p> <p>Rt7, ID5, ID6, (Pain Goal)</p> <p>ID17, Rt7 (Pt Edu)</p>
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	EPIC system utility (operating steps)			N=3 C5,C6,C7	N-1 G3	<p>"EPIC is based on a system in the States where you had to record everything because everything made money, this is the system we're dealing with right now. It doesn't make it terribly good for patient care but it makes it good for record keeping" C1-P7)</p> <p>" sometimes the EPIC system can be a big barrier because of all the steps you have to follow, I find it a little frustrating (with EPIC), you're supposed to be doing this stuff at the bedside but you have to go get your medication out at the OMNI cell,... you have to scan your patient so usually when you're giving a narcotic or something like that you have to either override scanning the patient or override the med bedside because you can't do both. to waste medications, it's so frustrating go back an forth from the bedside EPIC system to scan your patient then go to the omni cell to get med and waste unused part" (C2-P3).</p>	
	Bedside shift reports			N=2 C6,C7	N= 4 G1,G2,G3, G6	<p>"The communication about pain care goes from shift to shift at bedside now, instead of the way we charted before because the new electronic charting system is based on charting by exception" (C1-P6).</p> <p>" Here at bedside shift report a lot of nurses are fantastic at saying this person has chronic pain or this person's been having issues with this or that. It's really useful to know so I don't have to go searching or ask people"(C2-P2).</p>	Rt3, ID2

	In room documentation system (Whiteboards)	N=1 C8	N=7 G1,G2,G3, G4,G5,G6, G7		<p>"At the bedside, there is a care board (whiteboard) where the patient's pain level is usually on and the patient will adjust it up and down based on their pain so there's communication going on between the patient and the nurse all the time about their pain level but it's not evident on the chart, it's evident in the room and so the white board is not in any kind of documentation on the patient's chart" (C1-P8).</p> <p>"A facilitator I'd say is the white board, it has a pain scale that people will have written in what's the goal, what's the base line and it'll prompt me like oh are we near your goal, or how far off are we? (C2-P6). "I like the whiteboards, when I think about using them I not only just like circling the pain but I'll actually write on the whiteboard how often they can have pain meds or things like that and that helps to cue the patient and to cue me when I go in there, and the next nurse" (C2-P4).</p>	Rt3, ID2
	MD & Nurse communication on unit				<p>"Physicians never prompt a nurse about pain, very rarely. So I feel like if they want to improve maybe the physicians can also prompt nurses and vice versa but it could be that doctors don't know either and I mean that could be an area of improvement. Physicians don't really talk or communicate very well with nurses so we have to kind of go and search and find our answer for pain management" (C2-P2); "Senior residents tend to listen to nurses more" (C2-P3). " a few doctors think patients are just drug seeking and don't listen to nurses opinion" (C2-P8).</p>	

<p><u>business model structure & system to monitor/manage innovation</u></p>	<p>Collaborative supportive daily interdisciplinary rounds</p>			<p>N=3 G1,G2,G7</p>			<p>" at 2 pm there's nursing rounds where all patient issues come up " (C2-P1). " In daily rounds, we usually discuss barriers to discharge, but if pain management is an issue, we talk about it with the team" (C2-P2).</p>		
<p><u>NEW</u></p>	<p>Physical structure/layout</p>				<p>N=2 C1,C4</p>	<p>N=2 G3,G8</p>	<p>"We're a large unit, I think we're over, we're almost 80 beds, like we're, yeah it's a really large unit" (C1-P1), "and part of unit is on another floor with only 1 RN" (C1-P4). " Three units make up our unit, AMA , ICU and monitoring "(C2-P3)</p>	<p>ID1, ID2, Rt4, Rt6, Website</p>	
<p>Broader System</p>									
<p><u>Population characteristic's</u></p>	<p>Diverse population needs/ characteristics</p>		<p>N=8 C1,C2,C3, C4,C5,C6, C7,C8</p>	<p>N=6 G2,G4,G5, G6,G7,G8</p>			<p>" I think our population has a huge factor because I feel like a lot of people come in with some sort of pain. Many of our patients are multiple core morbidity so either it's a chronic pain or it's an acute pain. I feel like Medicine is so diverse" (C1-P1). "...we have a lot of drug abuse patients here and so of course they're pain management is different"C1-P7). "it's acute internal medicine but we're predominantly a stroke unit, with geriatrics and a patient population with dementia" (C2-P2).</p>	<p>Website, Rt4, Rt5, Rt6</p>	

	Patient beliefs/cooperation				N=4 C2, C4, C7, C8	N=3 G1, G4, G5	<p>"one the other things that does impede is certain patients who have already gotten their opioids will just dismiss anything else despite education, and so you don't even do the Pain Assessment at that point, they're like "I want it on the hour, when it's due, on the minute" "(C1-P2).</p> <p>"they'll (family) tell you that, Oh my dad or mom has chronic pain, because patients don't want to bother you and everything" (C2-P2). "...sometimes people are afraid to have pain medication " (C2-P1).</p>
	Family beliefs/cooperation				N=4 C2, C4, C7, C8	N=4 G1, G4, G5, G8	<p>"If families of patient don't cooperate can be a barrier" (C1-P6).</p> <p>"Family or their religion is a factor if they don't believe in taking medication or they're scared to ask for it" (C2-P8). "or families are afraid for their loved ones to have pain medication because they don't want them to be too out of it to be able to talk to them" (C2-P1).</p>
	Patient acuity levels				N=3 C5, C6, C7	N=2 G6, G8	<p>"We're just constantly getting new patients that are acutely ill. We don't have enough time now, because we have constant medical issues happening" (C1-P5). "I've been doing this for 32 years, but I've found in the last year or so, due to changes in patient make-up, we move our ALC patients fairly quickly, so all of our patients on the floor these days are acutely sick and require a lot more attention" (C1-P7).</p> <p>"So it's also a Medicine Unit...we're the Acute Monitoring Area too. We have all the brand-new strokes. We get, we tend to the higher acuity because of the type of staff we have" (C2-P8).</p>

Key: C# = Subcase 1 participant codes, G# = Subcase 2 participant codes, N# = total participants per subcase

Table 4.7. KTIs and documents mapped to DSF constructs and factors

DSF Constructs/ Factors	KTI Code	Subcase 1	Subcase 2	Document
Innovation/intervention				
Characteristics of innovation	Routinize recommendations into nursing forms and practices/processes	<u>Unit</u> -Embed Prompts integrated into forms (n=5) <ul style="list-style-type: none"> Flowsheets, admission history, brief pain inventory (BPI), medication forms- MAR. <u>Unit</u> - Embed Prompts integrated into routine practices/processes <ul style="list-style-type: none"> Admission processes (n=5) Ongoing processes (e.g., shift assessments, hourly rounding, care boards/whiteboards) (n=8) 	<u>Unit</u> - Embed Prompts integrated into forms (n=7) <ul style="list-style-type: none"> flowsheets, admission history, brief pain inventory (BPI), medication forms- MAR. <u>Unit</u> - Embed Prompts integrated into ‘routine practices/processes’ <ul style="list-style-type: none"> Admission processes (n=2) Ongoing processes (e.g., shift assessments, hourly rounding, care boards/whiteboards) (n=8) 	ID2, ID4-6, Rt3, ID12-20
Delivery platform	Digitalized Pain P/P and forms	<u>Dept.</u> - Digitalized policy and forms into new electronic patient information chart (EPIC) (N=6) <ul style="list-style-type: none"> Nursing forms are digitalized with prompts(n=6) Policy is digitalized 	<u>Dept.</u> - Digitalized policy and forms into new electronic patient information chart (EPIC) (N=6) <ul style="list-style-type: none"> Nursing forms are digitalized with prompts(n=6) Policy is digitalized 	
Practice Setting (context)				
Staffing =Human resources & capital resources exists within the practice setting	Engages IP stakeholder involvement	<u>Dept.</u> - Pain P/P remains corporate priority and IP policy <ul style="list-style-type: none"> requires all professions to follow (n=3) IP participate on internal quality committees <u>Unit</u> - members on pain management strategies (n=3)	<u>Dept.</u> - Pain P/P remains corporate priority and IP policy <ul style="list-style-type: none"> requires all professions to follow (n=3) IP participate on internal quality committees <u>Unit</u> - Consult with IP members on pain management strategies ie includes pain experts APS, PCS) (n=2) Unit – Collaborating in daily IP rounds on unit (n=3) G1, G2, G7	ID2, ID3, ID20, Rt3-4, Rt6,
	Mentorship used by senior nurses to support Pain P/P use	<u>Unit</u> –mentorship strategies used by Senior nurses (n=2) <ul style="list-style-type: none"> Senior nurses’ mentor/train novice nurses on pain mgmt. strategies to relieve pain at bedside C4, C5 	<u>Unit</u> – mentorship strategies used by senior nurses (n=4) <ul style="list-style-type: none"> Senior staff on the floor really works like a family, they always can help G7 especially in pain crisis G2 (n=2) teaching non-verbal language and pt.’s signs G2 and about special pts as Crohns. G2 (n-1) Novice to senior nurse pain care practice over time changes with experience (n=2) G1, G8 Sharing pain care support/ideas based on experience (n=1) G2 G6 	

<p>Org culture/climate</p>	<p>Fostering an IP and EBP culture among IP team to support Pain P/P use</p>		<p><u>Unit</u> – fostering a close, dynamic family style communicating or collaborating on pain issues (n=3)</p> <ul style="list-style-type: none"> • very close, family dynamic style of interaction on the unit (n=1) G8 when communicating and collaborating with each to deal with pain issues (n=3) G3, G6, G8 <p><u>Unit</u> – encouraging members to embracing new modalities and improvements (n=5)</p> <ul style="list-style-type: none"> • team that accepts/embraces new txmt modalities and ongoing improvements (n=5) G3, G4, G5, G6, G8... <p><u>Unit</u> - Continuously updating team (n=2)</p> <ul style="list-style-type: none"> • in terms of pain control using new alternative therapies, and medications. (n=2) G3, G6 	
<p>Information systems= org communication capacity for monitoring (exchange and feedback)</p>	<p>Establishing effective communications between providers</p>	<p><u>Unit</u> - reporting practices (n=3)</p> <ul style="list-style-type: none"> • Bedside report at shift change to inform patient pain status and how they did with strategies used to manage pain (n=2) C6, C7 • communication shift to shift via report and less with documentation now because is based on charting by exception (n=1) C6 • use of whiteboards for communicating pain scores using scales (1-10 and face) (n=2) C7, C8 and goal (n=1) C7 • use of clipboard to document pain level in am to charge nurse but not on chart (n=1) C7 	<p><u>Unit</u> - reporting practices (n=8)</p> <ul style="list-style-type: none"> • Bedside reporting - shift to shift - The patient’s status and treatment for pain mgmt. are explained to the next shift Nurse. (n=4) G1,G2,G3,G6 • Use of whiteboards for communicating pain scores (n=3) G1, G3, G8 and goal (n=5) G2,G4,G5,G6,G7 	
<p>supervision</p>	<p>Leadership strategies</p>	<p><u>Dept.</u>-performance goals related to BPGs in evaluation</p> <p><u>Unit</u> - Clinical Care Leaders (n=5)</p> <ul style="list-style-type: none"> • get involved in unit wide issues (n=5) C1, C2, C3, C4, C5, C8 • support ongoing improvements (n=2) C2, C5 <p><u>Unit</u>- Manager (n=7)</p> <ul style="list-style-type: none"> • gets involved to solve unit-wide problem, ones that occur multiple times (n=6) C2,C3,C4, C6,C7,C8 • provides flow diagram, with statistics about how our unit was doing, with different things to reinforce implementing target behaviours (n=2) C2, C4 • Managers use staff meetings are learning forums (n=1) C4 	<p><u>Dept.</u>-performance goals related to BPGs in evaluation</p> <p><u>Unit</u> - Clinical Coordinator (n=1)</p> <ul style="list-style-type: none"> • If it is a big issue you can call the nursing coordinator but usually a senior nurse helps (n=1) G7 <p><u>Unit</u>- KTI Manager (N=4)</p> <ul style="list-style-type: none"> • Encourages staff to go on the education days to learn new medication and techniques for pain care and to share at staff meetings (n=1) G6 • reviews incidents and strategies to prevent them in staff meetings (n=1) G5 • Manager is available, helpful and is aware of unit pt.’s needs (n=2) G7, G8 	<p>Rt2, Rt4-7, ID7-11</p>

<p>Training processes</p>	<p>Ongoing Education and Training to support Pain P/P use</p>	<p><u>Dept.</u> – by NPP representatives (n=7)</p> <ul style="list-style-type: none"> • General hospital orientation • Pain education days annually offered (n=6) C1, C2, C3, C5, C6, C7 • Mandatory on line pain education modules (ELM) (n=3) C1, C4, C5 • In-services on pain for targeted populations (n=3) (i.e. GPA training to identify what behs mean for pt with dementia C3, C4, C7) <p><u>Unit</u> -provided by Educator (n=7)</p> <ul style="list-style-type: none"> • Updates (N=1) C6 • Refreshers on pain assessment (n=2) C4, C7 • Refer to Educator to solve when a problem occurs multiple times (n=5) C2, C3, C6, C7, C8 • 1 on 1 training (n=3) C1, C3, C8 • Biannual seminars on pain mgmt. (n=1) C2, 	<p><u>Dept.</u>– by NPP representatives (n=5)</p> <ul style="list-style-type: none"> • General hospital orientation • Education days every year (n=5) G2, G3, G4, G6, G8 <p><u>Unit</u> -provided by Educator (n=5)</p> <ul style="list-style-type: none"> • Answers 1:1 question (n=2) G2, G6 • Refreshers on policy updates or changes (n=3) G4, G5, G7] • Inservice are available. (n=3) G6 G5, G8 • nursing staff stroke training (n=1) G2 	<p>Rt2-7, ID1-2</p>
<p>business model structure & system to monitor/ manage innovation</p>	<p>Monitoring and evaluation</p>	<p><u>Dept.</u>- ongoing training of surveyors biannually</p> <p><u>Unit</u>- audit and feedback (n=2)</p> <ul style="list-style-type: none"> • Timely sharing of audit data with unit and seeking remedial action plans (n=2) C1, C4 • Manager gets involved in unit wide issues (n=1) C4 • Manager provides flow diagram, with statistics about how our unit was doing, with different survey data compared to other units which are helpful (n=2) C1, C4 • Focusing of biannual audit questions to target BPG behaviour 	<p><u>Dept.</u>– ongoing training of surveyors biannually</p> <p><u>Unit</u>- audit and feedback (n=1)</p> <ul style="list-style-type: none"> • Timely sharing of audit data and seeking remedial action plans (n=1) G5 • Pt satisfaction survey done yearly and shared (n=1) G5 • The exit survey includes pain relieved (n=1) G5 • Manager reviews incidents and strategies to prevent them in staff meetings (n=1) G5 • Focusing of biannual audit question to target BPG behaviour 	<p>ID1, ID7-11, Rt1-7</p>

Key

N=frequency of response by informants
 Dept.= Department level KTI
 Unit = Unit level KTI

BPG – Best practice guideline
 PT = patient
 NPP = Nursing Professional Practice

APS = Acute Pain Service
 PCS = Palliative Care Service
 GPA =Gentle Persuasion Approach

Table 4.8. Characteristics of data sources

Key Informants	Case 1	Case 2
Total participates (nurses)	N = 8	N = 8
<u>Current job title</u> Registered Nurse	8	8
<u>Gender</u> Female	7	7
Male	1	1
<u>Age distribution</u> 26-30yrs.	4	5
31-40 yrs.	2	2
41- 50 yrs.	1	0
>50 yrs.	1	1
<u>Highest level of Education</u> Diploma	2	1
Degree (Bachelor degree in Nursing)	6	7
<u>Time in the profession distribution</u> 2.5 -5yrs.	3	4
6-10 yrs.	3	2
11-15 yrs.	1	1
>20 yrs.	1	1
<u>Average time in the current job</u>	8 yrs.	9 yrs.
Documents (see Additional file 1)		N=29
Reports		N=7
Internal documents		N=20
External documents		N=2

Age across Group

Independent-Samples Mann-Whitney U Test Summary

Total N	16
Mann-Whitney U	27.500
Wilcoxon W	63.500
Test Statistic	27.500
Standard Error	8.556
Standardized Test Statistic	-.526
Asymptotic Sig.(2-sided test)	.599
Exact Sig.(2-sided test)	.645

TimeInPos across Group**Independent-Samples Mann-Whitney U Test Summary**

Total N	16
Mann-Whitney U	30.000
Wilcoxon W	66.000
Test Statistic	30.000
Standard Error	8.944
Standardized Test Statistic	-.224
Asymptotic Sig.(2-sided test)	.823
Exact Sig.(2-sided test)	.878

To determine if differences exists between Subcase 1 and Subcase 2 groups, a Mann-Whitney U test was conducted, which indicated that there was no significant difference with respect to age ($p=.599$) or time in position ($p=.823$) (*given $p>.05$*)

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Additional file 4.1. Biannual prevalence survey measures and education training records mapped to the Pain P/P

Pain P/P Target Behavior	Data Sources = CA (Chart Audit) or PA (Pt Assessment)	Nov. 2010	Apr. 2011	Nov. 2011	Apr. 2012	Nov. 2012	Apr. 2013	Nov. 2013	Apr. 2014	Nov. 2014	Apr. 2015	Nov. 2015	Comments
#1 on adm	CA= Q1 (Nov 2010-Apr 2012)	x	x	x	x								4 CA data points
#2 once per shift - documented ongoing pain reassessment within last 24 hrs	CA= Q3 (2010 - Apr 2012)	x	x	x	x								4 CA data points
#2 once per shift	CA =Q11 (2012-Nov 2015)					x	x	x	x	x	x	x	7 CA data points
#2 once per shift	PA Q2 (2013 to 2015)					x	x	x	x	x	x	x	6 PA data points
#3 Documented pain during stay	CA = Q1 (2013 to 2015)						x	x	x	x	x	x	6 CA data points
	PA Q2 & PA Q3 (2010),	x	x	x	x								4 PA data points
	PA Q8 (2012), PA Q1 (2013 to 2015)					x	x	x	x	x	x	x	7 PA data points
#4 documented pain during hourly rounding.	Nil												no data points
#5 Intensity	CA = Q2 (Nov 2010 to Apr 2012)	x	x	x	x								4 CA data points
gives numeric value for pain 0-10	PA Q9 (Nov 2012) and PA Q1a (2013 to 2015)				x	x	x	x	x	x	x	x	8 PA data points
#6 Pain Goal established	CA = Q5 (Nov 2010 only)	x											1 CA data point
	PA Q5 (Apr 2014 to 2015)								x	x	x	x	4 PA data points

#7 Collab with pt on pain strategies	CA Q5 (Nov 2010) only	x												1 CA data point
# 8 Reassess pain intensity	PA Q12 (Nov 2012) PA Q4 (Nov 2013 to 2015)					x	x	x	x	x	x	x		7 PA data points
# 9 Assess effect of pharmacological interventions	PA Q7 (Nov 2010) PA Q10.2 (Nov 2012) PA Q2a (Nov 2013) PA Q2b (Nov 2014 & 2015)	x	x	x	x	x	x	x	x	x	x	x		11 PA data points
	PA Q8 (2010) only	x												4 PA data points
	PA Q11 (2012) PA Q3 (2013 to 2015)					x	x	x	x	x	x	x		7 PA data points
#10 Monitor side effects	nil													no data points
#11 Consults with experts	CA = Q6 (Nov 2010 only)	x												1 CA data points
# 12 Educate Pt & Family	CA = Q7 (Nov 2010), CA = Q12 (Nov 2012)	x	x	x	x	x	x							6 CA data points
	PA 4 (Nov 2010)	x												1 PA data point
#13 Ongoing document to comm with IP team	nil													no data points
#14 Ongoing Edu of staff	ELM records (Nov 2011 -Nov 2015)			x	x	x	x	x	x	x	x	x		9 data points

Key: CA = chart Audit, PA = Patient Assessment conducted during audit, Q# = Question number (#) on audit form/tool, Pt = Patient, Edu = Education, IP = Inter Professional

Additional file 4.2 Unit nurse questionnaire**Interview Guide – Unit Nurses**

- 1) *Complete key information below first....*

Date: _____

Place: _____

Interviewer Name: _____

Participant Code: _____

Position of Participant: _____

Start time of Interview: _____

Finishing Time _____

- 2) *Hello my name is Letitia Nadalin Penno, I am a PhD candidate and I am conducting this study for my thesis. As such I will be asking you a series of questions. This interview is expected to take 40-60 minutes.
Please know there is no right or wrong answers.*
- 3) *To review, the main focus of the study is ...*
 To understand nurses continued use (sustained) or not of the Pain P/P over time
 To understand the factors inhibiting and or promoting nurses' sustained use of Pain P/P
 To understand to impact of KTIs efforts on nurses' sustained use of the Pain P/P
- 4) *Please know “your participation in this study is voluntary and you are free to change your mind about being involved in this research at any time”*
- 5) *With your consent, I will audio tape and take notes so I don't miss any key points. Please know your responses will be grouped and coded with all interviewees so they are not identifiable*
- 6) *Please read the **Consent Form** (hand form to participant). If you have no questions, please sign you agree to participate.*

Once signed...

- 7) *I now will start the tape recorder and timer ...**Start tape recording and timer now...***
- 8) *I now have a few **Demographic questions to ask you** for the purpose of providing context in the analysis phase. This information will be aggregated to maintain your anonymity.*

Complete the demographic form below

Demographic Form

Pain Policy/Protocol Study

Participant Code _____

Personal Information

1. What is your age category using 5-year intervals?

- 20 yrs - 25 yrs
- 26 yrs – 30 yrs
- 31 yrs – 35 yrs
- 36 yrs – 40 yrs
- 41 yrs – 45 yrs
- 46 yrs – 50 yrs
- 51 yrs – 55 yrs
- More than 56 yrs

Education training

2. What is your highest level of Nursing education.

- Diploma RP,
- Diploma RN
- Bachelor (BScN)
- Post RN program
- Masters in Nursing
- PhD in Nursing
- Other (Specify type) _____

Work Experience as a nurse

3. How many years of experience in Nursing do you have?

- <2 year
- 2-5 years
- 6-10 years
- 11-15 years
- 16-20 years
- Over 20 years

4. What is your current position at Ottawa Hospital and how long have you held this position?

Position _____ Years _____

- Prompts
- Registered Nurse
 - Registered Practical Nurse
 - Team/Clinical Leader
 - Clinical Educator
 - APN
 - Program Manager
 - Coordinator

Thank you for your participation

- 9) *I also would like to take this opportunity to clarify some terminology*
 RNAO BPG, Pain P/P,
 KTIs efforts or strategies,
 Collective social processes (processes and procedures unique to their unit),
 Factors (influences that may inhibit or promote your use of the Pain P/P)
 Notion of sustainability (long term over time)

Give Participant Table 8 _ Pain P/P Target Behaviors policy

My thesis focuses only on the yellow highlighted part

Pain P/P Recommendation As per Procedure	Pain P/P Target Behavior
1	Screen inpatients for presence of pain on 2) Each initial contact/admission (2007 & 2013)
2	Ongoing assessments of Pain using standardized tools 3) Once per shift (2007). 4) During hourly rounding (2013)
3	Establish an individualized goal for pain management with the patient. (2007 & 2013)
4	Collaborate with the patient in establishing an individualized strategy and interventions to manage the patient’s pain based on the best evidence and available resources. (2007 & 2013)
6	Consult with pain management experts as required (i.e. Acute Pain Service, Chronic Pain Service, Palliative Care Service, Pharmacy, Physiotherapy). (2007 & 2013)
7	Educate pt and families about their individualized pain management plan, medications, indications for treatments or unexpected therapeutic effects, possible side effects, and method of pain assessment and to report unrelieved pain. (2007 & 2013)

- 10) *Do you have any questions before starting...?*

Maximum Sample Questions for Unit Nurses

Interview Questionnaire Guide for Unit Level Nurses (Maximum questions)

Questionnaire Unit Level	Reflective Notes – Jottings
<i>(use Table 8 to prompt participant about 6 Target Behs)</i>	
<p>Unit Level Strategies and factors influencing Fit</p> <p>Prompts:</p> <ul style="list-style-type: none"> ○ <i>on admission to the unit & use of BPI if ≥ 4</i> ○ <i>once per shift, & use of BPI if ≥ 4</i> ○ <i>during hourly rounding, please provide detail how Pain assessments are done and reflected in documentation</i> ○ <i>to establish pain goal,</i> ○ <i>how do you establish a pain mgmt. plan & intervention strategy with client,</i> ○ <i>when do you consult with pain mgmt. experts i.e., APS?</i> ○ <i>how are you educating client about pain mgmt. plan and documenting it.</i> <p>5.0 Can you describe the strategies that support you personally as a nurse on your unit to continue to use the Pain P/P? <i>(Prompt = use Table 8 for the 6 Target Behs)</i></p> <p>5.1 What factors (if any) are influencing (promoting or inhibiting) your current use of the 6 target behaviors on your unit? <i>(Prompt = use Table 8 for the 6 Target Behs)?</i></p> <p>5.2 Can you identify the type of information or (measurements) you would find helpful to support your ongoing use of the Pain P/P? <i>(Prompt = use Table 8 for the 6 Target Beh?)</i></p>	
<p>5.3 Please describe the strategies that are useful to your unit nursing team as a whole to use the Pain P/P? <i>(Prompt = use Table 8 for the 6 Target Behs)</i></p>	

<p>Sample answers= orientation of new staff on unit, in services, annual training, eLearn's</p> <p>5.4 What factors (if any) are influencing (promoting or inhibiting) your unit nursing team's use of the 6 recommendations? (Prompt = use Table 8 for the 6 Target Beh)</p>	
<p>Unit Culture & Voltage over time</p> <p>4.1 How would you describe the culture on the unit related to the use of Pain P/P?</p> <p>4.2 Do you feel the unit maintains a culture of ongoing improvement? <i>If Yes...</i> Can you explain how the culture has influenced the ongoing use of the Pain P/P? <i>If No...</i> why? can you explain in more detail?</p> <p>4.3 What other factors (if any) influence a culture of improvement on your unit and its use of the 6 target behs? Prompts: <i>on admission to the unit once per shift, during hourly rounding, to establish pain goal, to establish a pain mgmt. plan & intervention strategy, consult with pain mgmt. experts i.e., APS, educating client about pain plan.</i></p>	
<p>Learning Org Capacity Unit Level</p> <p>6.1 Can you describe any unit level processes, structures, or resources used to support the ongoing use of the Pain P/P?</p> <p>6.2 Can you describe the unit's problem-solving approach?</p> <p>6.3 Has the unit used this approach to support the ongoing use of the 6 target behs into routine practice? (Prompt = use Table 8 for the 6 Target Behs)</p>	

<p>6.4 <i>If yes ... what has worked? Please describe?</i></p> <p>6.5 <i>If no ... Why has it not worked or been used? Explain?</i></p>	
<p>Unit Level Stakeholders</p> <p>7.0 What involvement <i>do you have</i> with the ongoing use of the Pain P/P on your unit? <i>(Prompt = planning, processes adaption of policy (embedding into daily routines routine practices)</i></p> <p>7.1 Who are the key stakeholders involved in the ongoing use of the Pain P/P on your unit? <i>(Prompt = champions, leaders, educators, APN for acute Pain)</i></p> <p>7.2 Is there anyone you think should be involved but is not?</p> <p>7.3 If so who, why and how?</p>	
<p>Is there anything else we have not covered that influence your ongoing use of the Pain P/P on your unit.... you feel I should note?</p>	

- 13) *Thank you for your participation in this study*
- 14) *Remind them.... I may follow up after this interview to clarify or discuss further their ideas if needed*
- 15) *Stop tape and timer, record*

Additional file 4.3. Standards for Reporting Qualitative Research (SRQR)

NO.	TOPIC	LINE
Title and Abstract		
S1	Title	Line 2-3
S2	Abstract	Line 37-71
Introduction		
S3	Problem Formulation	Line 91-129
S4	Purpose or research question(s)	Line 130-139
Methods		
S5	Qualitative approach and research paradigm	Line 140-156
S6	Research characteristics and reflexivity	Line 157-176
S7	Context	Line 177-180
S8	Sampling strategy	Line 181-192
S9	Ethical issues pertaining to human subjects	Line 272-280
S10	Data collection methods	Line 193-226
S11	Data collection instruments and technologies	Line 227-234
S12	Units of study	Line 245
S13	Data processing	Line 235-245
S14	Data analysis	Line 246-258
S15	Techniques to enhance trustworthiness	Line 259-273
Results		
S16	Synthesis and interpretation	Line 283-494
S17	Links to empirical data	Line 497-655
Discussion		
S18	Integration with prior work, implications transferability and Contributions to the field (conclusion)	Line 658-676 Line 695-716 Line 717-736
S19	Limitations	Line 677-694
Other		
S20	Conflicts of interest	Line 770-771
S21	Funding	Line 772-773

Chapter 5

Identifying relevant concepts and factors for the sustainability of evidence-based practices within acute care contexts: A systematic review and theory analysis of selected sustainability frameworks

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Abstract

Background: There is growing recognition among healthcare professionals that sustainability of evidence-based practices (EBPs) within different settings is variable and suboptimal.

Understanding why a particular EBP might be sustained in one setting and not another remains unclear. Recent reviews illustrate the need to identify and analyze existing frameworks/models/theories (F/M/Ts) that focus solely on sustainability of EBPs in specific healthcare settings, such as acute care, to illuminate key determinants and facilitate appropriate selection to guide practice and research.

Methods: We conducted a systematic review to extract sustainability frameworks. This involved using two available syntheses of the literature and a systematic search of four databases from January 2015 to July 2018: CINAHL, Medline, Embase and ProQuest. We included studies published in English, and if they included sustainability F/M/Ts recommended for use in acute care or an unspecified healthcare organization/setting. F/M/Ts explicitly recommended for use in public health and or community settings were excluded. We, then conducted a comparative analysis of F/M/Ts using a modified theory analysis approach, to understand the theoretical underpinnings of each F/M/T, their determinants and concepts hypothesized to influence the sustained use of EBPs within an acute care context.

Results: Of 2967 identified citations from the two available syntheses and the systematic review, 8 F/M/Ts met the inclusion criteria. We identified 37 core factors, of which 16 were recorded as common factors (occurring within 4 or more of the 8 included F/M/Ts). All factors grouped into seven main themes: Innovation, Adopters, Leadership & Management, Inner Context, Inner Processes, Outer Context, Outcomes.

Conclusions: This systematic review is the first to include a comprehensive analysis of healthcare sustainability F/M/Ts for the sustained use of EBPs in acute care settings. Findings reveal insights into sustainability as a ‘process or ongoing stage of use’ following initial implementation, suggesting this construct should be added to the definition of sustainability. Results provide a resource of available F/M/Ts and hypothesized factors to consider for acute care team members who are planning or currently implementing EBPs with the goal of improving patient outcomes. It also provides a basis for future research on sustainability in acute care.

Keywords: frameworks, models, theories; sustainability, sustainment, routinization, institutionalization, utilization, evidence-based practices/guidelines/programs/interventions, innovations

Contributions to the literature

- This review identifies 8 sustainability frameworks/models/theories (F/M/Ts), 7 key themes/constructs and 37 factors hypothesized to influence sustained use of evidence-based practices (EBPs) for acute care team members who are planning or currently implementing EBPs with the goal of improving patient outcomes.
- Of the 7 themes/constructs identified for acute care, 4 align with current literature and 3 add to the body of evidence.
- The analysis provides insight into sustainability as a process or ongoing stage adding to the current definition for sustainability.
- The modified theory analysis tool can be used to examine concepts and factors of emerging or existing F/M/Ts.

5.1 Background

Over a decade ago, the sustained use of evidence-based practices (EBPs) was identified as a gap in the literature. Evolving debate among experts suggest sustainability should be considered a distinct concept that occurs “(1) after a defined period of time, (2) the program, clinical intervention and/or implementation strategies (hereafter referred to as EBPs) continue to be delivered and/or, (3) individual behavior change (i.e. clinician, patient) is maintained, (4) the program (EBP) and individual behavior change may evolve or adapt while (5) continuing to produce benefits for individuals/systems (1)”. Despite growing interest, the timing and understanding of how to sustain the use of EBPs remains a relatively unexplored field of research (2, 3) and least understood part of the translation research process (4) that has challenged practitioners and researchers alike. Evidence reveals the integration and sustainability of EBPs in clinical practice is “an iterative, dynamic”(5) and “complex process”, (6) which poses a significant challenge. Emerging discourse indicates efforts to sustain EBPs in healthcare should be guided by conceptual frameworks, models or theories (hereafter collectively referred to as F/M/Ts)(1, 7-12) to better understand the factors that impact sustainability as a distinct concept (13, 14), over time, in a range of distinct healthcare settings (3, 10, 11). Thus, a critical analysis of existing sustainability F/M/Ts relevant to acute care contexts was conducted as a way to understand the meaning of key concepts, factors and their relationships to ultimately provide direction for practice and research.

Increasing demand on healthcare organizations to improve patient outcomes (10, 15, 16) in an efficient, cost-effective manner (17, 18) has resulted in the growing expectation that EBPs be informed by research, be effective and sustainable to inform clinical decision making (19, 20). In response, healthcare organizations have undertaken a number of quality improvement initiatives (10). Despite efforts, variable rates of sustained use of EBPs exist ranging from none

to full adherence (2), not only among various healthcare professionals but also within different settings (1, 9, 10, 17, 20-24). Researchers argue the decay of sustained EBPs (17, 23, 25, 26), also referred to as the “improvement evaporation effect” (25, 26) can be attributed to the limited use of theoretical F/M/Ts (27, 28). To overcome these challenges and to advance knowledge, researchers (7, 11-14) recommend the use of F/M/Ts to examine the factors that impact sustainability as a distinct concept, especially in complex acute care environments (11).

Recent reviews/syntheses reveal a lack of use/empirical testing of existing F/M/Ts (10, 19, 24), highlight several diverse perspectives, applications and constructs deemed useful for sustainability (10), and few F/M/Ts that focus solely on the sustainability of EBPs within acute settings (10, 24, 29). Specifically, the majority of sustainability F/MTs and approaches are designed for use in non-specified healthcare settings (37% or 23/62) (e.g. healthcare organizations or systems), followed by 31% (19/62) specified for use in public health, 26% (16/62) in community settings, and only 3% (2/62) primarily focused within acute care (10). To date, a review that examines how to improve the sustainability of EBPs in acute care settings has not been conducted (11). Given healthcare expenditures are reported to be the largest in hospitals (36.9% in 2018)(30), exclusively identifying relevant concepts and factors related to sustainability in this challenging setting will likely be of considerable benefit to research and practice, potentially improving the quality of care and reducing costs. Clearly a gap exists regarding which existing sustainability F/M/Ts are applicable and what factors are relevant when trying to sustain the use of EBPs primarily in acute care contexts (10, 13).

The aims of this study were to: (i) identify existing healthcare F/M/Ts that explicitly address the process of sustained use of research (EBPs/guidelines/innovations/clinical protocols/programs/interventions) and are recommended for use within acute care contexts or unspecified healthcare organization/setting; (ii) compare F/M/Ts, using a theory analysis

approach, to identify key concepts and factors that influence/predict the likelihood of successful sustainability of EBPs; and (iii) provide a list of relevant sustainability F/M/Ts, concepts and core factors to act as a guide for practice and provide direction for future research within acute care contexts.

5.2 Methods

Search Strategy and Data Sources

Two different data sources and related search strategies were used to identify existing healthcare sustainability F/M/Ts. First, a full text review, abstraction and appraisal of all F/M/Ts included in two existing knowledge syntheses of sustainability in healthcare (1, 10) was conducted to determine overall alignment with the aims and eligibility criteria established for this study given their original purposes, scopes and related methodologies (see Table 1). Second, to identify relevant sustainability F/M/Ts published after the two syntheses, a new systematic search of all published articles, dissertations/theses, systematic and scoping reviews and concept analyses was conducted using the same eligibility criteria guided by the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) reporting standards (31)(32) (see Additional file 1). The selection of healthcare databases, search terms and strategy were supported by a health science librarian and peer reviewed by a second using the PRESS EBC Checklist (33). A search of CINAHL, Medline, Embase and ProQuest databases was conducted with results limited to citations published between 1 January 2015 to 3 July 2018, based on end dates of the two syntheses. A hand search of references from included citations was undertaken. Details of key terms and search strategies are available in Additional File 2. Ethical approval was not required for this review.

Eligibility Criteria

Eligibility criteria were designed to examine sustainability as a distinct concept, as per Moore et al.'s (1) definition, and to identify concepts and factors that related solely to the sustained use of EBPs, after initial roll out, in complex healthcare environments such as acute care (3, 34). A checklist of inclusion and exclusion criteria was developed to guide selection of citations (see Table 1). During the process, four coauthors (LNP, JS, BD, CB) reviewed a subsample of citations (25) to refine and ensure criteria could be consistently applied. To be eligible, citations needed to be published in English; in a peer reviewed journal; include Sustainability or Implementation and Sustainability F/M/Ts recommended for use in acute care or an unspecified healthcare organization/setting; and represent the most current/refined version.

A citation was excluded if the F/M/T was not recommended for healthcare; was recommended only for use within a specified setting other than acute care (e.g. public health or community); if it contained only an Implementation F/M/T; and if it contained an Implementation and Sustainability F/M/T without an explicit breakdown of related sustainability factors. Notably, this study was not designed to examine the influence of implementation on sustainability.

Data Collection Process and Analysis

A data collection form was piloted by four coauthors (LNP, BD, CB, JS) with 50 randomly selected citations to ensure comprehensiveness prior to screening. The form required minimal modification. To ensure inclusiveness, level 2-full text screening of all citations was conducted in two steps: (i) screening of results from two syntheses was completed by one reviewer (LNP) and reviewed by four coauthors (BD, IG, CB, JS); (ii) screening of systematic review results was completed by two independent reviewers (LNP, IM). Final decisions

regarding inclusion were made jointly by LNP and coauthors (BD, IG, CB, JS). Disagreements were resolved through discussion and consensus.

A theory analysis of the identified F/M/Ts was undertaken as a means of understanding their theoretical underpinnings, paying particular attention to key concepts/factors influencing sustained EBP use within acute care (35). According to Walker and Avant (36), theory analysis involves consideration of seven elements: (i) determining origins, (ii) examining meaning of concepts and their relationships; (iii) analyzing logical adequacy of concepts and relational statements to determine predictive ability to generate hypotheses, (iv) determining usefulness for practice and predicting outcomes, (v) defining generalizability across settings, (vi) defining the degree of parsimony and language clarity, and (vii) determining testability (see Table 2).

Modifications to the theory analysis elements/tool included adding a subjective rating scale for both parsimonious (full or partial) and language (clear, somewhat unclear, unclear). Analysis involved entering findings into a master chart to facilitate comparisons. All factors identified in the appraisal were then extracted and collated. Qualitative content analysis was completed by identifying and placing all related and similar factors together (identified as *core factors*) and then into broad *themes*, which were inductively identified from F/M/Ts (37, 38). Factors cited in four or more F/M/Ts within each theme were identified as *common factors*.

5.3 Results

Of the 2967 citations identified, eight met the inclusion criteria (e.g. four from Moore et al. (1), three from Lennox et al. (10), one from the new systematic review) and were eligible for theory analysis (Figure 1). Rationale for excluded citations is documented in Additional File 3. Most F/M/Ts containing both implementation and sustainability phases did not explicitly provide a detailed breakdown of the sustainability concepts/factors and were excluded. Those that did were recommended for use in community and/or public health settings and were excluded.

Framework/Model/Theory Characteristics and Quality Appraisal

Origins

The F/M/Ts were published between 2005 and 2016; the majority (n=6) published after 2010. The originators are from Europe (n=4) (25, 39) (40, 41); North America (n=3) (13, 34, 42); and Australia (n=1) (43) (see Table 3). Various methodological approaches used by originators to develop F/M/Ts included focused systematic or literature reviews (n=4) (25, 34, 40, 42); integrative reviews of frameworks or theory (41, 43); a Bayesian research co-production approach (39); and a concept analysis (13). The F/M/Ts were reported to be based on theoretical and empirical work of scholars from different fields of study/disciplines with varying theoretical perspectives on sustainability. Specifically, these included the diffusion of innovations theory (42, 43), organizational change theory (25), organizational and management theory (25, 39, 42), ecological theory (34, 43), total quality improvement theory (25), psychological theory (41), theory of routines (40), and multiple healthcare discipline theories (13). Six F/M/Ts were designed to be operationalized to guide practice and/or research at an organizational or unit/departmental level. Two were specified for use at the project/initiative level (34, 39). Three F/M/Ts were explicitly recommended for use in a hospital (13, 40, 41), and the remaining five were recommended for use in any unspecified healthcare organization/setting. Some F/M/Ts were intended for multiple audiences, namely researchers(13, 25, 34, 39-43) practitioners (13, 34, 39-42), policy makers (34), administrators (13) and funders/grantors (42). The most common motivation was to add to the body of evidence/knowledge to either guide research or better understand how to successfully sustain effective improvements in practice.

Meaning of the F/M/T

To examine how originators defined the constructs of sustainability, conceptual definitions for sustainability were mapped to the five constructs of a comprehensive definition

recently published by Moore et al. (1) (see Table 4). Notably, one author did not provide nor reference an explicit definition for sustainability (42). Two definitions included all five established constructs (25, 39), and four definitions included all but one construct (13, 34, 40, 41). Similar to Moore et al. (1) findings, the most commonly described construct for sustainability was ‘*continued delivery or use*,’ which was combined equally with the ‘*evolution or adaption*’ construct cited in seven out of eight definitions.

Differing from Moore et al. (1) findings where most publications did not define timeline for sustainability, the ‘*after a period of time*’ construct was included in 75% (6 out of 8) of the definitions. However, these time-related references were undefined and unquantified. The ‘*continued benefits*’ construct occurred in five out of eight definitions signifying the importance of the perceived goal to enhance outcomes (on individual, unit, organization, system level). The ‘*maintain behavior change in individuals*’ construct reflected how a broad range of EBPs may interact with individuals or teams to maintain behavior change for sustainability. Although this was the least commonly described construct, it occurred in half the definitions: two F/M/Ts recommended for use in acute care (40, 41) and two for use in unspecified settings (25, 39).

Two similar constructs of sustainability currently not included in the Moore et al. (1) definition emerged during the analysis: defining sustainability as a ‘*process*,’ (13, 25, 34, 39, 40, 43) or as a ‘*stage/phase of ongoing use*’ post implementation (41, 42). These views were supported by several theoretical perspectives given F/M/T origins, revealing a new construct that describes the nature of sustainability to be ‘*ongoing/continuous and process-like*’.

Synthesis of Factors and Themes

Initially, 152 sustainability factors were extracted from the eight F/M/Ts. Qualitative analysis identified 37 *core factors*, which grouped into seven *themes*: (1) characteristics of the **innovation/EBP**; (2) **adopter/user** factors influencing sustained use (3) **leadership and**

management influences/factors; (4) **inner context** (practice setting/ organization) factors where EBPs are delivered; (5) **inner processes**/infrastructure factors that support the EBPs (e.g. processes, methods, systems, structures or strategies); (6) **outer context** or broader system factors; and (7) **outcomes** descriptions without defined factors. Further synthesis identified 16 *common factors* (occurring in four or more F/M/Ts), which are highlighted with an asterix in Table 5.

A subgroup analysis comparing the themes and factors among the specified acute care F/M/Ts (13, 40, 41) with those recommended for unspecified healthcare settings (25, 34, 39, 42, 43) was conducted. Results are available in Additional file 4 and Table 5. Notably, originators collectively identified all seven themes within both subgroups. Only three out of 37 core factors were uniquely identified among all F/M/Ts: two core factors were separately identified in two different F/M/Ts within the acute care subgroup (e.g. behavioral change strategies (41), financial funds, and non-financial resources (13)), and one core factor was identified within the unspecified setting subgroup (e.g. barrier identification (43)). Given minimal subgroup differences, all F/M/Ts were included in the theory analysis.

The themes were defined by terms used by originators. The ‘Adopter’ theme is defined as stakeholder, staff, user, adopter, actor or individual using the innovation/EBP. Of note, the *Sustainability of Innovation Theoretical Framework* (hereafter Fox SITF) (43) and *Sustainability of Healthcare Innovations Framework* (hereafter Fleiszer SHIF) (13) focused exclusively on the presence and influence of champions. The ‘Inner Context’ theme refers to the context, practice setting or organization, while the ‘Inner Process’ theme includes processes, methods, systems, structures or strategies used within the context. The ‘Innovation’ theme, defined as a new process, change, product, practice or programme in six F/M/Ts, is not evident in two F/M/Ts (40, 41). Similarly, the ‘Leadership and Management’ theme refers to leadership style, approach,

behaviors, engagement, support or feedback in six F/M/Ts (13, 25, 34, 39, 41, 42). The ‘Outer Context’ theme, referencing conditions, context, systems or environment external to the Inner Context, is not evident in three F/M/Ts (39-41). The Outcome theme is described in four F/M/Ts as ‘outcomes on a spectrum from high to nil’ (13), sustained ‘teamwork behaviors’ (41), ‘consequences’ (25), or ‘continuation of benefits’ (34).

Inclusiveness of Themes and Factors

Three F/M/Ts (13, 25, 34) contain all seven themes with one F/M/T (42) containing six themes. The inclusiveness of six-seven themes in 50% (4 out of 8) F/M/Ts highlights the importance of all themes and related factors for the sustainability of EBPs within acute care contexts. The Innovation (40), Leadership and Management (34, 40, 41, 43), Outer Context (39-41) and Outcome (34, 39, 40, 42) themes were not evident in all F/M/Ts. The *Framework and a Measurement Instrument for Sustainability of Work Practice* (hereafter Slaghuis FMIS-WP) (40) contains only three themes and related factors as it represents a portion of a larger conceptualization on sustainability unpublished. The 37 *core* factors primarily are distributed among six themes, given the Outcome concept/factors are undefined. All F/M/Ts contain *core* factors from the Adopter, Inner Context and Process themes. Fifty-seven percent (21 out of 37) of the *core factors* are contextual contingent including Inner Context, Inner Processes and Outer Context core factors thus highlighting the influence context may have on sustainability of EBPs in acute care. One F/M/T contained all 16 *common* factors (13).

Concept/Factors Relationships

All originators described the relationship between the factors as non-discrete or dynamic, which may interact either in varied combinations or degrees on different levels. How this occurs, however, was not made explicit by definition/statements. The use of arrows to imply direction or potential influence between concepts/factors was used in seven F/M/Ts. Uniquely, the *National*

Health Service Sustainability Model (hereafter Maher NHS-SM) (39) originators used three overlapping colored circles representing broad concepts to illustrate a level of dynamic interaction among the related factors within the concepts. The use of arrows or circles failed to clarify how the interactions between factors occurred. The *Dynamic Sustainability Framework* (hereafter Chamber DSF) (34) originators specified a ‘dynamic relationship’ exists between and among the three concepts (e.g. innovation, practice setting, broader system) and changes over time, but how to interpret this was unclear. Uniquely, the *DCOM Framework with Realistic Evaluation* (hereafter Frykman DCOMF) (41) originators used relational statements to identify key influences impacting relationships between factors not evident in other F/M/Ts, namely four mechanisms of behavior change: direction, competence, opportunity and motivation. All originators recommended further testing to seek greater clarity about relationships between concepts. Fleiszer SHIF (13) originators suggest their framework is representative of a mid-range theory, and further understanding of the relationship between concepts and factors is essential.

Assumptions

Key assumptions underlying the F/M/Ts include (i) the concept of sustainability is only partially mature (13), dynamic (34) (40), or ambiguous having different meanings in different contexts (25); (ii) sustainability considers change (either strategic and/or incremental) as a central influence (25, 34, 39-41, 43); (iii) evolving fit and/or adaption of the EBP is expected (13, 25, 34, 39, 40); and (iv) success over time is based on whether or not the EBP remains beneficial (13, 25, 34, 39, 41, 42).

Schematics

All originators provided schematic representations illustrating key concepts/factors claiming to be operational and able to guide sustainability efforts and future research. Four F/M/Ts depict unidirectional graphical representations that assume a continuum or processual

stance focusing on the EBP and its ongoing implementation process in context influenced by internal or external factors (13, 25, 34, 41) thus implying the goal of maximizing the fit between the EBP and the context. Originators of the remaining schematics provided a simple, high level representation depicting the interplay among the set of factors (39, 40, 42, 43). Notably, in all schematics, each factor category was represented as equal relative to one another given their image size. In fact, originators contend the relative significance of the factors cannot be determined a priori, except the Maher NHS-SM (39) where relative weighting within and among the factors is provided based on empirical evidence.

Empirical Testability

To date, evidence of further testing of four F/M/Ts has occurred (13, 34, 39, 40). Notably, the Maher NHS-SM (39) has been empirically tested in the USA, Canada, UK, South Africa (14, 21, 44, 45) and in low to middle income countries (46). All originators recommended practical testing (application and evaluation) in multiple contexts using different methodologies to broaden conceptual understanding and further development/refinement. Specifically, research using a systemic and process orientated lens to uncover the complexities and dynamics of the concept was recommended (13).

Parsimonious and Language Clarity

Five F/M/Ts were subjectively rated by coauthors (LNP, BD, IG, CB, JS) as parsimonious, with clear language, terminology, explicit definitions for factors and without repetitions noted (13, 25, 39, 41, 42). The remaining three F/M/Ts were rated as partially parsimonious based on the lack of completeness (40) or the use of vague definitions and concept relational statements (34, 43).

Logical Adequacy

Originators claimed all F/M/Ts as operational and capable of guiding research and practice to explore factors influencing sustainability of healthcare EBPs. Originators of four F/M/Ts explicitly provided either testable hypotheses (34, 39, 42) or testable scales for the concepts (40). The Chambers DSF(34) originators proposed seven tenets related to the ongoing improvement of EBPs emphasizing a “central goal of continuously optimizing the fit between the innovation and the dynamic (changing) delivery context to achieve maximum benefit” (34). The *Model for Sustaining Innovations* (hereafter Racine MSI) (42) originators provided twelve propositions, which align with three main factor categories (Innovation Legitimacies, Intermediary Functions, Conditions of Local Adopters) but assert it does not predict the likelihood of sustainability. Conversely, the Maher NHS-SM (39) originators defined ten measurable factors, which are weighted within and among each other, providing a testable hypothesis and a prediction of sustainability for the improvement. Originators of the four remaining F/M/Ts (13, 25, 41, 43) identified measurable factors/variables to guide research and data collection without explicitly defining the impact of the factors for Outcomes concept but rather state it can vary based on the innovation, conditions, and contexts.

Logical Fallacies

Minimal inconsistencies related to the content within the ‘Adopters’ and ‘Outcomes’ themes were noted among all F/M/Ts by coauthors (LNP, BD, IG, CB, JS). Specifically, within three F/M/Ts, the ‘Adopters’ theme was not identified as distinct but rather considered part of the Inner Context (13, 34) or Inner Processes (41) themes. In the Fleischer SHIF (13), the deliberate positioning of individual characteristics within the Inner Context verses distinct, similar to the Leadership & Management theme, was not explicit. Chamber DSF (34) originators did not identify ‘staff’ separately but rather part of the ‘practice setting’ or Inner Context. The staff/team

member is not explicitly identified as a separate theme by originators of Frykman DCOM (41), yet the entire framework is focused on revealing how behavior change interventions influence the sustainability of staff/teamwork behaviors. The failure to distinguish Adopters, either as individual (2, 47) or collective agency (48) influences, as a separate theme by originators is inconsistent with other F/M/Ts noted in recent syntheses (10, 29) and this study. Furthermore, originators of four F/M/Ts, identified ‘Outcomes’ as a theme (13, 25, 34, 41) represented by the combined influence of factors from within their frameworks. Outcome factors were undefined in all F/M/Ts.

Usefulness

Originators claimed the F/M/Ts have multidisciplinary relevance and practicality to inform health professionals, administrators, policy makers and/or funders to identify inadequacies, refine theory, and ensure development of the concept. Uniquely, originators of Racine MSI (42) contend their model provides a “blueprint or agenda” (42) with clear practical implications. Maher NHS-SM (39) originators assert their model is intended to provide a platform for quality improvement for all healthcare disciplines. Other originators indicated their F/M/T can be used across multiple healthcare settings (34, 41), for nursing specific settings (13, 43) or at the micro level of work practice (40). Originators of *Sustaining Organizational Change Framework* (hereafter Buchanan’s SOCF) (25) presented a practical guide outlining a range of potential influences/factors at different levels of analysis.

Tools

Two F/M/Ts provided tools (39, 40). Maher NHS-SM (39) includes a manual, user guide, diagnostic tools, videos and an interactive option, all of which can be used to assess and predict the likelihood of the sustainability of change in clinical practice using a systematic

approach. The Slaghuis FMIS-WP (40) includes an instrument to measure sustained changed work practices related to improvement processes, which originators have tested (40, 49).

Generalizability

The Slaghuis FMIS-WP (40), Fleiszer SHIF (13) and Frykman DCOMF (41) were all designed to guide practice and research in acute care settings. Specifically, Slaghuis FMIS-WP (40) and Frykman DCOMF (41) were designed for changing complex healthcare environments (hospitals) where high turnover and an interdependence between multiple professionals often exists. The Fleiszer SHIF (13) was designed for use in diverse hospital nursing contexts at the unit/organizational level. The Fox SITF(43) was recommended for use in unspecified nursing contexts. The Maher NHS-SM (39) was designed to guide practice and research at the project/initiative level and has been tested in several non-specified healthcare settings (21) including hospitals (50), community settings (14), and globally (46). The Buchanan SOCF (25), Racine MSI (42) and Chambers DSF (34) were designed for use in non-specified healthcare contexts for a broad range of interventions at a project/initiative level (34) or unit/organizational level (25, 42).

5.4 Discussion

This systematic review is the first to include a comprehensive analysis of healthcare sustainability F/M/Ts with a primary focus on identifying key concepts influencing the sustained use of EBPs in acute care contexts. Our search revealed the vast majority of F/M/Ts relating to sustainability were designed specifically for use in community and public health settings, which is congruent with the current literature (3, 10). Notably, only three F/M/Ts were primarily focused on the sustainability of EBPs within acute care settings (13, 40, 41), and five were recommended for use in non-specified healthcare organizational/settings (25, 34, 39, 42, 43). Recommended target domains for use across disciplines implies general learning can be gathered

to inform sustainability for practice and research using an interdisciplinary approach. Addressing sustainability challenges from a variety of theoretical perspectives and disciplines is equally pivotal to understanding this concept in acute care as reported in other healthcare sectors (3).

The two most commonly described constructs cited in the F/M/Ts for sustainability were ‘*continued delivery or use*’, and ‘*evolution or adaption*’ constructs. The prominence of these constructs emphasizes the continuous use and evolutionary nature of sustained EBPs in context over time and is congruent with Moore et al.’s (1) previous developed definition of sustainability. Furthermore, this analysis provides insight into sustainability as a ‘*process*’ or ‘*stage/phase*’ of ongoing/continuous use of EBPs post implementation. This finding is congruent with researchers who argue sustainability is not an all or nothing ‘*phase or endgame*’(34) nor an ‘*outcome*’(51) but rather a “*process of managing and supporting the evolving EBP*” over time (34). Some contend it is a “*matter of degree of sustained change*”(18, 52) to be viewed as a ‘*continuous phase*’(53) or a ‘*continuum*’(14) or a ‘*process*’(10). The importance of this construct is consistent with a recent review (10), ultimately adding new knowledge to the current definition (1). The shift in perspective of sustainability as a ‘*process or ongoing/continuous stage/phase*’ (3, 10), together with the EBPs’ evolutionary nature and dynamic interaction/influence among the factors over time (3, 34), highlights the complexity of planning and measuring sustainability and the need to consider how strategies for sustainment over time differ from implementation and/or potentially overlap.

Results provide a resource of eight F/M/Ts and hypothesized factors that can be used by acute care team members planning or currently implementing EBPs with the goal of improving patient outcomes. Our synthesis of the concepts/factors revealed 37 *core factors* which cluster around 7 *themes specifically defined by the F/M/T originators to be relevant to acute care settings*. Four F/M/Ts containing all (13, 25, 34) or most (42) of the themes provide a knowledge

base for practitioners and researchers to evaluate the sustained use of EBPs within their acute care setting. Four themes align with those deemed useful in any setting by Lennox et al. (10) (e.g. (i) initiative design and delivery = *Inner Processes*, (ii) people involved = *Adopters*, (iii) organizational setting = *Inner Context*, (iv) external environment = *Outer Context*), and three add to the current knowledge, namely *Leadership & Management*, *Characteristics of the Innovation* and *Outcomes*. The equal distribution of *core factors* among six of the seven themes (excluding Outcome) signifies relative importance of each theme for the sustainability of EBPs in acute care. Notably, several factors support the conceptualization of sustainability as “a dynamic construct that allows for adaptation in response to new or changing populations, evidence, policies, or other contextual influences” (3). The combined contextual factors (57 % or 21/37) influencing sustainability related to acute care contexts include (i) the integration of *four layers of context factors* influencing the sustained use of complex organizational change practices (e.g. individual, interpersonal relationships, internal context, wider infrastructure system) (41); (ii) *attention to the complexity, multi-layered, ever-changing* organizational setting (13, 25, 34); (iii) *the adaptability of the innovation/EBP* to context (13, 34, 39), and (iv) *the dynamic process of routinization of innovations/EBPs* as a source of change (40). Arguably, contextual factors impacting sustainability within and among departments or sites will likely provide insight into why the sustained use of EBPs may vary within the same acute care setting. In turn, this likely will affect the strategies needed for sustainment.

Differences amongst F/M/Ts lie in the overall structures, the degree of refinement, substantiation to date, and identified gaps. Each F/M/T reflects a different conceptualization of sustainability evident in the varied schematics. The use of vague/minimal terminology defining concepts/factors and their relationships increases the potential for multiple interpretations. Sustainability Outcomes were depicted in three F/M/Ts as a range (e.g. decay to sustainability to

development (25), a spectrum from high to nil (13) or as an ongoing stage/phase of implementation(41)). The Chambers DSF (34) defined Outcomes as the ‘continuation of intended benefits.’ The Outcome theme is not explicitly defined in the remaining four F/M/Ts (39, 40, 42, 43). Consistent with other researchers (3), we recommend future inquiry focus on articulating sustainability outcomes.

Identified gaps among the eight F/M/Ts were revealed by examining their concepts/factors and tools. Variation existed related to the inclusiveness of each factor and labelling of themes. For example, the absence of any type of ‘financial factor’ in the Racine MSI (42) to guide stakeholders offers little insight into how this factor influences sustainability. Additionally, Fleiszer SIHF (13) did not include a separate ‘Adopter theme’ but instead recognized the role of Leadership & Management as distinct. A lack of focus on facilitation as a factor either explicitly or implicitly or its inclusion and the perceived need for it is not evident in most F/M/Ts (25, 34, 39, 41, 42), except the Fleiszer SIHF(13). Originators of the Chamber DSF (34) were distinct in their acknowledgement of the ‘dynamic relationship’ between three ‘changing’ concepts (innovation, practice setting, broader system), their focus on ‘benefits beyond helping patients’ and the ‘fit of the innovation’ with existing routines/processes. Despite this acknowledgement, the potential risk of overlooking the impact on patient outcomes has been recognized (21). Slaghuis FMIS-WP (40) originators claim their framework is part of a larger unpublished framework. Lastly, only two of the F/M/Ts included tools to measure changed work practices (39, 40). To date, minimal evidence for instrument reliability and validity is available for these tools.

5.5 Strengths and Limitations

This systematic review is the first to include a comprehensive analysis of healthcare sustainability F/M/Ts for EBPs with a primary focus on acute care context. Seven themes

primarily related to acute care were identified, four that align with a current review (10), and three that add to current knowledge (e.g. characteristics of the Innovation, Leadership and Management, and Outcomes). By identifying factors and themes/constructs relevant to acute care settings, this work has the potential to aid sustainability for those planning or currently implementing EBPs. The analysis offers insight into sustainability as a ‘process’ or ‘ongoing stage of implementation’ adding to the current definition. For the first time, factors (mechanisms) influencing sustainability of behavior changes in an acute care setting (see Table 5) are integrated into a synthesis adding to the current knowledge base (41). Additionally, the modified theory analysis criteria can be used as a tool to guide practitioners, researchers, and students in the appraisal of emerging or existing F/M/Ts, related concepts and factors.

There are limitations to consider when interpreting the results of this review. First, a systematic review was conducted for conceptual F/M/Ts related to the sustainability of healthcare EBPs from January 1, 2015 to July 3, 2018. Frameworks/models/theories prior to these dates were identified from two existing knowledge synthesis, dated 1946 to March 2017 inclusively. Inclusion criteria varied within each synthesis, and therefore, there is a risk some F/M/Ts may have been missed. Second, the new systematic review, designed to identify recently published F/M/Ts included four key databases, known to focus on healthcare and/or implementation science, among the fourteen combined databases used within the two syntheses. There could be sustainability F/M/Ts in databases restricted to the social sciences or organizational management literature that may have been missed. However, healthcare was the primary focus. Third, the qualitative analysis of the main themes and related factors was conducted independently by one reviewer, then analyzed/reviewed by coauthors. Analysis using a deductive approach might draw different conclusions. Lastly, interpretations made as part of

the theory analysis are based on the reviewers' subjective appraisal (36). These items are clearly marked in Table 2.

5.6 Conclusion

Sustainability is an emerging field of study. Given the ever-changing nature and complexity of acute healthcare settings and related costs, it is imperative practitioners and researchers consider the use of sustainability F/M/Ts to guide their practice and inquiry to ensure EBPs are sustained effectively, continue to inform clinical decisions, and contribute to improved patient outcomes. Principally, selecting one of the eight sustainability F/M/Ts proactively to plan, evaluate and interpret findings is recommended. Then consider the context level for F/M/T use, specify the goals of sustainability, and determine if the concepts and factors listed apply (54). We also recommend future inquiry adopt the use of mixed methodologies to explore the complex relationship between implementation factors and outcomes (including sustainability), and determine their level of influence using Proctor's Framework (55). Additionally, using a theory analysis approach to examine F/M/Ts containing both implementation and sustainability could provide new insight into the relationship of factors over time (e.g., early, mid-process and long-term) and/or the potential impact of implementation on the sustainability phase.

Registration

This review was not registered.

List of Abbreviations

Buchanan SOCF – Buchanan Sustaining Organizational Change Framework

Chamber DSF – Chamber Dynamic Sustainability Framework

EBP – Evidence Based Practices

F/M/T – Framework/Model/Theory

Fleischer SHIF – Fleischer Sustainability of Healthcare Innovation Framework

Fox SITF – Fox Sustainability of Innovation Theoretical Framework

Frykman DCOMF – Frykman Direction, Competence, Opportunity & Motivation Framework

Maher NHS-SM- Maher National Health Services Sustainability Model
Racine MIS - Racine Model for Sustaining Innovations in their effectiveness
Slaghuis FMIS-WP – Slaghuis A Framework and a Measurement Instrument for Sustainability of Work Practice in long term care

Declarations

Ethics approval and consent to participate

Not applicable

Consent for publication

Not applicable

Availability of data and material

All data generated or analysed during this study are included in this published article (and its supplementary information files).

Competing interests

The authors declare that they have no competing interests.

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Author's contributions

LNP and thesis committee members (IG, BD, CB JS) conceived the study design. LNP was responsible for the systematic review search strategy with the assistance of Librarians. The search strategy was reviewed by JS, IG, BD, CB. LNP conducted the search and screening of both data sources. Data source 2 was screened independently by LNP and IM. LNP conducted the data analysis and produced the tables, figures and additional files. JS, IG, BD, CB provided input into the analysis and interpretation. The initial draft of the manuscript was prepared by LNP, then circulated among all coauthors for comments and revision. All coauthors read and approved the final manuscript.

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TABLES

Table 5.1 Inclusion and exclusion criteria for systematic review (January 1, 2015 to July 3, 2018)

Inclusion criteria	
Study Design	All published articles and dissertations/theses, systematic and scoping reviews, concept analysis
Publication Dates	Published between January 2015 to July, 3 2018. Based on reviews by Moore et al. (2017); and Lennox et al. (2018) Represents the most refined version of the framework/model/theory (F/M/T)
Setting	Recommended for use in acute care setting Recommended for use in any healthcare organization in general and did not specify a specific healthcare setting. Must explicitly provide factors and concepts relate to sustainability
Outcomes	Primary Outcome: A sustainability F/M/T that addresses the process of sustained use of research (evidence-based practice/guidelines/innovation/clinical protocol/programs/interventions) Provides a definition of sustainability. Because sustainability is defined numerous ways, we included all studies in which the originators used one of the following terms sustainability, routinization, institutionalization. Provides information on the theoretical underpinnings and evidence supporting the F/M/T Provides information on the concepts and related factors influencing sustainability of evidence-based practice/guidelines/innovation/clinical protocol/programs/interventions.
Exclusion criteria	
Publications	Exclude if not a unique and index version (most up to date) of the F/M/T
Setting	Exclude if not recommended for use or applicable within a healthcare organizational practice setting Exclude if not explicitly recommended for use within acute care or unspecified healthcare organization/setting Exclude if explicitly recommended for use in a specific setting such as public health or community setting, or has a health promotion focus
Language	Exclude all citations in any other languages than English
Outcomes	Exclude if no F/M/T is included Excluded if about delivery system components and no F/M/T model included Exclude if only describes factors related to sustainability and no F/M/T is included Exclude if it contains both initial implementation and sustainability and does not explicitly provide a detailed breakdown of related sustainability concepts and factors. Excluded if the F/M/T being described is not about healthcare innovations/evidence-based practices

Table 5.2 Theory analysis elements applied to sustainability frameworks/models/theories

Categories	Criteria
Origins	Who are the developers, discipline, country? Methodological approach Evidence to support or refute model development Target domain (practice, education, research, policy) Motivation(s) for development
Meaning of the Framework/ Model/Theory (F/M/T)	Examines conceptual definitions and their use Identifies concepts (factors), Inclusiveness of innovation, potential adopters, context factors Relationship between and among concepts (factors) Assumptions underlying the model (preconditions) Schematic presentation
Empirical Testability	Supported by empirical data (studies)
Parsimonious	Clarity and simplicity while being complete (as per rater)
Language	Use of clear, concise language (as per rater)
Logical adequacy	Logical adequacy (logical structure of the concepts and statements) Predictions or testable hypotheses are provided Logical fallacies within the content or structure of the model
Usefulness	Supported by tools Practicality to nursing & or other target groups. Contributes to the understanding and predicting of outcomes
Generalizability	Clinical context, generalizes (can be extended) to multiple settings

Based on Walker and Avant (36)

Table 5.3 Origins of sustainability frameworks/models/theories for acute care settings

First Author	Year	Country of Origin	Name of F/M/TI	Methodological approach used	Basis or field of study derived from	Recommended setting for use	Context level	Target audience
Buchanan et al. (25)	2005	UK	Sustaining Organizational Change Framework (SOCF)	Focused Systematic Review	-Organizational (orgal) change theory -Management (Mgmt.) & total Quality Improvement (QI) theory	Recommended for different types of change and different contexts - organizational settings providing health and human care services (p.189)	Unit or organization al level	Researchers concerned with organizational change (p.190)
Racine (42)	2006	USA	Model for Sustaining Innovations in their effectiveness (MSI)	Focused Systematic Review	-diffusion of Innovation theory -Orgal & Mgmt. theory	For use in health and human service innovations & related contexts, (p.357,381)	Unit or organization al level	Blueprint (p.382) for funders, grantors, researchers & practitioners (p.356-7)
Maher et al.(39)	2010	UK	NHS Sustainability Model (NHS SM)	Bayesian subjective research co-production approach to identify & rank factors	-Orgal &gmt. theory	Healthcare settings and service innovations (p.5 of guide)	Project or initiative level	Inter-disciplinary researchers & practitioners (p.5)
Slaghuis et al. (40)	2011	Netherlands	A Framework and a Measurement Instrument for Sustainability of Work Practice in long term care (FMIS WP)	Literature review of the concepts ‘routinization’ and ‘institutionalization’	-Theory of routines	Applicable to multiple settings and service organizations in and out of healthcare including hospital care, long term care (p.323)	Department or organization al level	Researchers & practitioners seeking to measure if changed practices are sustained (p.314)
Chambers et al. (34)	2013	USA	Dynamic Sustainability Framework (DSF)	Literature review of the concepts ‘voltage drop’ and ‘program drift’	-Ecological theory	Recommended for a broad range of healthcare service interventions and a myriad of clinical organization and community settings (p.125)	Project or initiative level	Researchers, policy makers, practitioners (p.117, 123-4)
Fox et al. (43)	2015	Australia	Sustainability of Innovation Theoretical Framework (SITF)	A synthesis of theoretical propositions from an integrative review featuring 2 frameworks: Greenhalgh et al 2004 and Chambers et al 2013	-Diffusion of Innovation theory	Broad range of healthcare service innovation in several contexts including nursing contexts (p.73)	Unit or organization al level	Researchers (p.70 ,74)
Fleischer et al. (13) &	2015 & 2016	Canada	Sustainability of Healthcare Innovations Framework (SHIF)	Concept analysis of ‘innovation sustainability’”	-Theories from multiple disciplines (health, social services, public healthy, mgmt.)	Diverse frontline acute healthcare nursing settings (2016, p.215)	Unit level	Inter-disciplinary researchers, practitioners, administrators (p.1484-5)
Frykman et al. (41)	2017	Sweden	DCOM Framework with Realistic Evaluation (DCOMF)	Integrative review combining an organizational framework grounded in psychological theory with Realistic Evaluation	-Psychological theory of applied behavior analysis	Complex changing healthcare context such as emergency depts (p.76)	Organizatio nal level	Researchers & inter-professional practitioners (p.64, 76)

Table 5.4 Framework/Model/Theory sustainability definitions mapped to sustainability constructs by Moore et al (1)

Reference	Synonym	Definition	Sustainability constructs by Moore et al (1)					No. of Constructs Total = 5	New constructs	
			After a period of time	Continued delivery or use of innovation	Maintain behaviour change (use of innovation) by individuals	Evolution or adaptations of innovation	Continued benefits of using innovation		Defined as process*	Defined as a stage**
Buchanan et al. (25)	Sustainability	The sustainability of change can be broadly defined as the process through which new working methods, performance goals and improvement trajectories are maintained for a period appropriate to a given context (25).	x		x		x	3	x	
Racine (42)	Sustainability	None provided The framework alludes to the existence of stages in the process through which an innovation goes from adoption to sustainability						0		x
Maher et al. (39)	Sustainability	Sustainability is when new ways of working and improved outcomes become the norm. Not only have the process and outcome changed, but the thinking and attitudes behind them are fundamentally altered and the systems surrounding them are transformed in support. In other words, it has become an integrated or mainstream way of working rather than something 'added on'. As a result, when you look at the process or outcome one year from now or longer, you can see that at a minimum it has not reverted to the old way or old level of performance. Further, it has been able to withstand challenge and variation; it has evolved alongside other changes in the context, and perhaps has actually continued to improve over time (39).	x		x	X	X	4	x	
Slaghuis et al. (40)	Routinization	Sustainability is "a dynamic process in which actors in a targeted work practice develop and/or adapt the organizational routines to a new work method. This process can also be described as routinization: through the development of organizational routines a new work method becomes part of everyday routine activities. This process also involves learning processes at different levels in the		x	x	x		3	x	

		organization, as there is more to the daily performance of a work practice than just routinization” (40).								
Chambers et al. (34)	Sustainability	Sustainability is a process of managing and supporting the evolution of an intervention within a changing context (34). Sustainability has evolved from being considered as the endgame of a translational research process to a suggested 'adaptation phase' that integrates and institutionalizes interventions within local organizational and cultural contexts (34).	X	x		x	x	4	x	
Fox et al. (43)	Sustainability	<u>No explicit definition is provided with framework.</u> ...only explicitly states it combines the concepts presented by Greenhalgh et al(56) in their systematic review (e.g. successful routinization is strongly impacted by staff continuity, attrition, and perceptions of the value and need of the innovation), and the DSF Chambers et al,(34) which posits the concept is not an endpoint but rather involves a process of innovation evolution or continual adaptation as a result of learning, problem solving and evolution (43).	x	x	x	x		4	x	
Fleischer et al. (13)	Sustainability	Sustainability is a process that emerges from and succeeds innovation implementation wherein improvements are maintained, new ways of working become routine, surrounding systems are transformed in support and the innovation may even be developed, over a period of time appropriate to a given situation “(13).	x	x		x	x	4	x	
Frykman et al. (41)	Sustainability	Uses Stirman et al (9) definition of sustainability, “the phase of implementation when initial support has been withdrawn, core elements are maintained, and capacity for continued performance of the core elements is maintained” (41).	x	x		x	x	4		x
Total definitions referencing the construct			6	5	4	6	5		6	2

* Defines sustainability as a process (25); (39); (40); (34); (43); (13)

**Defines sustainability as an ongoing stage or phase of implementation (42); (41)

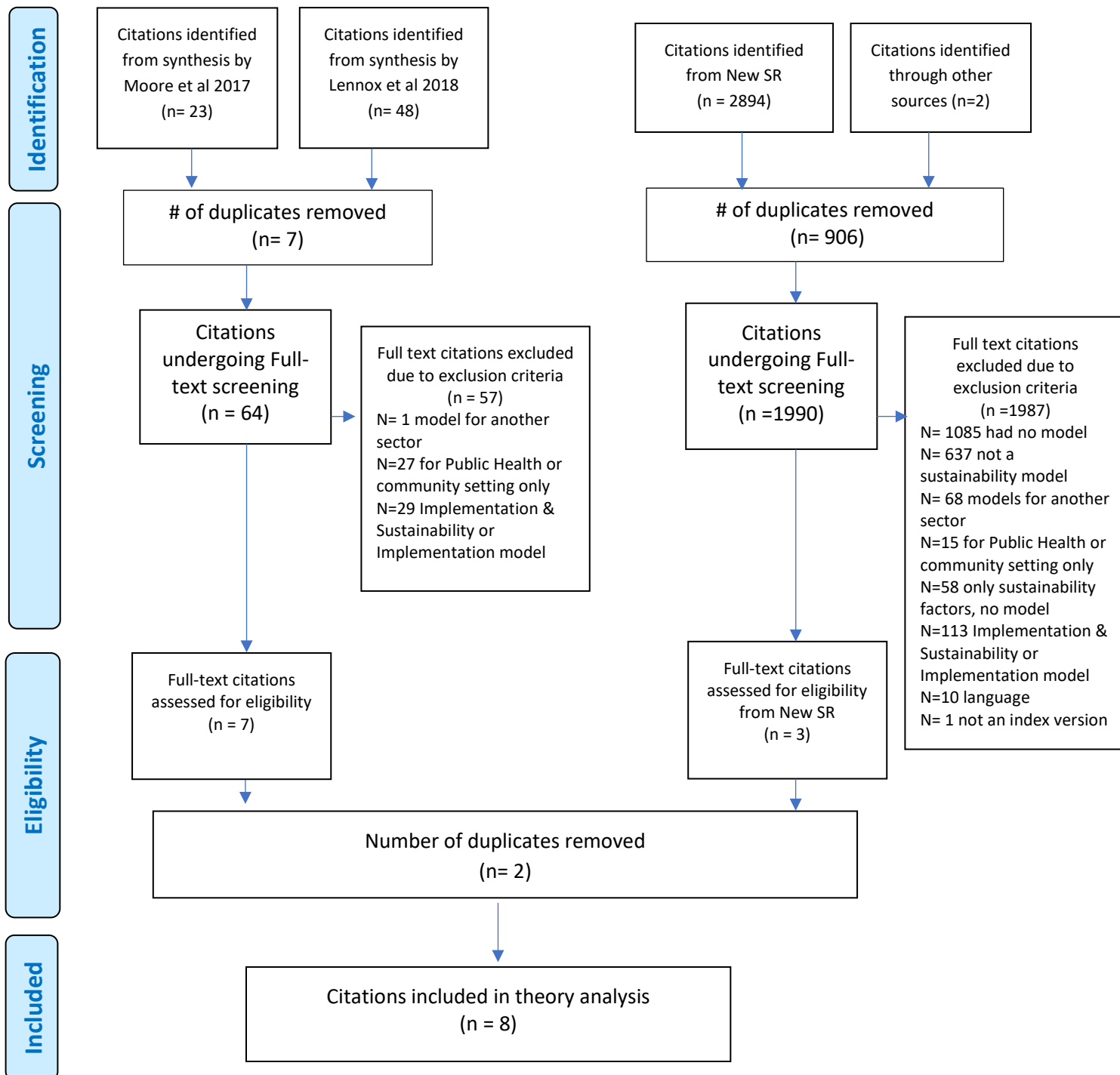
Table 5.5 Synthesis of themes and factors found in sustainability frameworks/models/theories for acute care (n=8)

Theme /Concept	Core Factors	Unspecified setting Fwks					Acute care Fwks		
		1	2	3	5	6	4	7	8
Innovation (defined as: new process/change/ product/practice or program, innovation, intervention)	*Relevance/consistent with competitive strategy	✓	✓			✓		✓	
	*Characteristics (scale, shape & form, age, nature, type, integrity)	✓	✓		✓			✓	
	*Perceived centrality to organizational performance /platform /services	✓	✓		✓			✓	
	Fit with org's vision/mission, procedures/ strategies	✓		✓				✓	
	Adaptability of innovation			✓		✓		✓	
	*Benefits to patient, staff, organization (cost effective, efficiency & quality of care)		✓	✓	✓	✓		✓	
	Barrier Identification					✓			
Adopters (defined as: staff, stakeholder, user, adopter, actor, and or individual)	Human resources - recruitment, processes, succession and leave planning (staffing)				✓	✓			
	*Individual commitment to innovation	✓	✓			✓		✓	
	*Individual competency (skill knowledge, absorptive capacity) to perform innovation	✓	✓		✓			✓	✓
	Internal cohesion btwn individual & commitment within the organization /stakeholder engagement leads to increased performance		✓					✓	✓
	Stakeholder Commitment to innovation			✓				✓	✓
	Stakeholder beliefs, attitude, perceptions, emotions, expectations towards innovation	✓		✓		✓			
	Champion presence & involvement					✓		✓	
Leadership & Management (defined as: style, approach, behaviors, engagement support, or feedback)	*Management approach & engagement	✓	✓	✓	✓			✓	✓
	*Senior Leadership involvement & actions	✓	✓	✓				✓	
Inner Context (defined as: context, practice setting or organization)	*Infrastructure support- Policies & Procedures based on Innovation	✓		✓				✓	✓
	Infrastructure support for innovation in job description with mechanism for recognizing achievement	✓		✓			✓		
	*Infrastructure support-equipment & supplies for innovation			✓			✓	✓	✓
	Organization - Absorptive capacity for innovation							✓	✓
	Cultural - Beliefs, values & perceptions to innov	✓						✓	
	*Cultural - Climate	✓	✓		✓			✓	
	Cultural - innovation integrated into Norms (documents, protocols, manuals)	✓					✓		
	Political internal stakeholder coalition, power, influence	✓				✓		✓	
	Financial performance budgeting & measurement	✓				✓			
Financial-internal funds & other non-financial resources of innovation					✓		✓		
Inner Processes (defined as: processes, methods, systems, structures, or strategies)	*Education & training processes			✓	✓	✓	✓	✓	
	Processual - Planning, method, & timing of embedding innovation	✓					✓	✓	
	*Processual- project structure & system to monitor/manage innovation	✓		✓	✓		✓	✓	
	*Organization - communication capacity for monitoring (exchange & feedback)	✓	✓	✓	✓	✓	✓	✓	
	Behavioural change strategies								✓
Outer Context (defined as: external condition, context, system, or environment)	Soci-economic political threats, stability	✓			✓			✓	
	*External conditions, compatibility for innovation	✓	✓		✓			✓	
	Connection to broader external context		✓			✓		✓	
	External Support for innovation from Stakeholders	✓	✓					✓	
	*Political-Policy, legislation & Interests		✓		✓	✓		✓	
	Financial-external funds & other non-financial resources of innovation							✓	
Outcomes (defined as: outcomes, teamwork behaviors, consequences, or continuation of benefits)	No factors explicitly defined in frameworks for this concept	✓				✓		✓	✓

* **Common Factors** - occurs in 4 or more frameworks

Legend: 1= Buchanan SOCF, 2= Racine MSI, 3= Maher NHS-SM, 4= Slaghuis FMIS-WP, 5=Chambers DSF, 6= Fox SITF, 7= Fleiszer SIHF, 8=Frykman DCOMF

Figure 5.1 PRISMA flow diagram for combined syntheses (Moher et al, 2009)



Databases searched in the two syntheses and new systematic review:
 Lennox et al. (2018) – **Ovid Journals- full text, Medline, Embase, HMC**
 Moore et al. (2017) – includes databases from 4 SRs- **CINAHL, Medline, Embase, Cochrane Library, ERIC, Health Source, ISI, PsycINFO, Academic Search Premier, Campbell, GIN, Google Schola**
 New SR - **CINAHL, Medline, Embase, Ovid-ProQuest**

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Additional file 5.1 PRISMA 2009 Checklist - Identifying relevant concepts and factors for the sustainability of evidence-based practices within acute care contexts: A systematic review and theory analysis of selected sustainability frameworks - Letitia Nadalin Penno1

Section/topic	#	Checklist item	Reported on page #	Line #
TITLE				
Title	1	Identify the report as a systematic review, meta-analysis, or both.	1	1-3
ABSTRACT				
Structured summary	2	Provide a structured summary including, as applicable: background; objectives; data sources; study eligibility criteria, participants, and interventions; study appraisal and synthesis methods; results; limitations; conclusions and implications of key findings; systematic review registration number.	2	34-63
INTRODUCTION				
Rationale	3	Describe the rationale for the review in the context of what is already known.	3-4	80-123
Objectives	4	Provide an explicit statement of questions being addressed with reference to participants, interventions, comparisons, outcomes, and study design (PICOS).	4-5	124-131
METHODS				
Protocol and registration	5	Indicate if a review protocol exists, if and where it can be accessed (e.g., Web address), and, if available, provide registration information including registration number.	NA	
Eligibility criteria	6	Specify study characteristics (e.g., PICOS, length of follow-up) and report characteristics (e.g., years considered, language, publication status) used as criteria for eligibility, giving rationale.	5-6 6 23	150-165 Table 1 cited on 155 Table 1(line 559)
Information sources	7	Describe all information sources (e.g., databases with dates of coverage, contact with study authors to identify additional studies) in the search and date last searched.	5	133-149
Search	8	Present full electronic search strategy for at least one database, including any limits used, such that it could be repeated.	5	Additional file 1-cited on 143

			5	(PRISMA checklist) Additional file 2 – cited on 148 (key terms & search strategy)
Study selection	9	State the process for selecting studies (i.e., screening, eligibility, included in systematic review, and, if applicable, included in the meta-analysis).	5-6	133--165
Data collection process	10	Describe method of data extraction from reports (e.g., piloted forms, independently, in duplicate) and any processes for obtaining and confirming data from investigators.	6-7	166-189
Data items	11	List and define all variables for which data were sought (e.g., PICOS, funding sources) and any assumptions and simplifications made.	7 7 24	175-189 Table 2 cite on 182 Table 2 (line 564)
Risk of bias in individual studies	12	Describe methods used for assessing risk of bias of individual studies (including specification of whether this was done at the study or outcome level), and how this information is to be used in any data synthesis.	NA	
Summary measures	13	State the principal summary measures (e.g., risk ratio, difference in means).	NA	
Synthesis of results	14	Describe the methods of handling data and combining results of studies, if done, including measures of consistency (e.g., I ²) for each meta-analysis.	NA	

Page 1 of 2

Section/topic	#	Checklist item	Reported on page #	Line #
Risk of bias across studies	15	Specify any assessment of risk of bias that may affect the cumulative evidence (e.g., publication bias, selective reporting within studies).	NA	
Additional analyses	16	Describe methods of additional analyses (e.g., sensitivity or subgroup analyses, meta-regression), if done, indicating which were pre-specified.	NA	
RESULTS				
Study selection	17	Give numbers of studies screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally with a flow diagram.	7 7 29	191-196 Figure 1 cited on 193

			7	Figure 1 Additional file 3 – cited on 193
Study characteristics	18	For each study, present characteristics for which data were extracted (e.g., study size, PICOS, follow-up period) and provide the citations.	7-15 7 25 8 26-27 10 28 10	197-387 Table 3 cited on 200 Table 3 (line 570) Table 4 cited on 219 Table 4 (line 573) Table 5 cite on 247, 250 Table 5 Additional file 4 - cited on 250
Risk of bias within studies	19	Present data on risk of bias of each study and, if available, any outcome level assessment (see item 12).	NA	
Results of individual studies	20	For all outcomes considered (benefits or harms), present, for each study: (a) simple summary data for each intervention group (b) effect estimates and confidence intervals, ideally with a forest plot.	NA	
Synthesis of results	21	Present results of each meta-analysis done, including confidence intervals and measures of consistency.	NA	
Risk of bias across studies	22	Present results of any assessment of risk of bias across studies (see Item 15).	NA	
Additional analysis	23	Give results of additional analyses, if done (e.g., sensitivity or subgroup analyses, meta-regression [see Item 16]).	10 10 28	248-256 Additional file 4 - cited on 250 Table 5 - cited on 250
DISCUSSION				
Summary of evidence	24	Summarize the main findings including the strength of evidence for each main outcome; consider their relevance to key groups (e.g., healthcare providers, users, and policy makers).	15-19	388-478

Limitations	25	Discuss limitations at study and outcome level (e.g., risk of bias), and at review-level (e.g., incomplete retrieval of identified research, reporting bias).	19-20	479-494
Conclusions	26	Provide a general interpretation of the results in the context of other evidence, and implications for future research.	20	495-508
FUNDING				
Funding	27	Describe sources of funding for the systematic review and other support (e.g., supply of data); role of funders for the systematic review.	NA	

From: Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group (2009). Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. PLoS Med 6(7): e1000097. doi:10.1371/journal.pmed1000097

For more information, visit: www.prisma-statement.org.

Additional file 5.2 Concept key terms and search strategy

Concept key terms

<u>Concept 1</u>	<u>Concept 2</u>	<u>Concept 3</u>
Frameworks/Models/Theories	Sustainability	Research use or evidence-based
Framework(s)	Sustain* (*includes variable endings)	Research
Model(s)	Routinization / Routinisation	Research utilization(s)
Theory(ies)	Institutionalization / Institutionalisation	Evidence-based practice(s) or guideline(s)
		Practice Guideline(s)
		Diffusion of innovation(s)
		Organizational innovation(s)
		Clinical protocol(s)
		Program(s) / Programme(s)
		Intervention(s)

Search strategies

Embase Classic + Embase 1947 to 2017 October 25

<input type="checkbox"/>	# ▲	Searches	Results
<input type="checkbox"/>	1	model/	509363
<input type="checkbox"/>	2	nonbiological model/	47162
<input type="checkbox"/>	3	theoretical model/	83599
<input type="checkbox"/>	4	conceptual framework/	19765
<input type="checkbox"/>	5	theor*.tw.	546677
<input type="checkbox"/>	6	model?.tw.	2788156
<input type="checkbox"/>	7	framework?.tw.	222149
<input type="checkbox"/>	8	concept*.tw.	511658
<input type="checkbox"/>	9	or/1-8	3793374
<input type="checkbox"/>	10	program sustainability/	777
<input type="checkbox"/>	11	program feasibility/	812
<input type="checkbox"/>	12	*health care quality/	69065
<input type="checkbox"/>	13	or/10-12	70523
<input type="checkbox"/>	14	exp evidence based practice/	1090764
<input type="checkbox"/>	15	exp practice guideline/	432485
<input type="checkbox"/>	16	mass communication/	13485
<input type="checkbox"/>	17	Translational research/	13609
<input type="checkbox"/>	18	health services research/	31037
<input type="checkbox"/>	19	clinical protocol/	84256
<input type="checkbox"/>	20	program development/	21736
<input type="checkbox"/>	21	health program/	100704
<input type="checkbox"/>	22	healthcare policy/	173659
<input type="checkbox"/>	23	hospital policy/	2033
<input type="checkbox"/>	24	or/14-23	1712186
<input type="checkbox"/>	25	13 and 24	18954
<input type="checkbox"/>	26	((sustain* or routin#ation or institutional#ation) adj3 (evidence-based or guideline? or policy or policies or protocol? or innovation? or intervention? or program? or programme? or research utili#ation or "research use")).tw.	6965
<input type="checkbox"/>	27	or/25-26	25804
<input type="checkbox"/>	28	9 and 27	5539
<input type="checkbox"/>	29	limit 28 to yr="2015 -Current"	1222

Ovid MEDLINE(R) Epub Ahead of Print, In-Process & Other Non-Indexed Citations, Ovid MEDLINE(R) Daily and Ovid MEDLINE(R) 1946 to Present

# ▲	Searches	Results
1	models, organizational/	18660
2	models, theoretical/	143463
3	theor*.tw.	558004
4	model?.tw.	2346016
5	framework?.tw.	217516
6	concept*.tw.	428067
7	or/1-6	3243171
8	*program evaluation/	9809
9	*quality assurance, health care/	32522
10	or/8-9	42127
11	exp Evidence-based practice/	83824
12	exp guideline/	31767
13	Diffusion of Innovation/	16948
14	translational research/	8945
15	health services research/	36347
16	Organizational Innovation/	23594
17	clinical protocols/	26861
18	Program Development/	27662
19	Health Policy/	61684
20	or/11-19	294686
21	10 and 20	6400
22	((sustain* or routine#ation or institutional#ation) adj3 (evidence-based or guideline? or policy or policies or protocol? or innovation? or intervention? or program? or programme? or research utili#ation or "research use")).tw.	5891
23	or/21-22	12208
24	7 and 23	3455
25	limit 24 to yr="2015 -Current"	823

CINAHL (Ebsco)

S1	(MH "Models, Theoretical")	26,273
S2	(MH "Organizational Theory")	513
S3	(MH "Theory-Practice Relationship")	2,478
S4	(MH "Conceptual Framework")	29,374
S5	TI model# OR AB model#	191,696
S6	TI theor* OR AB theor*	71,718
S7	TI framework# OR AB framework#	42,142
S8	TI concept# OR AB concept#	47,307

S9	S1 OR S2 OR S3 OR S4 OR S5 OR S6 OR S7 OR S8	324,912
S10	(MM "Program Evaluation")	6,159
S11	(MM "Quality of Health Care")	23,071
S12	S10 OR S11	29,137
S13	(MH "Professional Practice, Evidence-Based+")	48,564
S14	(MH "Professional Practice, Research-Based+")	4,345
S15	(MH "Health Services Research+")	14,737
S16	(MH "Program Implementation")	15,396
S17	(MH "Program Development")	15,943
S18	(MH "practice guidelines")	40,880
S19	(MH "Guideline Adherence")	5,612
S20	(MH "Health Policy")	31,714
S21	(MH "Diffusion of Innovation")	7,274
S22	(MH "Protocols")	11,218
S23	S13 OR S14 OR S15 OR S16 OR S17 OR S18 OR S19 OR S20 OR S21 OR S22	172,135
S24	S12 AND S23	4,348
S25	TI (((sustain* OR routini?ation OR institutional?ation) N3 ("evidence-based" OR guideline? OR policy OR policies OR protocol? OR innovation? OR intervention? OR program? OR programme? OR "research utili?ation" OR "research use")))) OR AB (((sustain* OR routini?ation OR institutional?ation) N3 ("evidence-based" OR guideline? OR policy OR policies OR protocol? OR innovation? OR intervention? OR program? OR programme? OR "research utili?ation" OR "research use"))))	1,244
S26	S24 OR S25	5,570
S27	S9 AND S26	1,283
S28	S9 AND S26	262

ProQuest Dissertations & Theses Global

Search Strategy:

TI,AB(model OR theory OR framework OR concept) AND TI,AB((sustain* OR institutionalization OR routinization) NEAR/3 ("evidence-based" OR guideline OR policy OR protocol OR innovation OR intervention OR program OR "research utilization" OR "research utilisation" OR "research use")) AND TI,AB(health)

Results= 36

Other sources

Rogers (2005). Diffusion of Innovations

Buchanan, Fitzgerald & Ketley (2006). The Sustainability and Spread of Organizational Change

Follow up search from Oct 1 2017 to July 3, 2018

Databases	Platform	Date	# records
CINAHL	Ebsco	July 2018	91
Medline	Ovid	July 2018	197
Embase	Ovid	July 2018	260
ProQuest Dissertation & Thesis Global	ProQuest	July 2018	4
Total of records		July 2018	552
Total of records after duplicates removed	N=53	July 2018	499

Additional file 5.3 Excluded files

Legend	
CINAHL (Jan 1, 2015 - Oct 25, 2017)	CINAHL (Oct 1, 2017, to July 3, 2018)
EMBASE (Jan 1, 2015 - Oct 25, 2017)	EMBASE (Oct 1, 2017, to July 3, 2018)
MEDLINE (Jan 1, 2015 - Oct 25, 2017)	MEDLINE (Oct 1, 2017, to July 3, 2018)
Proquest Dissertation and Thesis (Jan 1, 2015 - Oct 25, 2017)	Proquest Dissertation and Thesis (Oct 1, 2017, to July 3, 2018)

Author	Title	Year	Language	Rationale for Exclusion
Aarons, G. A., Ehrhart, M. G., Farahnak, L. R., et al.	Discrepancies in Leader and Follower Ratings of Transformational Leadership: Relationship with Organizational Culture in Mental Health	2017	English	Implementation and sustainability or implementation model
Aarons, G. A., Green, A. E., Trott, E., et al.	The Roles of System and Organizational Leadership in System-Wide Evidence-Based Intervention Sustainment: A Mixed-Method Study	2016	English	Implementation and sustainability or implementation model
Abara, W., Coleman, J. D., Fairchild, A., et al.	A faith-based community partnership to address HIV/AIDS in the southern United States: implementation, challenges, and lessons learned	2015	English	Implementation and sustainability or implementation model
Abela-Dimech, F., & Johnston, K.	Safe Searches: The Scale and Spread of a Quality Improvement Project	2017		Implementation and sustainability or implementation model
Acri, M., Hamovitch, E., Mini, M., et al.	Testing the 4Rs and 2Ss Multiple Family Group intervention: study protocol for a randomized controlled trial	2017		Implementation and sustainability or implementation model
Adams, A. K., Christens, B., Meinen, A., et al.	The obesity prevention initiative: A statewide effort to improve child health in wisconsin	2016	English	Implementation and sustainability or implementation model
Aidam, J., & Sombie, I.	The West African Health Organization's experience in improving the health research environment in the ECOWAS region	2016	English	Implementation and sustainability or implementation model

Altschaeffl, M. R.	Promoting Treatment Integrity Of Parent- and Teacher-Delivered Math Fluency Interventions: An Adult Behavior Change Intervention	2015	English	Implementation and sustainability or implementation model
Ament, S. M., Gillissen, F., Moser, A., et al.	Factors associated with sustainability of 2 quality improvement programs after achieving early implementation success. A qualitative case study	2017	English	Implementation and sustainability or implementation model
Andersen, B. L., & Dorfman, C. S.	Evidence-based psychosocial treatment in the community: Considerations for dissemination and implementation	2016	English	Implementation and sustainability or implementation model
Baker, A. M., Riekert, K. A., Sawicki, G. S., et al.	CF RISE: Implementing a Clinic-Based Transition Program	2015	English	Implementation and sustainability or implementation model
Bao, J., Rodriguez, D. C., Paina, L., et al.	Monitoring and Evaluating the Transition of Large-Scale Programs in Global Health	2015	English	Implementation and sustainability or implementation model
Barker, M., Baird, J., Tinati, T., et al.	Translating Developmental Origins: Improving the Health of Women and Their Children Using a Sustainable Approach to Behaviour Change	2017	English	Implementation and sustainability or implementation model
Barrera, M., Jr., Berkel, C., & Castro, F. G.	Directions for the Advancement of Culturally Adapted Preventive Interventions: Local Adaptations, Engagement, and Sustainability	2017	English	Implementation and sustainability or implementation model
Bauer, M. S., Krawczyk, L., Tuozzo, K., et al.	Implementing and Sustaining Team-Based Telecare for Bipolar Disorder: Lessons Learned from a Model-Guided, Mixed Methods Analysis	2017	English	Implementation and sustainability or implementation model
Bennett, S., Ozawa, S., Rodriguez, D., et al.	Monitoring and evaluating transition and sustainability of donor-funded programs: Reflections on the Avahan experience	2015	English	Implementation and sustainability or implementation model
Bergh, A. M., Allanson, E., & Pattinson, R. C.	What is needed for taking emergency obstetric and neonatal programmes to scale?	2015	English	Implementation and sustainability or implementation model
Bhat, S., Kohlmeier, M., & Ray, S.	Bridging research, Education and practice across disciplines: Need for nutrition Education/Innovation Programme (NNEdPro)	2017	English	Implementation and sustainability or implementation model
Birken, S. A., Powell, B. J., Pesseau, J., et al.	Combined use of the Consolidated Framework for Implementation Research (CFIR) and the Theoretical Domains Framework (TDF): a systematic review	2017	English	Implementation and sustainability or implementation model

Borges, E., Caliri, M., Haas, V., et al.	Use of the Diffusion of Innovation Model in venous ulcers by specialized professionals	2017		Implementation and sustainability or implementation model
Bousquet, J., Farrell, J., Crooks, G., et al.	Scaling up strategies of the chronic respiratory disease programme of the European Innovation Partnership on Active and Healthy Ageing (Action Plan B3: Area 5)	2016	English	Implementation and sustainability or implementation model
Breckenridge-Sproat, S. T., Throop, M. D., Raju, D., et al.	Building a Unit-Level Mentored Program to Sustain a Culture of Inquiry for Evidence-Based Practice	2015	English	Implementation and sustainability or implementation model
Bridges, J., May, C., Fuller, A., et al.	Optimising impact and sustainability: a qualitative process evaluation of a complex intervention targeted at compassionate care	2017	English	Implementation and sustainability or implementation model
Brockman, V.	Implementing the Mother-Baby Model of Nursing Care Using Models and Quality Improvement Tools	2015	English	Implementation and sustainability or implementation model
Cates, J. R., Calo, W., Trogon, J., et al.	Application of the consolidated framework for implementation research (cfir) to identify factors that may influence implementation of a practice-based communication intervention to normalize HPV vaccination among preteens	2018		Implementation and sustainability or implementation model
Chodosh, J., & Weiner, M.	Implementing Models of Geriatric Care-Behind the Scenes	2017	English	Implementation and sustainability or implementation model
Clerkin, P., & MacFarlane, A.	An analysis of primary care elements of innovative personalised, community-based supports for people with dementia and their families/ carers in Ireland	2017		Implementation and sustainability or implementation model
Coles, E., Wells, M., Maxwell, M., et al.	The influence of contextual factors on healthcare quality improvement initiatives: What works, for whom and in what setting? Protocol for a realist review	2017	English	Implementation and sustainability or implementation model
Collister, B., Gutscher, A., & Ambrogiano, J.	Evaluating Innovations in Home Care for Performance Accountability	2016	English	Implementation and sustainability or implementation model
Colombo, R., & Wilson, C.	Prevention, intervention, and sustained wellness model (prism) care philosophy in cancer survivorship, palliative care, and chronic disease management in the era of healthcare reform: A perspective paper	2015	English	Implementation and sustainability or implementation model

Colquhoun, H. L., Lowe, D., Helis, E., et al.	Evaluation of a training program for medicines-oriented policymakers to use a database of systematic reviews	2016	English	Implementation and sustainability or implementation model
Cook, J. M., Dinnen, S., Thompson, R., et al.	A Quantitative Test of an Implementation Framework in 38 VA Residential PTSD Programs	2015	English	Implementation and sustainability or implementation model
Cook, S., de Kok, B., & Odland, M. L.	'It's a very complicated issue here': understanding the limited and declining use of manual vacuum aspiration for postabortion care in Malawi: a qualitative study	2017	English	Implementation and sustainability or implementation model
Cotic, Z., Rees, R., Wark, P. A., & Car, J.	Factors influencing the implementation, adoption, use, sustainability and scalability of eLearning for family medicine specialty training: A systematic review protocol	2016	English	Implementation and sustainability or implementation model
Crouse, H. L., Angel Soto, M., Razeghi, G., et al.	Utilizing a shared leadership model for development of an effective, locally-adapted and locally-relevant pediatric Triage training program in Latin America	2015	English	Implementation and sustainability or implementation model
Del Boca, F. K., McRee, B., Vendetti, J., et al.	The SBIRT program matrix: a conceptual framework for program implementation and evaluation	2017		Implementation and sustainability or implementation model
Eakin, M. N., Ugbah, L., Arnautovic, T., et al.	Implementing and sustaining an early rehabilitation program in a medical intensive care unit: A qualitative analysis	2015	English	Implementation and sustainability or implementation model
Edward, K. L., Walker, K., & Duff, J.	A multi-state, multi-site, multi-sector healthcare improvement model: Implementing evidence for practice	2017	English	Implementation and sustainability or implementation model
Ehrhart, M. G., Torres, E. M., Green, A. E., et al.	Leading for the long haul: a mixed-method evaluation of the Sustainment Leadership Scale (SLS)	2018		Implementation and sustainability or implementation model
Engelbright, C. L.	Planning for a Community Supported Farmers Market in a Rural USDA Food Desert	2015	English	Implementation and sustainability or implementation model
Enzmann, D. R.	The risks of innovation in health care	2015	English	Implementation and sustainability or implementation model
Fortune-Britt, A. G., Nieuwsma, J. A., Gierisch, J. M., et al.	Evaluating the implementation and sustainability of a program for enhancing veterans' intimate relationships	2015	English	Implementation and sustainability or implementation model
Gammell, K. L.	Water, sanitation, and hygiene (WASH) education: Exploring best practices used in the Dominican Republic	2016	English	Implementation and sustainability or implementation model
Goldstein, H., & Olszewski, A.	Developing a Phonological Awareness Curriculum: Reflections on an Implementation Science Framework	2015	English	Implementation and sustainability or implementation model

Gramlich, L. M., Sheppard, C. E., Wasylak, T., et al.	Implementation of Enhanced Recovery After Surgery: a strategy to transform surgical care across a health system	2017	English	Implementation and sustainability or implementation model
Green, S. A., Bell, D., & Mays, N.	Identification of factors that support successful implementation of care bundles in the acute medical setting: a qualitative study	2017	English	Implementation and sustainability or implementation model
Greenhalgh, T., Wherton, J., Papoutsi, C., et al.	Beyond Adoption: A New Framework for Theorizing and Evaluating Nonadoption, Abandonment, and Challenges to the Scale-Up, Spread, and Sustainability of Health and Care Technologies	2017	English	Implementation and sustainability or implementation model
Hamberger, L. K., Rhodes, K., & Brown, J.	Screening and Intervention for Intimate Partner Violence in Healthcare Settings: Creating Sustainable System-Level Programs	2015		Implementation and sustainability or implementation model
Harper, D. C., Selleck, C. S., Eagerton, G., et al.	PARTNERSHIP TO IMPROVE QUALITY CARE FOR VETERANS: THE VA NURSING ACADEMY	2015		Implementation and sustainability or implementation model
Harris, C., Allen, K., King, R., et al.	Sustainability in Health care by Allocating Resources Effectively (SHARE) 2: identifying opportunities for disinvestment in a local healthcare setting	2017	English	Implementation and sustainability or implementation model
Harris, C., Allen, K., Waller, C., et al.	Sustainability in health care by allocating resources effectively (SHARE) 3: examining how resource allocation decisions are made, implemented and evaluated in a local healthcare setting	2017	English	Implementation and sustainability or implementation model
Harris, C., Green, S., & Elshaug, A. G.	Sustainability in Health care by Allocating Resources Effectively (SHARE) 10: operationalising disinvestment in a conceptual framework for resource allocation	2017	English	Implementation and sustainability or implementation model
Harris, C., Ko, H., Waller, C., et al.	Sustainability in health care by allocating resources effectively (SHARE) 4: exploring opportunities and methods for consumer engagement in resource allocation in a local healthcare setting	2017	English	Implementation and sustainability or implementation model
Hayes, C. W., & Goldmann, D.	Highly Adoptable Improvement: A Practical Model and Toolkit to Address Adoptability and Sustainability of Quality Improvement Initiatives	2018		Implementation and sustainability or implementation model

Hojberg, H., Rasmussen, C. D. N., Osborne, R. H., et al.	Identifying a practice-based implementation framework for sustainable interventions for improving the evolving working environment: Hitting the Moving Target Framework	2018	English	Implementation and sustainability or implementation model
Innis, J., Dryden-Palmer, K., Perreira, T., et al.	How do health care organizations take on best practices? A scoping literature review	2015	English	Implementation and sustainability or implementation model
James, S., Thompson, R. W., & Ringle, J. L.	The Implementation of Evidence-Based Practices in Residential Care	2017		Implementation and sustainability or implementation model
Kalolo, A., Radermacher, R., Stoermer, M., et al.	Factors affecting adoption, implementation fidelity, and sustainability of the Redesigned Community Health Fund in Tanzania: a mixed methods protocol for process evaluation in the Dodoma region	2015	English	Implementation and sustainability or implementation model
Katz, J., & Wandersman, A.	Technical Assistance to Enhance Prevention Capacity: a Research Synthesis of the Evidence Base	2016	English	Implementation and sustainability or implementation model
Khalil, H.	The triple C (consultation, collaboration and consolidation) model: a way forward to sustainability of evidence into practice	2017		Implementation and sustainability or implementation model
Kozica, S. L., Lombard, C. B., Harrison, C. L., et al.	Evaluation of a large healthy lifestyle program: informing program implementation and scale-up in the prevention of obesity	2016	English	Implementation and sustainability or implementation model
Lau, A. S., & Brookman-Fraze, L.	The 4KEEPS study: identifying predictors of sustainment of multiple practices fiscally mandated in children's mental health services	2016	English	Implementation and sustainability or implementation model
Lehrer, H. M., Dubois, S. K., Brown, S. A., et al.	Resilience-based Diabetes Self-management Education: Perspectives From African American Participants, Community Leaders, and Healthcare Providers	2017	English	Implementation and sustainability or implementation model
Luig, T., Asselin, J., Sharma, A. M., et al.	Understanding implementation of complex interventions in primary care teams	2018		Implementation and sustainability or implementation model
Magee, M., Bardsley, J. K., Wallia, A., et al.	Transitioning the Adult with Type 2 Diabetes From the Acute to Chronic Care Setting: Strategies to Support Pragmatic Implementation Success	2017	English	Implementation and sustainability or implementation model
Martindale-Adams, J., Tah, T., Finke, B., et al.	Implementation of the REACH model of dementia caregiver support in American Indian and Alaska Native communities	2017	English	Implementation and sustainability or implementation model

Mayer, A. B.	Documenting Perceived Effectiveness of Community-Based Health Promotion Coalitions: A Grounded Theory Approach	2015	English	Implementation and sustainability or implementation model
McWilliam, J., Brown, J., Sanders, M. R., et al.	The Triple P Implementation Framework: the Role of Purveyors in the Implementation and Sustainability of Evidence-Based Programs	2016	English	Implementation and sustainability or implementation model
Mellon, D.	Evaluating Evidence Aid as a complex, multicomponent knowledge translation intervention	2015	English	Implementation and sustainability or implementation model
Melnyk, B.	Models to guide the implementation and sustainability of evidence-based practice: A call to action for further use and research. <i>Worldviews on Evidence-Based Nursing</i> , 14 (4), 255–256	2017		Implementation and sustainability or implementation model
Melnyk, B. M.	Models to Guide the Implementation and Sustainability of Evidence-Based Practice: A Call to Action for Further Use and Research	2017		Implementation and sustainability or implementation model
Miller, K. L.	Patient centered care: A path to better health outcomes through engagement and activation	2016	English	Implementation and sustainability or implementation model
Misso, M. L., Ilic, D., Haines, T. P., et al.	Development, implementation and evaluation of a clinical research engagement and leadership capacity building program in a large Australian health care service	2016	English	Implementation and sustainability or implementation model
Mitchell, S. E., Weigel, G. M., Laurens, V., et al.	Implementation and adaptation of the Re-Engineered Discharge (RED) in five California hospitals: a qualitative research study	2017	English	Implementation and sustainability or implementation model
Molnar, A., Renahy, E., O'Campo, P., et al.	Using Win-Win Strategies to Implement Health in All Policies: A Cross-Case Analysis	2016	English	Implementation and sustainability or implementation model
Moore, S., & Stichler, J. F.	Engaging Clinical Nurses in Quality Improvement Projects	2015	English	Implementation and sustainability or implementation model
Nelson, G., Macnaughton, E., & Goering, P.	What qualitative research can contribute to a randomized controlled trial of a complex community intervention	2015	English	Implementation and sustainability or implementation model
Nichols, L. O., Martindale-Adams, J., Burns, R., et al.	REACH VA: Moving from Translation to System Implementation	2016	English	Implementation and sustainability or implementation model
Nkoy, F., Fassl, B., Stone, B., et al.	Improving Pediatric Asthma Care and Outcomes Across Multiple Hospitals	2015	English	Implementation and sustainability or implementation model

Northridge, M. E., Birenz, S., Gomes, D. M., et al.	Views of Dental Providers on Primary Care Coordination at Chairsides: A Pilot Study	2016		Implementation and sustainability or implementation model
Palinkas, L. A., Spear, S. E., Mendon, S. J., et al.	Measuring sustainment of prevention programs and initiatives: a study protocol	2016	English	Implementation and sustainability or implementation model
Papadakis, S., Cole, A. G., Reid, R. D., et al.	Increasing Rates of Tobacco Treatment Delivery in Primary Care Practice: Evaluation of the Ottawa Model for Smoking Cessation	2016	English	Implementation and sustainability or implementation model
Perry, R., Golley, R., Hartley, J., et al.	The adaptation and translation of the PEACH™ RCT intervention: the process and outcomes of the PEACH™ in the community trial	2017		Implementation and sustainability or implementation model
Roberts-Gray, C., Sweitzer, S. J., Ranjit, N., et al.	Structuring Process Evaluation to Forecast Use and Sustainability of an Intervention: Theory and Data From the Efficacy Trial for Lunch Is in the Bag	2017	English	Implementation and sustainability or implementation model
Rothstein, J. D., Leontsini, E., Olortegui, M. P., et al.	Determinants of caregivers' use and adoption of household water chlorination: A qualitative study with peri-urban communities in the Peruvian Amazon	2015	English	Implementation and sustainability or implementation model
Rutten, A., Wolff, A., & Streber, A.	Sustainable Implementation of Evidence-Based Programmes in Health Promotion: A Theoretical Framework and Concept of Interactive Knowledge to Action. [German]	2016	German	Implementation and sustainability or implementation model
Ryan, R. W., Harris, K. K., Mattox, L., et al.	Nursing Leader Collaboration to Drive Quality Improvement and Implementation Science	2015	English	Implementation and sustainability or implementation model
Schutte, L., van den Borne, M., Kok, G., et al.	Innovatively Supporting Teachers' Implementation of School-Based Sex Education: Developing A Web-Based Coaching Intervention From Problem to Solution	2016	English	Implementation and sustainability or implementation model
Shelton, R. C., Charles, T. A., Dunston, S. K., et al.	Advancing understanding of the sustainability of lay health advisor (LHA) programs for African-American women in community settings	2017	English	Implementation and sustainability or implementation model
Shelton, R. C., Dunston, S. K., Leoce, N., et al.	Predictors of activity level and retention among African American lay health advisors (LHAs) from The National Witness Project: Implications for the implementation and sustainability of community-based LHA programs from a longitudinal study	2016	English	Implementation and sustainability or implementation model

Sherman, C. W., & Steiner, S. C.	Implementing Sustainable Evidence-Based Interventions in the Community	2016	English	Implementation and sustainability or implementation model
Shirey, M. R.	LEADERSHIP PRACTICES FOR HEALTHY WORK ENVIRONMENTS	2017		Implementation and sustainability or implementation model
Simos, J., Spanswick, L., Palmer, N., et al.	The role of health impact assessment in Phase V of the Healthy Cities European Network	2015	English	Implementation and sustainability or implementation model
Smallwood, S. W., Freedman, D. A., Pitner, R. O., et al.	Implementing a Community Empowerment Center to Build Capacity for Developing, Implementing, and Sustaining Interventions to Promote Community Health	2015	English	Implementation and sustainability or implementation model
Sorensen, T. D., Pestka, D., Sorge, L. A., et al.	A qualitative evaluation of medication management services in six Minnesota health systems	2016		Implementation and sustainability or implementation model
Takeuchi, R., Kawamura, K., Kawamura, S., et al.	Evaluation of the child oral health promotion 'MaliMali' Programme based on schools in the Kingdom of Tonga	2017	English	Implementation and sustainability or implementation model
Talsma, A., McLaughlin, M., Bathish, M., et al.	The Quality, Implementation, and Evaluation Model: A Clinical Practice Model for Sustainable Interventions	2014		Implementation and sustainability or implementation model
Thiele Schwarz, U., Lundmark, R., & Hasson, H.	The Dynamic Integrated Evaluation Model (DIEM): Achieving Sustainability in Organizational Intervention through a Participatory Evaluation Approach	2016		Implementation and sustainability or implementation model
Thompson, T., Kreuter, M. W., Caito, N., et al.	Implementing an Evidence-based Tobacco Control Program at Five 2-1-1 Call Centers: An Evaluation Using the Consolidated Framework for Implementation Research	2017	English	Implementation and sustainability or implementation model
Van Hoyer, A., Larsen, T., Sovik, M., et al.	Evaluation of the Coaches Educators training implementation of the PAPA project: A comparison between Norway and France	2015		Implementation and sustainability or implementation model
Velasco, V., Griffin, K. W., Antichi, M., et al.	A large-scale initiative to disseminate an evidence-based drug abuse prevention program in Italy: Lessons learned for practitioners and researchers	2015	English	Implementation and sustainability or implementation model
Virgolino, A., Heitor, M. J., Carreiras, J., et al.	Facing unemployment: study protocol for the implementation and evaluation of a community-based intervention for psychological well-being promotion	2017	English	Implementation and sustainability or implementation model
Walker-Czyz, A.	The Impact of an Integrated Electronic Health Record Adoption on Nursing Care Quality	2016	English	Implementation and sustainability or implementation model

Walters, L. E. M., Scott, R. E., & Mars, M.	A Teledermatology Scale-Up Framework and Roadmap for Sustainable Scaling: Evidence-Based Development	2018		Implementation and sustainability or implementation model
Wang, M. Y., Kao, C. C., & Lin, C. F.	The EPCOR model: a model for promoting the successful implementation of evidence-based nursing in hospital-based settings	2015	English	Implementation and sustainability or implementation model
Ward, J., Davies, G., Dugdale, S., et al.	Achieving digital health sustainability: Breaking free and CGL	2017	English	Implementation and sustainability or implementation model
Weiss, S., Tobin, J., Lopez, M., et al.	Translating an Evidence-Based Behavioral Intervention for Women Living with HIV into Clinical Practice: The SMART/EST Women's Program	2015		Implementation and sustainability or implementation model
Winterton, R., & Hulme Chambers, A.	Developing sustainable social programmes for rural ethnic seniors: perspectives of community stakeholders	2017		Implementation and sustainability or implementation model
Wozniak, L., Soprovich, A., Rees, S., et al.	Impact of Organizational Stability on Adoption of Quality-Improvement Interventions for Diabetes in Primary Care Settings	2015		Implementation and sustainability or implementation model
Xiang, X., Robinson-Lane, S., Rosenberg, W., et al.	Implementing and sustaining evidence-based practice in health care: The Bridge Model experience	2018		Implementation and sustainability or implementation model
Yoos, A., Kenigsberg, T., & Willacy, E.	Re-aiming program design and implementation: A preliminary process evaluation of a workforce development program	2017		Implementation and sustainability or implementation model
Zullig, L. L., & Bosworth, H. B.	Selecting, adapting, and sustaining programs in health care systems	2015	English	Implementation and sustainability or implementation model
Bal, R., Stoopendaal, A. M., & van de Bovenkamp, H.	[Resilience and patient safety: how can health care regulations contribute?]	2015	Dutch	Language
Becker, I., Wallmann-Sperlich, B., Rupp, R. et al.	[Workplace Interventions to Reduce Sedentary Behavior: A Systematic Review]	2017	German	Language
Cuadrado, C.	[Public health policies in Chile: seeking to regain trust]	2016	Spanish	Language
Han, J., & Zhou, Y.	[Research progress in material metabolism and its effects on resource and environment]	2017	Journal Article	Language
Muche-Borowski, C., Nothacker, M., & Kopp, I.	[Implementation of clinical practice guidelines: how can we close the evidence-practice gap?]	2015	German	Language

Palyga, S. & Dent, C.	Sa community foodies; The experiences of volunteers and participants being trained and training in their local community	2016		Language
Rapin, J., D'Amour, D., Penseyres, T., et al.	Développement d'un système de gestion de la performance des soins dans un centre hospitalier universitaire suisse	2017		Language
Seo, G. S.	Quality of care in inflammatory bowel disease. [Korean]	2015	Korean	Language
Voevodin, M. & Komesaroff, P.	How do we know we have a sustainable food system? when the population is healthy	2016		Language
Zhao, J.	Research progress on nursing human resource management based on iceberg quality model	2018		Language
Abson, D. J., Fischer, J., Leventon, J., et al.	Leverage points for sustainability transformation	2017	English	Model for public health or community setting only
Chilundo, B. G., Cliff, J. L., Mariano, A. R., et al.	Relaunch of the official community health worker programme in Mozambique: is there a sustainable basis for iCCM policy?	2015	English	Model for public health or community setting only
Dijkman, M. A. M., Harting, J., van Tol, L., et al.	Sustainability of the good behaviour game in Dutch primary schools	2017		Model for public health or community setting only
Garst, J., L'Heveder, R., Siminerio, L. M., et al.	Sustaining diabetes prevention and care interventions: A multiple case study of translational research projects	2017	English	Model for public health or community setting only
George, A. S., LeFevre, A. E., Schleiff, M., et al.	Hubris, humility and humanity: expanding evidence approaches for improving and sustaining community health programmes	2018		Model for public health or community setting only
Greenberg, M. T., Feinberg, M. E., Johnson, L. E., et al.	Factors that predict financial sustainability of community coalitions: five years of findings from the PROSPER partnership project	2015	English	Model for public health or community setting only
Iwelunmor, J., Blackstone, S., Veira, D., et al. (b)	Toward the sustainability of health interventions implemented in sub-Saharan Africa: a systematic review and conceptual framework	2016	English	Model for public health or community setting only
Mendes, R., Plaza, V., & Wallerstein, N.	Sustainability and power in health promotion: community-based participatory research in a reproductive health policy case study in New Mexico	2016		Model for public health or community setting only

Nyholm, L., Salmela, S., Nyström, L., et al.	Sustainability in care through an ethical practice model	2018		Model for public health or community setting only
Roy, M., Czaicki, N., Holmes, C., et al.	Understanding Sustained Retention in HIV/AIDS Care and Treatment: a Synthetic Review	2016	English	Model for public health or community setting only
Shelton, R. C., Cooper, B. R., & Stirman, S. W.	The Sustainability of Evidence-Based Interventions and Practices in Public Health and Health Care	2018		Model for public health or community setting only
Stolldorf, D. P.	Sustaining Health Care Interventions to Achieve Quality Care	2017		Model for public health or community setting only
Stolldorf, D. P., Havens, D. S., & Jones, C. B.	Sustaining Innovations in Complex Health Care Environments: A Multiple-Case Study of Rapid Response Teams	2016	English	Model for public health or community setting only
Tabak, R. G., Duggan, K., Smith, C., et al.	Assessing Capacity for Sustainability of Effective Programs and Policies in Local Health Departments	2016	English	Model for public health or community setting only
Vermeer, A. J., Van Assema, P., Hesdahl, B., et al.	Factors influencing perceived sustainability of Dutch community health programs	2015	English	Model for public health or community setting only
Abraham, H., Gizaw, S., & Urge, M.	Identification of breeding objectives for Begait goat in western Tigray, North Ethiopia	2018		Models for other sectors
Abuhejleh, A., Dulaimi, M., & Ellahham, S.	Using lean management to leverage innovation in healthcare projects: Case study of a public hospital in the UAE	2016	English	Models for other sectors
Alcala, F. J., Martin-Martin, M., Guerrero, F., et al.	A feasible methodology for groundwater resource modelling for sustainable use in sparse-data drylands: Application to the Amtoudi Oasis in the northern Sahara	2018		Models for other sectors
Allen, T., & Prospero, P.	Modeling Sustainable Food Systems	2016	English	Models for other sectors
Andreasson, J., Eriksson, A., & Dellve, L.	Health care managers' views on and approaches to implementing models for improving care processes	2016		Models for other sectors
Annunziata, A., & Mariani, A.	Consumer perception of sustainability attributes in organic and local food	2017		Models for other sectors
Barry, C. N., Abraham, K. M., Weaver, K. R., et al.	Innovating team-based outpatient mental health care in the Veterans Health Administration: Staff-perceived benefits and challenges to pilot implementation of the Behavioral Health Interdisciplinary Program (BHIP)	2016	English	Models for other sectors

Binti Md Isa, Y.	Harm reduction in the context of drug use in malaysia, a critical analysis of its justification and its compatibility with the criminal justice approach	2015	English	Models for other sectors
Bjorn, A., & Hauschild, M. Z.	Introducing carrying capacity-based normalisation in LCA: framework and development of references at midpoint level	2015	English	Models for other sectors
Brunoro, C. M., Bolis, I., & Sznclwar, L. I.	Exploring work-related issues on corporate sustainability	2016		Models for other sectors
Busse, H. A., Jogo, W., Fofanah, M., et al.	Participatory Assessment of Factors Influencing Nutrition and Livelihoods in Rural Ethiopia: Implications for Measuring Impacts of Multisector Nutrition Programs	2017	English	Models for other sectors
Cao, S., Zhang, J., Chen, L., et al.	Ecosystem water imbalances created during ecological restoration by afforestation in China, and lessons for other developing countries	2016	English	Models for other sectors
Carinci, F., Van Gool, K., Mainz, J., et al.	Towards actionable international comparisons of health system performance: Expert revision of the OECD framework and quality indicators	2015	English	Models for other sectors
Chapman, A., & Darby, S.	Evaluating sustainable adaptation strategies for vulnerable mega-deltas using system dynamics modelling: Rice agriculture in the Mekong Delta's An Giang Province, Vietnam	2016	English	Models for other sectors
Christis, M., Geerken, T., Vercajsteren, A., et al.	Value in sustainable materials management strategies for open economies case of Flanders (Belgium)	2015	English	Models for other sectors
Chu, J., Wang, J., & Wang, C.	A structure-efficiency based performance evaluation of the urban water cycle in northern China and its policy implications	2015	English	Models for other sectors
Ciaburri, M., Napolitano, M., & Bravo, E.	Business Planning in Biobanking: How to Implement a Tool for Sustainability	2017	English	Models for other sectors
Clavijo, A., Kronberg, M. F., Rossen, A., et al.	The nematode <i>Caenorhabditis elegans</i> as an integrated toxicological tool to assess water quality and pollution	2016	English	Models for other sectors
Dalerum, F., & Miranda, M.	Game auction prices are not related to biodiversity contributions of southern African ungulates and large carnivores	2016	English	Models for other sectors

Demartini, E., Gaviglio, A., & Bertoni, D.	Integrating agricultural sustainability into policy planning: A geo-referenced framework based on Rough Set theory	2015	English	Models for other sectors
Demirkesen, A. C., & Evrendilek, F.	Compositing climate change vulnerability of a Mediterranean region using spatiotemporally dynamic proxies for ecological and socioeconomic impacts and stabilities	2017	English	Models for other sectors
Ding, Q., Wang, Y., Chen, X., et al.	Effects of economics and demographics on global fisheries sustainability	2017	English	Models for other sectors
Du Mortier, S., Mukangu, S., Sagna, C., et al.	A decade of an HIV workplace programme in armed conflict zones; a social responsibility response of the International Committee of the Red Cross	2016	English	Models for other sectors
Du, B., Liu, Q., & Li, G.	Coordinating Leader-Follower Supply Chain with Sustainable Green Technology Innovation on Their Fairness Concerns	2017	English	Models for other sectors
Engel-Enright, C.	Consumer product preferences of cultural textile products: Co-design with textile artisans from Guatemala and Peru	2016	English	Models for other sectors
Fleuren, B. B., de Grip, A., Jansen, N. W., et al.	Critical reflections on the currently leading definition of sustainable employability	2016	English	Models for other sectors
Forrester, I. T., Mayaka, P., Brown-Fraser, S., et al.	Earthquake Disaster Resilience: A Framework for Sustainable Gardening in Haiti's Vulnerable Population	2017	English	Models for other sectors
Geijzendorffer, I. R., Cohen-Shacham, E., Cord, A. F., et al.	Ecosystem services in global sustainability policies	2017	English	Models for other sectors
Gill, S., & Benatar, S. R.	History, Structure and Agency in Global Health Governance Comment on "Global Health Governance Challenges 2016 - Are We Ready?"	2016	English	Models for other sectors
Gu, B., Fujiwara, T., Jia, R., et al.	Methodological aspects of modeling household solid waste generation in Japan: Evidence from Okayama and Otsu cities	2017	English	Models for other sectors
Guo, J., Yue, D., Li, K., et al.	Biocapacity optimization in regional planning	2017	English	Models for other sectors
Haas, T. C., & Ferreira, S. M.	Combating Rhino Horn Trafficking: The Need to Disrupt Criminal Networks	2016	English	Models for other sectors
Hanberger, A., Lundstrom, U., & Marald, G.	Intentions and knowledge shaping local safety policy: A comparison of two Swedish cities	2015	English	Models for other sectors

Henry, H. F., & Suk, W. A.	Sustainable exposure prevention through innovative detection and remediation technologies from the NIEHS Superfund Research Program	2017	English	Models for other sectors
Hobbs, T. J., Neumann, C. R., Meyer, W. S., et al.	Models of reforestation productivity and carbon sequestration for land use and climate change adaptation planning in South Australia	2016	English	Models for other sectors
Hossain, M. U., Poon, C. S., Dong, Y. H., et al.	Development of social sustainability assessment method and a comparative case study on assessing recycled construction materials	2017	English	Models for other sectors
Khair, S. M., Mushtaq, S., & Reardon-Smith, K.	Groundwater Governance in a Water-Starved Country: Public Policy, Farmers' Perceptions, and Drivers of Tubewell Adoption in Balochistan, Pakistan	2015	English	Models for other sectors
Kumar, N., Plenert, E., Hwang, S. W., et al.	Sustaining housing first after a successful research demonstration trial: Lessons learned in a large urban center	2017	English	Models for other sectors
Layton, A., Bras, B., & Weissburg, M.	Designing Industrial Networks Using Ecological Food Web Metrics	2016	English	Models for other sectors
Lees, K., Guthrie, B., Henderson, E., et al.	NUCare: Advancing research on technological integration for self-management in the aging population	2018		Models for other sectors
Mangone, E. R., Agarwal, S., L'Engle, K., et al.	Sustainable Cost Models for mHealth at Scale: Modeling Program Data from m4RH Tanzania	2016	English	Models for other sectors
McVeigh, T., Reighard, A., Day, A., et al.	Show-Me-Careers: Missouri's transition to employment collaborative	2017		Models for other sectors
Morgan, A. U., Grande, D. T., Carter, T., et al.	Penn Center for Community Health Workers: Step-by-Step Approach to Sustain an Evidence-Based Community Health Worker Intervention at an Academic Medical Center	2016		Models for other sectors
Nazar, H., & Nazar, Z.	Community pharmacy minor ailment services in England: Pharmacy stakeholder perspectives on the factors affecting sustainability	2018		Models for other sectors
Oberth, G., & Whiteside, A.	What does sustainability mean in the HIV and AIDS response?	2016	English	Models for other sectors
Othoniel, B., Rugani, B., Heijungs, R., et al.	Assessment of Life Cycle Impacts on Ecosystem Services: Promise, Problems, and Prospects	2016	English	Models for other sectors

Padula, W. V., Lee, K. K. H., & Pronovost, P. J.	Using Economic Evaluation to Illustrate Value of Care for Improving Patient Safety and Quality: Choosing the Right Method	2017	English	Models for other sectors
Paule-Mercado, M. A., Lee, B. Y., Memon, S. A., et al.	Influence of land development on stormwater runoff from a mixed land use and land cover catchment	2017	English	Models for other sectors
Perry, B. D., Robinson, T. P., & Grace, D. C.	Review: Animal health and sustainable global livestock systems	2018		Models for other sectors
Prince, K., Lorrilliere, R., Barbet-Massin, M., et al.	Forecasting the effects of land use scenarios on farmland birds reveal a potential mitigation of climate change impacts	2015	English	Models for other sectors
Rakicevic, Z., Omerbegovic-Bijelovic, J., & Lecic-Cvetkovic, D.	A model for effective planning of SME support services	2016	English	Models for other sectors
Rose, S., Hall, E., Etienne, V., et al.	Continuing education and job satisfaction in a rural haitian hospital	2017		Models for other sectors
Runhaar, H. A. C., van der Windt, H. J., & van Tatenhove, J. P. M.	Productive science-policy interactions for sustainable coastal management: Conclusions from the Wadden Sea area	2016	English	Models for other sectors
Sau, A.	A Simulation Study on Hypothetical Ebola Virus Transmission in India Using Spatiotemporal Epidemiological Modeler (STEM): A Way towards Precision Public Health	2017	English	Models for other sectors
Schreck, M., & Wagner, J.	Incentivizing secondary raw material markets for sustainable waste management	2017	English	Models for other sectors
Seed, B.	Sustainability in the Qatar national dietary guidelines, among the first to incorporate sustainability principles	2015		Models for other sectors
Steg, L., Perlaviciute, G., & van der Werff, E.	Understanding the human dimensions of a sustainable energy transition	2015	English	Models for other sectors
Strassner, C., Kahl, B. J., Paoletti, F., et al.	The organic food system as a framework for a global, sustainable and healthy diet, taking into account regional and cultural adaptations (Organic Diet Project, ODP)	2015	English	Models for other sectors
Subramanian, V., Semenzin, E., Hristozov, D., et al.	Sustainable nanotechnology decision support system: bridging risk management, sustainable innovation and risk governance	2016	English	Models for other sectors

Sun, Q.	Empirical research on coordination evaluation and sustainable development mechanism of regional logistics and new-type urbanization: a panel data analysis from 2000 to 2015 for Liaoning Province in China	2017	English	Models for other sectors
Tickner, J. A., Schifano, J. N., Blake, A., et al.	Advancing safer alternatives through functional substitution	2015	English	Models for other sectors
Townsend, T. J., Ramsden, S. J., & Wilson, P.	Analysing reduced tillage practices within a bio-economic modelling framework	2016	English	Models for other sectors
Trego, L. L.	Developing a military nurse scientist program of research: A military women's health exemplar	2017	English	Models for other sectors
Tuljapurkar, S.	The big challenges in modeling human and environmental well-being	2016	English	Models for other sectors
Uzarski, D., Burke, J., Turner, B., et al.	A Plan for Academic Biobank Solvency-Leveraging Resources and Applying Business Processes to Improve Sustainability	2015	English	Models for other sectors
Villarruel, A. M.	Building Innovation and Sustainability in Programs of Research	2017	English	Models for other sectors
Webb, R., Bai, X., Smith, M. S., et al.	Sustainable urban systems: Co-design and framing for transformation	2017	English	Models for other sectors
Whelan, J., Love, P., Millar, L., et al.	Sustaining obesity prevention in communities: a systematic narrative synthesis review	2018		Models for other sectors
Abakar, M. F., Schelling, E., Bechir, M., et al.	Trends in health surveillance and joint service delivery for pastoralists in West and Central Africa	2016	English	No Model
Abba, K., Zammit, R., Horton, S., et al.	WA23 Research methodology workshop	2015	English	No Model
Abrahams, E., Foti, M., & Kean, M. A.	Accelerating the delivery of patient-centered, high-quality cancer care	2015	English	No Model
Abughosh, S., Wang, X., Serna, O., et al. (a)	A motivational interviewing (MI) intervention by pharmacy students to prevent medication discontinuationx	2017	English	No Model
Abughosh, S., Wang, X., Serna, O., et al. (b)	A motivational interviewing intervention by pharmacy students to improve medication adherence	2017	English	No Model
Adams, K. W., Kletsov, S., Lamm, R. J., et al.	Role for egr1 in the transcriptional program associated with neuronal differentiation of pc12 cells	2017	English	No Model

Adebanji, O., Maciocia, L. R., Sherrard, J., et al.	What effect do practice visits have upon opportunistic chlamydia screening test uptake and case detection in primary care? an audit of 81 general practices in oxfordshire	2016	English	No Model
Adelman, W.	Achieving quality health services for adolescents	2016	English	No Model
Afiero, E.-O.-K., Eng, B., & Eng, M.	Dying Intestate or With a Will on Toxic Estate? An Evaluation of Petroleum Fiscal Systems and The Economic and Policy Implications for Decommissioning of Onshore Crude Oil Fields in Nigeria	2018	English	No Model
Agimi, Y., Regasa, L., Ivins, B., et al.	Role of Department of Defense Policies in Identifying Traumatic Brain Injuries Among Deployed US Service Members, 2001-2016	2018		No Model
Agnes, L., Shelley, V., & Balraj, M.	Stroke action plan: The reality of the dream	2017	English	No Model
Ahmed, S., Hayward, J., & Ahmed, M.	Primary care professionals' perceptions of using a short family history questionnaire	2016	English	No Model
Ahmed, S., Siegel, C. A., & Melmed, G. Y.	Implementing Quality Measures for Inflammatory Bowel Disease	2015	English	No Model
Alam, M., & Lee, D. U.	ECO-friendly synthesis, physicochemical studies, biological assay and molecular docking of steroidal oxime-ethers	2015	English	No Model
Alemnji, G., Edghill, L., Guevara, G., et al.	Development and implementation of the caribbean laboratory quality management systems stepwise improvement process (LQMS-SIP) towards accreditation	2017	English	No Model
Alemu, Z. A., Ahmed, A. A., Yalaw, A. W., et al.	Individual and community level factors with a significant role in determining child height-for-age Z score in East Gojjam Zone, Amhara Regional State, Ethiopia: a multilevel analysis	2017	English	No Model
Alexander, K. A., Jemmott, L. S., Teitelman, A. M., et al.	Addressing sexual health behaviour during emerging adulthood: a critical review of the literature	2015		No Model
Alhassan, R. K., Nketiah-Amponsah, E., & Arhinful, D. K.	Design and implementation of community engagement interventions towards healthcare quality improvement in Ghana: a methodological approach	2016	English	No Model

Allen, J., Kildea, S., Hartz, D. L., et al.	The motivation and capacity to go 'above and beyond': Qualitative analysis of free-text survey responses in the M@NGO randomised controlled trial of caseload midwifery	2017		No Model
Alles, B., Mejean, C., Fassier, P., et al.	Sociodemographic characteristics associated with sustainable food choice motives during purchasing in French adults	2015	English	No Model
Al-Wahaibi, A., & Zeka, A.	Health impacts from living near a major industrial park in Oman	2015	English	No Model
Amar, C., Pomey, M. P., SanMartin, C., et al.	Sustainability: orthopaedic surgery wait time management strategies	2015	English	No Model
Amara, R., Prieto, P., Tetzlaff, M., et al.	Neoadjuvant plus adjuvant dabrafenib and trametinib versus standard of care in patients with high-risk, surgically resectable melanoma: A single-centre, open-label, randomised, phase 2 trial	2018		No Model
American College of Obstetricians and Gynecologists.	Committee Opinion No. 657 Summary: The Obstetric and Gynecologic Hospitalist	2016	English	No Model
Amerson, R.	Moving Beyond the "Medical Mission" Model for International Service-Learning	2016		No Model
Amrichova, J., Lacina, L., Pindjakova, J., et al.	Detailed FACS, migration, and invasion assay analyses of MeLiM melanoma model	2018		No Model
Anderson, B. O.	IS-1 Breast cancer initiative 2.5 (BCI2.5): A framework for systematic improvement in global breast cancer outcomes	2017	English	No Model
Anderson, R., & Hardwick, R.	Realism and resources: Towards more explanatory economic evaluation	2016	English	No Model
Angwenyi, V., Asante, K. P., Traore, A., et al.	Health providers' perceptions of clinical trials: Lessons from Ghana, Kenya and Burkina Faso	2015	English	No Model
Anonymous	NURSING RESEARCH ONLINE	2016		No Model
Anonymous (b)	Skin testing for allergic rhinitis: A health technology assessment	2016	English	No Model
Anonymous (d)	Experimental Biology 2016, EB	2016	English	No Model
Anonymous ©	Quality department evolution to deeper data, more efficient action	2016	English	No Model

Anoushiravani, A. A., Sayeed, Z., El-Othmani, M. M., et al.	High Reliability of Care in Orthopedic Surgery: Are We There Yet?	2016	English	No Model
Ansari, S., Hosseinzadeh, H., Dennis, S. M., et al.	Empowerment of primary care patients with chronic obstructive pulmonary disease (COPD) in the context of multi-morbidity by tailored self-management education in Sydney, Australia	2017	English	No Model
Antonelli, K., O'mally, J., & Steverson, A.	Participant Experiences in an Employment Mentoring Program for College Students with Visual Impairments	2018		No Model
Antunes, A., Neto, S., Carnide, F., et al.	Biofeedback-assisted learning of scapula dynamic control is influenced by the dimensionality of the feedback information	2016	English	No Model
Arango, C., Calvo, A., Moreno, M., et al.	Psychoeducational group intervention for adolescents with psychosis and their families. A two-year follow-up: The piensa trial	2015	English	No Model
Armbruster, S., Song, J., Gatus, L., et al.	Long-term BMI follow-up after a prospective physical activity intervention for endometrial cancer survivors: What's the skinny?	2017	English	No Model
Armstrong, N. E.	A Quality Improvement Project Measuring the Effect of an Evidence-Based Civility Training Program on Nursing Workplace Incivility in a Rural Hospital Using Quantitative Methods	2017		No Model
Asche, C. V., Seal, B., Kahler, K. H., et al.	Evaluation of Healthcare Interventions and Big Data: Review of Associated Data Issues	2017	English	No Model
Athanasakis, K., Tarantilis, F., Tsalapati, K., et al.	Cost-utility analysis of tocilizumab monotherapy in first line versus standard of care for the treatment of rheumatoid arthritis in Greece	2015	English	No Model
Atif, N., Krishna, R. N., Sikander, S., et al.	Mother-to-mother therapy in India and Pakistan: Adaptation and feasibility evaluation of the peer-delivered Thinking Healthy Programme	2017	English	No Model
Au, A.	Developing Volunteer-Assisted Behavioral Activation Teleprograms to Meet the Needs of Chinese Dementia Caregivers	2015		No Model

Au, A., Gallagher-Thompson, D., Wong, M. K., et al.	Behavioral activation for dementia caregivers: scheduling pleasant events and enhancing communications	2015	English	No Model
Aubry, R. E., Scott, L., & Cassidy, E.	Lithium monitoring patterns in the United Kingdom and Ireland: Can shared care agreements play a role in improving monitoring quality? A systematic review	2017	English	No Model
Auerbach, M., Whitfill, T., Gawel, M., et al.	Differences in the quality of pediatric resuscitative care across a spectrum of emergency departments	2016	English	No Model
Aung, E., Donald, M., Coll, J., et al.	The impact of concordant and discordant comorbidities on patient-assessed quality of diabetes care	2015	English	No Model
Awruch, C. A.	Shark reproductive endocrinology: Past, present and future	2015	English	No Model
Bae, J., Cho, J., Cho, S. I., et al.	Application and Developmental Strategies for Community-Based Injury Prevention Programs of the International Safe Communities Movement in Korea	2015	English	No Model
Bailey, S., Checkland, K., Hodgson, D., et al.	The policy work of piloting: Mobilising and managing conflict and ambiguity in the English NHS	2017		No Model
Bailit, J. L., & Grobman, W. A.	What we have learned about quality measures for intrapartum obstetrical care	2016	English	No Model
Bain, S. C., Feher, M., Russell-Jones, D., et al.	Management of type 2 diabetes: the current situation and key opportunities to improve care in the UK	2016	English	No Model
Baltzell, K., & Dandu, M.	Results of a five year program review for the first US-based masters of science in global health at UC San Francisco	2015	English	No Model
Bam, V., & Bell, S.	Emergency nursing in Ghana: Outcomes after a five year pilot program	2015	English	No Model
Barber, C. E. H., Marshall, D. A., Mosher, D. P., et al.	Development of system-level performance measures for evaluation of models of care for inflammatory arthritis in Canada	2016	English	No Model
Barker, A. M., Cannon, G. W., Lawrence, P., et al.	Enhancing medicine trainees' exposure to common musculoskeletal disorders through a primary care musculoskeletal clinic	2015	English	No Model
Bartholomew, J. C., Pearson, A. D., Stenseth, N. C., et al.	Building Infectious Disease Research Programs to Promote Security and Enhance Collaborations with Countries of the Former Soviet Union	2015	English	No Model

Bassett-Gunter, R., Yessis, J., Manske, S., et al.	Healthy school communities in Canada	2016	English	No Model
Batbaatar, E., Dorjdagva, J., Luvsannyam, A., et al.	Determinants of patient satisfaction: a systematic review	2017		No Model
Battersby, M., Lawn, S., Kowanko, I., et al.	Chronic condition self-management support for Aboriginal people: Adapting tools and training	2018		No Model
Baudouin, C., Bredif, S., Leclere-Bienfait, S., et al.	A natural cosmetic active ingredient dedicated to the needs of pregnant woman's skin	2016	English	No Model
Bays, A., Nayak, R. R., Murray, S., et al.	Improving pneumococcal vaccination rates for immunosuppressed patients in an academic rheumatology clinic	2016	English	No Model
Beattie, M., Shepherd, A., Lauder, W., et al.	Development and preliminary psychometric properties of the Care Experience Feedback Improvement Tool (CEFIT)	2016	English	No Model
Beaumont, T., & Goode, K.	Evaluation of the Gynaecology Physiotherapy Assessment Service Pilot Program--an advanced scope physiotherapy model of care for women referred with incontinence and/or pelvic organ prolapse symptoms...25th National Conference on Incontinence in association with the Urogynaecological Society of Australasia 9-12 November 2016 Adelaide Convention Centre, Adelaide, South Australia	2016		No Model
Becker, I., Wallmann-Sperlich, B., Rupp, R. et al.	[Workplace Interventions to Reduce Sedentary Behavior: A Systematic Review]	2017		No Model
Bedell, H. W., Hermann, J. K., Ravikumar, M., et al.	Targeting CD14 on blood derived cells improves intracortical microelectrode performance	2018		No Model
Beebe, L., Raynor, H., Roman, M. W., et al.	The Recovery-Based Interprofessional Distance Education (RIDE) Rotation: Content and Rationale	2015		No Model
Beglinger, J. E.	Transitioning to Excellence in Nurse Staffing: A Statewide Initiative to Leverage the Evidence	2015	English	No Model
Bellemere, G., Bredif, S., Leclere-Bienfait, S., et al.	A natural cosmetic active ingredient dedicated to the needs of pregnant woman's skin	2017	English	No Model
Bendavid, E., Mills, E., Kanters, S., et al.	Epidemiologic benefits and cost-effectiveness of improving Rwanda's HIV care cascade	2015	English	No Model

Bender, B. G., Krishnan, J. A., Chambers, D. A., et al.	American Thoracic Society and National Heart, Lung, and Blood Institute Implementation research workshop report	2015	English	No Model
Berendsen, B. A., Kremers, S. P., Savelberg, H. H., et al.	The implementation and sustainability of a combined lifestyle intervention in primary care: mixed method process evaluation	2015	English	No Model
Bergman, J., & Laviana, A. A.	Opportunities to maximize value with integrated palliative care	2016	English	No Model
Berkes, F., & Ross, H.	Panarchy and community resilience: Sustainability science and policy implications	2016	English	No Model
Berland, N., Fox, A., Tofighi, B., et al.	Opioid overdose prevention training with naloxone, an adjunct to basic life support training for first-year medical students	2017	English	No Model
Bhanbhro, S., Gee, M., Cook, S., et al.	Recovery-based staff training intervention within mental health rehabilitation units: a two-stage analysis using realistic evaluation principles and framework approach	2016	English	No Model
Bhatti, R., Webber, K., Krzetucki, M., et al.	Can glucometrics be used as a quality indicator for inpatient diabetes care?	2015	English	No Model
Bilal, S. M., Spigt, M., Dinant, G. J., et al.	Utilization of sexual and reproductive health services in ethiopia - Does it affect sexual activity among high school students?	2015	English	No Model
Blok, D. J., De Vlas, S. J., & Richardus, J. H.	Global elimination of leprosy by 2020: are we on track?	2015	English	No Model
Boccalini, S., Alicino, C., Martinelli, D., et al.	Clinical and economic impact of herpes zoster vaccination in elderly in Italy	2017	English	No Model
Boissy, A., Windover, A. K., Bokar, D., et al.	Communication Skills Training for Physicians Improves Patient Satisfaction	2016	English	No Model
Bolacali, M., Öztürk, Y., Yilmaz, O., et al.	Effect of genotype and non-genetic factors on growth traits and survival rates in Turkish indigenous Hair goats and their first cross with Boer bucks	2017		No Model
Bolton, P., Cri, I. H., & Rivas, K.	Thinking differently: working together for better care	2015	English	No Model
Bonkowski, S., Gagne, J., Cade, M., et al.	Evaluation of a Pain Management Education Program and Operational Guideline on Nursing Practice, Attitudes, and Pain Management	2018		No Model

Bosmans, M., Gyselinck, K., Van Bastelaere, S., et al.	Critical reflections on SRHR policies and law	2017	English	No Model
Botin, L., Bertelsen, P., & Nohr, C.	Challenges in Improving Health Care by Use of Health Informatics Technology	2015		No Model
Boutelle, K. N., Rhee, K. E., Liang, J., et al.	Effect of attendance of the child on body weight, energy intake, and physical activity in childhood obesity treatment: A randomized clinical trial	2017	English	No Model
Boyle, J., Hollands, G., Beck, S., et al.	Process evaluation of a pilot evidence-based Polycystic Ovary Syndrome clinic in the Torres Strait	2017		No Model
Brady, M., Scott, D. J., Campbell, C., et al.	A pilot stepped-wedge, cluster randomised-controlled-trial (RCT) of the effectiveness of an oral health care (OHC) intervention compared to standard care in stroke wards (socle II)	2018		No Model
Braithwaite, J., Matsuyama, Y., Mannion, R., et al.	How to do better health reform: A snapshot of change and improvement initiatives in the health systems of 30 countries	2016	English	No Model
Brammer, J. R., Brunet, N. D., Burton, A. C., et al.	The role of digital data entry in participatory environmental monitoring	2016	English	No Model
Bredart, A., Kop, J. L., Efficace, F., et al.	Quality of care in the oncology outpatient setting from patients' perspective: A systematic review of questionnaires' content and psychometric performance	2015	English	No Model
Bredif, S., Leclere-Bienfait, S., & Baudouin, C.	A natural cosmetic active ingredient dedicated to the needs of pregnant woman's skin	2015	English	No Model
Bredif, S., Rocheteau, J., Leclere-Bienfait, S., et al.	Avocado perseose, a biomimetic active ingredient for the protection and accompaniment of infants' skin	2015	English	No Model
Breitenstein, S. M., Shane, J., Julion, W., et al.	Developing the eCPP: adapting an evidence-based parent training program for digital delivery in primary care settings	2015	English	No Model
Brenner, S., Wilhelm, D., Lohmann, J., et al.	Implementation research to improve quality of maternal and newborn health care, Malawi	2017		No Model
Brinckmann, J. A., Luo, W., Xu, Q., et al.	Sustainable harvest, people and pandas: assessing a decade of managed wild harvest and trade in Schisandra sphenanthera	2018		No Model

Brink, A. J., Messina, A. P., Feldman, C., et al.	From guidelines to practice: a pharmacist-driven prospective audit and feedback improvement model for peri-operative antibiotic prophylaxis in 34 South African hospitals	2017	English	No Model
Brinkmann, A., Braun, J. P., Riessen, R., et al.	[Quality assurance concepts in intensive care medicine]	2015	German	No Model
Brookes, V. J., Gill, G. S., Singh, C. K., et al.	Exploring animal rabies endemicity to inform control programmes in Punjab, India	2017	English	No Model
Broughton, E. I., Nunez, O., Arana, R., et al.	Effectiveness and Efficiency of Improving HIV Service Provision for Key Populations in Nicaragua	2016	English	No Model
Brown, H. L., Smith, M., Beasley, Y., et al.	Infant Mortality Lessons Learned from a Fetal and Infant Mortality Review Program	2017		No Model
Brown, K. K., Maryman, J., & Collins, T.	An Evaluation of a Competency-Based Public Health Training Program for Public Health Professionals in Kansas	2017	English	No Model
Brown, M., & Drummond, C.	Advance care directives are an important part of good healthcare	2017	English	No Model
Brown, V.	Infusing Adult Education Principles Into a Health Insurance Literacy Program	2018		No Model
Browne, K.O., Graham, R., & Siegel, B.	Leading Multisector Collaboration: Lessons From the Aligning Forces for Quality National Program Office	2016		No Model
Brownson, R. C., Kemner, A. L., & Brennan, L. K.	Applying a mixed-methods evaluation to Healthy Kids, Healthy Communities	2015	English	No Model
Broyles, J.	Building the Road Ahead: Reflections on the C-TAC National Summits	2017		No Model
Brunwasser, S. M., & Gillham, J. E.	Identifying Moderators of Response to the Penn Resiliency Program: A Synthesis Study	2016	English	No Model
Buckingham, S., Kendall, M., Ferguson, S., et al.	HELping older people with very severe chronic obstructive pulmonary disease (HELP-COPD): Mixed-method feasibility pilot randomised controlled trial of a novel intervention	2015	English	No Model
Busza, J., Dauya, E., Bandason, T., et al.	The role of community health workers in improving HIV treatment outcomes in children: lessons learned from the ZENITH trial in Zimbabwe	2018		No Model

Byer, S. H., & Michels, G. D.	Sustainable university-based water quality program in the developing world	2016	English	No Model
Cahyanti, R., Wiyati, P., & Hadijono, S.	Role of clinical governance in Maternal Death Review process: Strategies to response quality improvement management of maternal death from pre-eclampsia	2018		No Model
Cai, L. Z., Long, C., Iqbal, A., et al.	Lessons from the establishment of Nepal's first skin bank	2016	English	No Model
Cai, L., Long, C., Karki, B., et al.	Creation of Nepal's First Skin Bank: Challenges and Outcomes	2017		No Model
Callea, G., Armeni, P., Marsilio, M., et al.	The impact of HTA and procurement practices on the selection and prices of medical devices	2017	English	No Model
Calnitsky, D.	More Normal than Welfare: The Mincome Experiment, Stigma, and Community Experience	2016	English	No Model
Cameron, D. B., & Rangel, S. J.	Variation in pediatric surgical care	2015	English	No Model
Campanella, P., Lovato, E., Marone, C., et al.	The impact of electronic health records on healthcare quality: a systematic review and meta-analysis	2016		No Model
Campbell, C., Braund, R., & Morris, C.	Beyond the four walls: an exploratory survey of location, employment and roles of pharmacists in primary health care	2017		No Model
Cappelletti, P.	Appropriateness of diagnostics tests...XXIXth International Symposium on Technological Innovations in Laboratory Hematology 12–14 May 2016 Milano, Italy	2016		No Model
Carbone, M., Jones, D., Mells, G. F., et al.	Predicted risk of end stage liver disease with continued standard of care and subsequent addition of obeticholic acid in patients with PBC	2016	English	No Model
Carlsson Petri, K. C., Ingwersen, S. H., Flint, A., et al.	Semaglutide s.c. Once-Weekly in Type 2 Diabetes: A Population Pharmacokinetic Analysis	2018		No Model
Carter, B. L., Coffey, C. S., Ardery, G., et al.	Cluster-randomized trial of a physician/pharmacist collaborative model to improve blood pressure control	2015	English	No Model
Cartwright, J., Franklin, D., Forman, D., et al.	Promoting collaborative dementia care via online interprofessional education	2015		No Model
Cashin, A.	The challenge of nurse innovation in the Australian context of universal health care	2015	English	No Model

Casteleyn, L., Dumez, B., Becker, K., et al.	A pilot study on the feasibility of European harmonized human biomonitoring: Strategies towards a common approach, challenges and opportunities	2015	English	No Model
Cavalcanti, A. B., Bozza, F. A., Machado, F. R., et al.	Effect of a quality improvement intervention with daily round checklists, goal setting, and clinician prompting on mortality of critically ill patients: A randomized clinical trial	2016	English	No Model
Cavicchi, A., Venturini, S., Petrazzuoli, F., et al.	INFORMEG, a new evaluation system for family medicine trainees: feasibility in an Italian rural setting	2016		No Model
Ceballos, R. M., Molina, Y., Malen, R. C., et al.	Design, development, and feasibility of a spanish-language cancer survivor support group	2015	English	No Model
Cendelin, J., Purkartova, Z., Kubik, J., et al.	Embryonic cerebellar graft development in the cerebellum of normal and cerebellar mutant mice	2018		No Model
Ceschia, A., & Horton, R.	Maternal health: time for a radical reappraisal	2016		No Model
Chacko, A., Fabiano, G. A., Doctoroff, G. L., et al.	Engaging Fathers in Effective Parenting for Preschool Children Using Shared Book Reading: A Randomized Controlled Trial	2017	English	No Model
Chai, J., Shen, X., Feng, R., et al.	eCROPS-CA: A systematic approach toward effective and sustainable cancer prevention in rural China	2015	English	No Model
Chambers, S., Hyde, M., & Dunn, J.	Maximising effectiveness in peer support: Practical considerations	2015	English	No Model
Chandra, R. V., Leslie-Mazwi, T. M., Mehta, B. P., et al.	Does the use of IV tPA in the current era of rapid and predictable recanalization by mechanical embolectomy represent good value?	2016	English	No Model
Chang, Y. C., & Locke, J.	A systematic review of peer-mediated interventions for children with autism spectrum disorder	2016	English	No Model
Chao, Y. S., Wu, H. T., Scutari, M., et al.	A network perspective on patient experiences and health status: the Medical Expenditure Panel Survey 2004 to 2011	2017		No Model
Charrette, A., Lorenz, L., Fong, J., et al.	Outcomes, supports and barriers related to intensive exercise participation for adults with chronic moderate-to-severe acquired brain injury	2017	English	No Model
Chattopadhyay, K., Fournie, G., Abul Kalam, M., et al.	A Qualitative Stakeholder Analysis of Avian Influenza Policy in Bangladesh	2017	English	No Model

Chauhan, A., Perera, M., & Kandasamy, G.	The impact of the golden patient rule in emergency theatres	2018		No Model
Chavez, F., & McKinnon, T.	Innovations in global health education: A global inter professional collaboration	2015	English	No Model
Chen, J. Y., Wan, E. Y. F., Chan, K. H. Y., et al.	Evaluation of the quality of care of a haemodialysis public-private partnership programme for patients with end-stage renal disease	2016	English	No Model
Chen, J., & Rhoads, K.	Money vs. mission: Role of academic medical centers in promoting colorectal cancer screening in underserved communities	2016	English	No Model
Chen, K., Wang, Q., Chen, Y. L., et al.	Chinese practice guideline for therapeutic drug monitoring of vancomycin: Recommendations external review. [Chinese]	2015	Chinese	No Model
Chi, G., & Ho, H. C.	Population stress: A spatiotemporal analysis of population change and land development at the county level in the contiguous United States, 2001-2011	2018	English	No Model
Chinyere, I., Weigand, K., Moukabary, T., et al.	Model of induced ventricular tachycardia and cardiac electrophysiological mapping	2016	English	No Model
Cho, J. M., Colen, C. B., Li, G., et al.	Neurosurgery Concepts: Key perspectives on Traumatic Brain Injury, New Treatments for Glioblastoma, Hemicraniectomy for Extensive Middle-Cerebral-Artery Stroke, Minimally Invasive Spine Surgery and Lumbar Epidural Injections for Radiculopathy	2015	English	No Model
Choorapoikayil, S., Zacharowski, K., & Meybohm, P.	Patient blood management: Is it worth to be employed?	2016	English	No Model
Christensen, J., Richardson, K., & Hetherington, S.	New York State Partnerships in Employment	2017		No Model
Ciervo, C. A., Shubrook, J. H., & Grundy, P.	Leveraging the principles of osteopathic medicine to improve diabetes outcomes within a new era of health care reform	2015	English	No Model
Clarke, R., Bharmal, N., Di Capua, P., et al.	Innovative Approach to Patient-Centered Care Coordination in Primary Care Practices	2015		No Model
Clarke, S., Julie, I., Yao, A., et al.	A longitudinal exploration of in situ mock code events and the performance of cardiac arrest skills	2016	English	No Model

Coffman, S., Doolen, J., & Llasus, L. S. M.	Program Development and Evaluation of the Concierge Model of Simulation	2015		No Model
Conchin, S., & Carey, S.	The expert's guide to mealtime interventions - A Delphi method survey	2017	English	No Model
Conde, S.	Chemoreception and metabolic diseases	2016	English	No Model
Conklin, A., Morris, Z., & Nolte, E.	What is the evidence base for public involvement in health-care policy?: results of a systematic scoping review	2015		No Model
Conway, K.	FMOLHS and Cook Medical take a standards road trip	2015		No Model
Cook, M. N.	Helping teens regulate emotions and behavior by helping their parents	2017		No Model
Cook, S.	Factors contributing to the limited and declining use of MVA for postabortion care in Malawi: A qualitative study of health workers' opinions	2016	English	No Model
Cornejo Olivas, M., Vishnevetsky, A., M, I. I.-M., Marca, V., et al.	Neurologic medical campaigns in Peru: A successful, low-cost program for huntington's disease and other chronic neurologic diseases	2017	English	No Model
Correa-Fernandez, V., Wilson, W. T., Shedrick, D. A., et al.	Implementation of a tobacco-free workplace program at a local mental health authority	2017	English	No Model
Covell, C. L., Neiterman, E., & Bourgeault, I. L.	Scoping review about the professional integration of internationally educated health professionals	2016	English	No Model
Cowell, A. J., Dowd, W. N., Mills, M. J., et al.	Sustaining SBIRT in the wild: simulating revenues and costs for Screening, Brief Intervention and Referral to Treatment programs	2017		No Model
Coxeter, P., Del Mar, C. B., McGregor, L., et al.	Interventions to facilitate shared decision making to address antibiotic use for acute respiratory infections in primary care	2015	English	No Model
Cresswell, K. M., Bates, D. W., & Sheikh, A.	Ten key considerations for the successful optimization of large-scale health information technology	2017	English	No Model
Crossman, J. M.	Planning, practising and prioritising wellness through an integrative behaviour change plan	2016	English	No Model

Cunha-Cruz, J., Milgrom, P., Shirtcliff, R. M., et al.	Everybody brush!: protocol for a parallel-group randomized controlled trial of a family-focused primary prevention program with distribution of oral hygiene products and education to increase frequency of toothbrushing	2015	English	No Model
Cunningham, S., & Jackson, R.	A description of the development of a post-graduate orthopaedic manual therapy residency program in Kenya	2016	English	No Model
Cunningham, S., Jackson, R., Muli, D. K., et al.	The Development of a Postgraduate Orthopaedic Manual Therapy Residency Program in Nairobi, Kenya	2017	English	No Model
Cunningham, W. E., Nakazono, T., Malek, M., et al.	Effectiveness of a peer navigation intervention to maintain viral suppression among HIV+ men and transgender women released from a large municipal jail: Results of a randomized controlled TRIAL	2017	English	No Model
Dalmar, A. A., Hussein, A. S., Walhad, S. A., et al.	Rebuilding research capacity in fragile states: the case of a Somali-Swedish global health initiative	2017	English	No Model
Daly, B., Olopade, O. I., Hou, N., et al.	Evaluation of the Quality of Adjuvant Endocrine Therapy Delivery for Breast Cancer Care in the United States	2017	English	No Model
Daniels, L. M., Dixon, K. E., & Campbell, L. C.	Building Capacity for Behavioral Health Services and Clinical Research in a Rural Primary Care Clinic: A Case Study	2014		No Model
Danilovich, M. K., Hughes, S. L., Corcos, D. M., et al.	Translating Strong for Life Into the Community Care Program: Lessons Learned	2017		No Model
Dark, F.	Environmental characteristics that facilitate successful cognitive remediation implementation in australia	2015	English	No Model
Das, A., Chodavarapu, P., Yip, D., et al.	Perceptions regarding futility of care in pediatrics	2015	English	No Model
D'Assuncao, M. A., Fry, L. C., & Monkemuller, K.	Tu1561 Development and Testing of a New, Simple and Inexpensive Ex-Vivo, ERCP Training Model for Basic and Intermediate ERCP Skills...2016 DDW (Digestive Disease Week) ASGE (American Society for Gastrointestinal Endoscopy) Program and Abstracts 21 May 2016-24 May 2016, San Diego, California	2016		No Model
Dauphinee, W. D., Boulet, J. R., & Norcini, J. J.	Considerations that will determine if competency-based assessment is a sustainable innovation	2018		No Model

Davies, D. J.	Quality improvement initiatives in a case management service: Case study	2015	English	No Model
Davis T.	Is an urgent start program a sustainable model for initiating peritoneal dialysis?	2018		No Model
Davis, L. L.	Improving symptom recognition and symptom interpretation in women who have experienced an acute coronary syndrome event: Results of a feasibility study testing a nurse-delivered educational and skill building intervention	2016		No Model
Davis, R. A., & Travers Gustafson, D.	Academic-Practice Partnership in Public Health Nursing: Working with Families in a Village-Based Collaboration	2015		No Model
Davy, C., Bleasel, J., Liu, H., et al.	Effectiveness of chronic care models: opportunities for improving healthcare practice and health outcomes: a systematic review	2015	English	No Model
Dawson-Hahn, E. E., Fesinmeyer, M. D., & Mendoza, J. A.	Correlates of Physical Activity in Latino Preschool Children Attending Head Start	2015		No Model
De Leeuw, E.	Engagement of Sectors Other than Health in Integrated Health Governance, Policy, and Action	2017	English	No Model
De Maeseneer J.	Challenges for general practice/primary care research in a changing world	2017		No Model
De Pietro, C., Camenzind, P., Sturny, I., et al.	Switzerland: Health System Review	2015	English	No Model
Decosimo, A., & Boland, C. R.	A chance to thrive, not just survive ebola: A model for international psychosocial support programming in emergency and disaster settings	2017		No Model
Delgado-Noguera, M. F., Merchan-Galvis, T. M., Mera-Mamian, A. Y., et al.	Evaluation of the quality of Colombian Pediatrics Clinical Practice Guidelines. [Spanish]	2015	Spanish	No Model
Denbæk, A., Andersen, A., Bast, L., et al.	Importance of implementation level when evaluating the effect of the Hi Five Intervention on infectious illness and illness-related absenteeism	2018		No Model
Denysyk, L. M., & Denton, J. J.	Lessons from European value-based health care systems: How an emerging focus on health care quality will impact the pharmaceutical industry in the United States	2016	English	No Model

Deuba, K., Anderson, S., Ekstrom, A. M., et al.	Micro-level social and structural factors act synergistically to increase HIV risk among Nepalese female sex workers	2016	English	No Model
Devan, J., Musilova, K., Janikova, A., et al.	[Novel Findings in Follicular Lymphoma Pathogenesis and the Concepts of Targeted Therapy]	2017	Czech	No Model
Devine, D. A., Wenger, B., Krugman, M., et al.	Part 1: Evidence-based facility design using Transforming Care at the Bedside principles	2015	English	No Model
Diamond-Brown, L.	It can be challenging, it can be scary, it can be gratifying: Obstetricians' narratives of negotiating patient choice, clinical experience, and standards of care in decision-making	2018		No Model
Dick, J. E.	The role of stem cells in the origin of relapse in acute leukemia	2016	English	No Model
Dickson, K., Sutcliffe, K., Rees, R., et al.	Gaps in the evidence on improving social care outcomes: findings from a meta-review of systematic reviews	2017		No Model
Dilworth, T. J., Klein, P. W., Mercier, R. C., et al.	Clinical and Economic Effects of a Pharmacist-Administered Antiretroviral Therapy Adherence Clinic for Patients Living with HIV	2018		No Model
Dima, A. L., Linn, A. J., & Schweitzer, A. M.	Where we are now and how we can improve: A qualitative study of practitioners perspectives on providing ART adherence support in Romania	2016	English	No Model
Dimmock, T.	Comment on 'Models of care for musculoskeletal health in Australia: now more than ever to drive evidence into health policy and practice'	2015		No Model
Dinesen, B., Nonnecke, B., Lindeman, D., et al.	Personalized Telehealth in the Future: A Global Research Agenda	2016	English	No Model
Dinizulu, S. M.	University and faith-based collaboration to build resilience for African American youth exposed to community violence	2017		No Model
Diop, M., Fiset-Laniel, J., Provost, S., et al.	Does enrollment in multidisciplinary team-based primary care practice improve adherence to guideline-recommended processes of care? Quebec's Family Medicine Groups, 2002-2010	2017	English	No Model

Dobbels, F., De Bleser, L., Kristanto, P., et al.	Electronic monitoring feedback and motivational interviewing improves medication adherence in heart, liver and lung transplant patients: Results from the maestro-TX RCT	2015	English	No Model
Documet, P. I., Macia, L., Thompson, A., et al.	A Male Promotores Network for Latinos	2016		No Model
Dodani, S., Arora, S., & Kraemer, D.	Heals hypertension control program for stroke prevention in african american communities	2015	English	No Model
Doherty, R., Damle, N. S., Blehm, J. A., et al.	Assessing the patient care implications of "concierge" and other direct patient contracting practices: A policy position paper from the American College of physicians	2015	English	No Model
Dom, N. C., Ahmad, A. H., Latif, Z. A., et al.	Application of geographical information system-based analytical hierarchy process as a tool for dengue risk assessment	2016	English	No Model
Domercant, J. W., Puttkammer, N., Lu, L., et al.	Attrition from antiretroviral treatment services among pregnant and non-pregnant patients following adoption of Option B+ in Haiti	2015	English	No Model
Donnelly, R., Lee, C., Carrington, A., et al.	Making foundation doctors' insulin prescriptions safer: Implementation research	2018		No Model
Doshi, R., Yock, P., Kumar, U., et al.	Stanford-India Biodesign: Outcomes from an eight year collaboration with the government of India to promote medical technology innovation in India	2016	English	No Model
Douglas, N. F., Campbell, W. N., & Hinckley, J. J.	Implementation Science: Buzzword or Game Changer?	2015	English	No Model
Downs, S., Fox, E. L., & Fanzo, J.	Mitigating climate change with a carbon tax on foods: What are the ethical implications?	2017	English	No Model
Drum, C. L.	TRIPOD puts prediction models on a firmer footing	2015	English	No Model
D'Souza, E., Swinburn, B., & Vandevijvere, S.	Systems mapping of unhealthy food environments in Auckland schools: A case study	2017		No Model
Duffy, S. A., Ewing, L. A., Louzon, S. A., et al.	Evaluation and costs of volunteer telephone cessation follow-up counseling for Veteran smokers discharged from inpatient units: a quasi-experimental, mixed methods study	2015	English	No Model

Duke, F. D., Nowland, M. H., & Makidon, P.	Developing clinical standard of care guidelines for rodents at a large research institution: Objectives and challenges	2015	English	No Model
Duke, T., Hwaihwanje, I., Kaupa, M., et al.	Solar powered oxygen systems in remote health centers in Papua New Guinea: a large scale implementation effectiveness trial	2017	English	No Model
DuPree, E., & Baker, D. W.	Building the Road to High Reliability	2016	English	No Model
Durack, J., Rauch, M., Panzer, A. R., et al.	Lactobacillus enrichment induces a sustained program of anti-inflammatory microbiome metabolism in infancy	2015	English	No Model
Duran-Aniotz, C., Cornejo, V. H., Espinoza, S., et al.	IRE1 signaling exacerbates Alzheimer's disease pathogenesis	2017	English	No Model
Durand, M. A., Yen, R. W., O'Malley, A. J., et al.	What matters most: protocol for a randomized controlled trial of breast cancer surgery encounter decision aids across socioeconomic strata	2018		No Model
Earle, A., LaBrie, J., Boyle, S., et al.	In pursuit of a self-sustaining college alcohol intervention: Deploying gamified PNF in the real world	2018		No Model
Eaton, J. L., Mohr, D. C., Gallarde, S., et al.	Impact of clinical quality on employee choice of providers for workers' compensation-related medical care	2015	English	No Model
Eaton, L. H., Doorenbos, A. Z., & Zeliadt, S.	The relationship of nurse characteristics, unit culture, and hospital to evidence-based pain management practice at two inpatient oncology units	2015	English	No Model
Eaton, L. H., Meins, A. R., Mitchell, P. H., et al.	Evidence-Based Practice Beliefs and Behaviors of Nurses Providing Cancer Pain Management: A Mixed-Methods Approach	2015		No Model
Edmunds, L.	Theory into practice: Working with families in weight management interventions	2015	English	No Model
Edney, S., Plotnikoff, R., Vandelanotte, C., et al.	Active Team a social and gamified app-based physical activity intervention: randomised controlled trial study protocol	2017	English	No Model
Eichelberg, M., & Chronaki, C.	Large Scale eHealth Deployment in Europe: Insights from Concurrent Use of Standards	2016	English	No Model

Elsinga, J., Van Der Veen, H. T., Gerstenbluth, I., et al.	Community participation in mosquito breeding site control: A multidisciplinary mixed methods study in Curacao	2017	English	No Model
Elwy, A. R., Itani, K. M., Bokhour, B. G., et al.	Surgeons' Disclosures of Clinical Adverse Events	2016	English	No Model
Englesbe, M. J., Grenda, D. R., Sullivan, J. A., et al.	The Michigan Surgical Home and Optimization Program is a scalable model to improve care and reduce costs	2017	English	No Model
Enloe, S. K., Schulte, L. A., & Tyndall, J. C.	Public-Private Partnerships Working Beyond Scale Challenges toward Water Quality Improvements from Private Lands	2017	English	No Model
Ennett, S. T., Jackson, C., Choi, S., et al.	A Parenting Program to Promote an Alcohol-Free Childhood: Influence on Parents' Readiness to Prevent Child Sipping	2016	English	No Model
Enos G.	Center applies wellness concepts to transform levels of care	2015		No Model
erez-Escamilla, R., Lutter, C. K., Rabadan-Diehl, C., et al.	Prevention of childhood obesity and food policies in Latin America: from research to practice	2017	English	No Model
Estcourt, C. S., Gibbs, J., Sutcliffe, L. J., et al.	The eSexual Health Clinic system for management, prevention, and control of sexually transmitted infections: exploratory studies in people testing for Chlamydia trachomatis	2017	English	No Model
Ettema, R., Schuurmans, M. J., Schutijser, B., et al.	Feasibility of a nursing intervention to prepare frail older patients for cardiac surgery: A mixed-methods study	2015	English	No Model
Evans, L., Derkenne, R., Liu, J., et al.	Creating a sustainable OBGYN residency in a resource-limited country improves maternal health outcomes	2017		No Model
Ey, S., Moffit, M., Kinzie, J. M., et al.	Feasibility of a Comprehensive Wellness and Suicide Prevention Program: A Decade of Caring for Physicians in Training and Practice	2016	English	No Model
Fan-Osuala, C., Ramadhani H., Ereka, S., et al.	The impact of structured mentor mother support on retention during the first 12 months postpartum among HIV positive women in rural Nigeria	2018		No Model
Farmery, A., O'Kane, G., McManus, A., et al.	Consuming sustainable seafood: guidelines, recommendations and realities	2018		No Model

Fehr, A., Hense, S., & Ziese, T.	BRIDGE Health-an update of European Core Health Indicators (ECHI)	2016	English	No Model
Fernandes, B. S., Vieira, J. P. F., Contesini, F. J., et al.	High value added lipids produced by microorganisms: a potential use of sugarcane vinasse	2017	English	No Model
Filby, A., McConville, F., & Portela, A.	What prevents quality midwifery care? A systematic mapping of barriers in low and middle income countries from the provider perspective	2016	English	No Model
Fisher, H. H., Hoyte, T., Flores, S. A., et al.	Evaluation framework for HIV prevention and care activities in the enhanced comprehensive HIV prevention planning project, 2010-2013	2016	English	No Model
Fitzgerald, M., & McClelland, T.	What makes a mobile app successful in supporting health behaviour change?	2017	English	No Model
Fitzpatrick, C., Haines, A., Bangert, M., et al.	An economic evaluation of vector control in the age of a dengue vaccine	2017	English	No Model
Fletcher, J. B., Landovitz, R. J., & Reback, C. J.	Contingency management vs. non-contingent rewards: Intervention response patterns among stimulant-using MSM	2015	English	No Model
Floyd, C., Bunk, E., & Higginbotham, S.	Impact of pharmacist intervention on patient health outcomes in a diabetes prevention program	2018		No Model
Fonseca, K. L., Rodrigues, P. N. S., Olsson, I. A. S., et al.	Experimental study of tuberculosis: From animal models to complex cell systems and organoids	2017	English	No Model
Footer, C., Eigsti, H., Christenson, M., et al.	Return on investment of international immersion programs: Stakeholder perspectives	2015	English	No Model
Forest, P. G., Denis, J. L., Brown, L. D., et al.	Health reform requires policy capacity	2015	English	No Model
Fowler, K. E., Gould, R. L., Karamtzioti, P., et al.	Porcine IVP: A route to environmentally friendly and sustainable food production?	2015	English	No Model
Fraker, T.M., Kelli, T., Honeycutt, T. C., Luecking, R. G., Mamun, A. A., O'Day, B. L.	The youth transition demonstration project in Miami, Florida: Design, implementation, and three-year impacts	2018		No Model
Frambes, D., Lehto, R., Sikorskii, A., et al.	Fidelity scorecard: evaluation of a caregiver-delivered symptom management intervention	2017		No Model

Frauenknecht, X., & Gerhardt, H.	Implementation of an academic center of Integrative Medicine and Health (CIMH) under German Federal Republic legislation-organizational and economic challenges	2017		No Model
Freedman, S. B., Lee, B. E., Louie, M., et al.	Alberta Provincial Pediatric Enteric Infection Team (APPETITE): Epidemiology, emerging organisms, and economics	2015	English	No Model
Freihoefer, K., Guerin, D., Martin, C., et al.	Occupants' satisfaction with, and physical readings of, thermal, acoustic, and lighting conditions of sustainable office workspaces	2015	English	No Model
Freund, J., Kosirog, E., Vande Griend, J., et al.	Transition from a grant-funded clinical pharmacy program into an innovative, sustainable, value-based model in a Federally Qualified Health Center	2015	English	No Model
Frische, T., Egerer, S., Matezki, S., et al.	5-Point programme for sustainable plant protection	2018		No Model
Frongillo, E. A.	Evaluation of programs to improve complementary feeding in infants and young children	2017		No Model
Fuller, T., Pearson, M., Peters, J., et al.	What affects authors' and editors' use of reporting guidelines? Findings from an online survey and qualitative interviews	2015	English	No Model
Furey, A., Rourke, J., & Larsen, H.	Building the Capacity to Manage Orthopaedic Trauma After a Catastrophe in a Low-Income Country	2015	English	No Model
Gagnon, M. P., Desmartis, M., Poder, T., et al.	Effects and repercussions of local/hospital-based health technology assessment (HTA): A systematic review	2015	English	No Model
Gagnon-Girouard, M. P., Begin, C., Provencher, V., et al.	Outcomes of a health-at-every-size intervention in local health centers across the province of Quebec	2015	English	No Model
Gaiha, S. M., Shukla, R., Gilbert, C. E., et al.	Is India's policy framework geared for effective action on avoidable blindness from diabetes?	2016	English	No Model
Gaipa, G., Introna, M., Golay, J., et al.	Development of advanced therapies in Italy: Management models and sustainability in six Italian cell factories	2016	English	No Model
Gallagher, C. M., Weber, E., & Rathi, N.	Reframing Medical Appropriateness: A Case Study Concerning the Use of Life-Sustaining Technologies for a Patient With Profoundly Diminished Quality of Life	2017	English	No Model

Galvan-Turner, V. B., Chang, J., Ziogas, A., et al.	Observed-to-expected ratio for adherence to treatment guidelines as a quality of care indicator for ovarian cancer	2015	English	No Model
Galvao, L. A., Haby, M. M., Chapman, E., et al.	The new United Nations approach to sustainable development post-2015: Findings from four overviews of systematic reviews on interventions for sustainable development and health	2016	English	No Model
Gandee, M.	ACCC's overview of psychosocial distress screening in the community cancer setting	2015	English	No Model
Gao, L., & Bryan, B. A.	Finding pathways to national-scale land-sector sustainability	2017	English	No Model
Garde, A., Chowdhury, M., Rollinson, A. U., et al.	A Multi-Week Assessment of a Mobile Exergame Intervention in an Elementary School	2018		No Model
Gehrlach, C., & Guntert, B.	[Expectations and patient satisfaction in hospitals: construction and application of an expectation-based experience typology and its use in the management of quality and expectations]	2015	German	No Model
Genuis, S. J., & Genuis, R. A.	Preconception Care: A New Standard of Care within Maternal Health Services	2016	English	No Model
Gerard, N.	Rethinking compassion fatigue	2017	English	No Model
Gerard, N.	Universal healthcare and universal basic income	2018		No Model
Getanda, E. M., Vostanis, P., & O'Reilly, M.	Exploring the challenges of meeting child mental health needs through community engagement in Kenya	2017	English	No Model
Ghisi, G. L. D. M., Grace, S. L., Thomas, S., et al.	Knowledge and exercise behavior maintenance in cardiac rehabilitation patients receiving educational interventions	2015	English	No Model
Gidengil, C. A., Linder, J. A., Hunter, G., et al.	The Volume-Quality Relationship in Antibiotic Prescribing: When More Isn't Better	2015		No Model
Gilbert, M., Haag, D., Hottes, T. S., et al.	Get checked where? lessons learned from implementing getcheckedonline, an integrated, complex public health system intervention to promote online STI/HIV testing in British Columbia, Canada	2016	English	No Model
Gillan, C., Davis, C. A., Moran, K., et al.	The Quest for Quality: Principles to Guide Medical Radiation Technology Practice	2015	English	No Model

Gitlin, L. N., Marx, K., Stanley, I. H., et al.	Translating Evidence-Based Dementia Caregiving Interventions into Practice: State-of-the-Science and Next Steps	2015	English	No Model
Glasson, N. M., Larkins, S. L., & Crossland, L. J.	What do patients with diabetes and providers think of an innovative Australian model of remote diabetic retinopathy screening? A qualitative study	2017	English	No Model
Gleeson, J., Lederman, R., Koval, P., et al.	Moderated Online Social Therapy: A Model for Reducing Stress in Carers of Young People Diagnosed with Mental Health Disorders	2017	English	No Model
GlobalSurg Collaborative.	Management and Outcomes Following Surgery for Gastrointestinal Typhoid: An International, Prospective, Multicentre Cohort Study	2018		No Model
Goerlandt, F., & Reniers, G.	Prediction in a risk analysis context: Implications for selecting a risk perspective in practical applications	2018	English	No Model
Goff, S. L., Mazor, K. M., Pekow, P. S., et al.	Patient navigators and parent use of quality data: A randomized trial	2016	English	No Model
Goicolea, I., Vives-Cases, C., Hurtig, A. K., et al. (b)	Mechanisms that Trigger a Good Health-Care Response to Intimate Partner Violence in Spain. Combining Realist Evaluation and Qualitative Comparative Analysis Approaches.[Erratum appears in PLoS One. 2015;10(9):e0139184; PMID: 26398769]	2015	English	No Model
Gold, R., Hollombe, C., Bunce, A., et al.	Study protocol for "Study of Practices Enabling Implementation and Adaptation in the Safety Net (SPREAD-NET)": a pragmatic trial comparing implementation strategies	2015	English	No Model
Golden, S. H., Hager, D., Gould, L. J., et al.	A Gap Analysis Needs Assessment Tool to Drive a Care Delivery and Research Agenda for Integration of Care and Sharing of Best Practices Across a Health System	2017		No Model
Goldman, R. E., Parker, D. R., Brown, J., et al.	Recommendations for a mixed methods approach to evaluating the patient-centered medical home	2015	English	No Model
Goldstein, S. R.	Evaluation of postmenopausal bleeding: What is the standard of care?	2017		No Model

Golsteijn, L., Menkveld, R., King, H., et al.	A compilation of life cycle studies for six household detergent product categories in Europe: the basis for product-specific A.I.S.E. Charter Advanced Sustainability Profiles	2015	English	No Model
Gomez, G. B., Foster, N., Brals, D., et al.	Improving Maternal Care through a State-Wide Health Insurance Program: A Cost and Cost-Effectiveness Study in Rural Nigeria	2015	English	No Model
Gonzalez, S. A., Castiblanco, M. A., Arias-Gomez, L. F., et al.	Results From Colombia's 2016 Report Card on Physical Activity for Children and Youth	2016	English	No Model
Goode, V., Crego, N., Cary Jr, M. P., et al.	Improving Quality and Safety Through Use of Secondary Data: Methods Case Study	2017		No Model
Gordon, A. J., Lo-Ciganic, W. H., Cochran, G., et al.	Patterns and Quality of Buprenorphine Opioid Agonist Treatment in a Large Medicaid Program	2015	English	No Model
Gordon, L. G., & Bartley, N.	Views from senior Australian cancer researchers on evaluating the impact of their research: results from a brief survey	2016	English	No Model
Gottlieb, L. M., Quinones-Rivera, A., Manchanda, R., et al.	States' Influences on Medicaid Investments to Address Patients' Social Needs	2017	English	No Model
Grandisson, M., Hébert, M., & Thibeault, R.	Practice guidelines for program evaluation in community-based rehabilitation	2017		No Model
Granger, B. B., Ekman, I., Hernandez, A. F., et al.	Results of the chronic heart failure intervention to improve medication adherence study: A randomized intervention in high-risk patients	2015	English	No Model
Green, J., Howe, T., Preston, J., et al.	Clinician adherence to protocol and reporting is low in determining caseload characteristics of adultswith shoulder pain	2017		No Model
Green, S.	Code STEMI	2016	English	No Model
Greenberg, A. E., Purcell, D. W., Gordon, C. M., et al.	Addressing the challenges of the HIV continuum of care in high-prevalence cities in the United States	2015	English	No Model
Grieve, H., & Da Sousa, E.	Making collaboration the default to deliver multisector nutrition programming-a new approach in Timor-Leste	2017		No Model

Grieve, H., De Sousa, E., & Arakelian, M.	Making collaboration the default to achieve genuine multisector nutrition programming-a new approach in timor-leste	2017		No Model
Grose, J., Menkouo, C., & Grande, G.	[Sustainable Strategies for Health Promotion in Urban Districts]	2015	German	No Model
Grylli, C., Brockington, I., Fiala, C., et al.	Anonymous birth law saves babies-optimization, sustainability and public awareness	2016	English	No Model
Gupta, K. S., & Rokade, V.	Importance of Quality in Health Care Sector	2016		No Model
Gupta, S., Allen, C., Moosa, D., et al.	Novel Interprofessional Mentoring Intervention to Improve Spirometry in Primary Care: Uptake, Feedback, and Effects on Behavioral Intention	2017		No Model
Gutierrez, L., Patris, J., Hutchings, A., et al.	Principles for consistent value assessment and sustainable funding of orphan drugs in Europe	2015	English	No Model
Haby, M. M., Chapman, E., Clark, R., et al. (b)	Agriculture, food, and nutrition interventions that facilitate sustainable food production and impact health: an overview of systematic reviews	2016	English	No Model
Haby, M. M., Chapman, E., Clark, R., et al. (c)	Energy interventions that facilitate sustainable development and impact health: an overview of systematic reviews	2016	English	No Model
Haby, M. M., Soares, A., Chapman, E., et al.	Interventions that facilitate sustainable development by preventing toxic exposure to chemicals: an overview of systematic reviews	2016	English	No Model
Haddad, A. K., Redmond, N., Curry, W., et al.	Creating a multifaceted health disparities curriculum in an internal medicine residency program	2016	English	No Model
Haigh, L., Bremner, S., Houghton, D., et al.	Effective dietary interventions for non-alcoholic fatty liver disease: Barriers and facilitators to adoption of a Mediterranean diet in a northern European patient population	2017		No Model
Hakim, J. G., Chidzonga, M. M., Borok, M. Z., et al.	Medical Education Partnership Initiative (MEPI) in Zimbabwe: Outcomes and Challenges	2018		No Model
Halawi, M. J., Greene, K., & Barsoum, W. K.	Optimizing Outcomes of Total Joint Arthroplasty Under the Comprehensive Care for Joint Replacement Model	2016	English	No Model

Halterman, J. S., Tajon, R., Tremblay, P., et al.	Development of School-Based Asthma Management Programs in Rochester, New York: Presented in Honor of Dr Robert Haggerty	2017	English	No Model
Halton, K., Hall, L., Gardner, A., et al. (a)	Using a clinical governance framework to identify barriers to infection control practice	2016	English	No Model
Hamar, B., Rula, E. Y., Wells, A. R., et al.	Impact of a scalable care transitions program for readmission avoidance	2016	English	No Model
hambers, M. C., El-Othmani, M. M., & Saleh, K. J.	Health Care Reform: Impact on Total Joint Replacement	2016	English	No Model
Hammel, K., Meyer, T., Wilson, G., et al.	GENERAL CARE IMPROVEMENT PROJECT: COPD 30 DAY READMISSIONS. SEARCH FOR G.O.L.D	2016		No Model
Hand, G. A., Shook, R. P., Hill, J. O., et al.	Energy flux: Staying in energy balance at a high level is necessary to prevent weight gain for most people	2015	English	No Model
Hanigan, W. C.	Standards of care (SsC) in the Union Army: Case studies of head injuries during the American civil war	2016	English	No Model
Hans, S. L., Edwards, R. C., & Zhang, Y.	Randomized Controlled Trial of Doula-Home-Visiting Services: Impact on Maternal and Infant Health	2018		No Model
Hansen, A. B. G., & Jones, A.	Advancing 'real-world' trials that take account of social context and human volition	2017	English	No Model
Hansen, M., O'Brien, K., Meckler, G., et al.	Understanding the value of mixed methods research: the Children's Safety Initiative-Emergency Medical Services	2016	English	No Model
Hansson, L., Asklid, A., Diels, J., et al.	Ibrutinib versus previous standard of care: an adjusted comparison in patients with relapsed/refractory chronic lymphocytic leukaemia	2017	English	No Model
Harden, S. M., Ramalingam, N. S., Wilson, K. E., et al.	Informing the development and uptake of a weight management intervention for preconception: a mixed-methods investigation of patient and provider perceptions	2017	English	No Model
Hardy, S. A., & Kingsnorth, R.	Mental health nurses can increase capability and capacity in primary care by educating practice nurses: an evaluation of an education programme in England	2015	English	No Model
Hargreaves, J. R., Goodman, C., Davey, C., et al.	Measuring implementation strength: lessons from the evaluation of public health strategies in low- and middle-income settings	2016	English	No Model

Harris, A. H. S., Weisner, C. M., Chalk, M., et al.	Specifying and pilot testing quality measures for the American society of addiction medicine's standards of care	2016	English	No Model
Harris, C., Allen, K., Ramsey, W., et al.	Sustainability in Health care by Allocating Resources Effectively (SHARE) 11: reporting outcomes of an evidence-driven approach to disinvestment in a local healthcare setting	2018		No Model
Harris, C., Green, S., Ramsey, W., et al.	Sustainability in Health care by Allocating Resources Effectively (SHARE) 9: conceptualising disinvestment in the local healthcare setting	2017	English	No Model
Harris, D. A., Pensa, M. A., Redlich, C. A., et al.	Community-based Participatory Research Is Needed to Address Pulmonary Health Disparities	2016	English	No Model
Harris, R., Cormack, D., Curtis, E., et al.	Development and testing of study tools and methods to examine ethnic bias and clinical decision-making among medical students in New Zealand: The Bias and Decision-Making in Medicine (BDMM) study	2016	English	No Model
Harrison, E., Fisher, K., Chad, K., et al.	Function, health status, and health services costs in older adults with osteoarthritis participating in physical activity programming: A longitudinal study	2015	English	No Model
Hart, C. K., Dykes, C., Thienprayoon, R., et al.	Change Management in Quality Improvement: The Softer Skills	2015	English	No Model
Hart, N. H., Newton, R. U., Spry, N. A., et al.	Can exercise suppress tumour growth in advanced prostate cancer patients with sclerotic bone metastases? A randomised, controlled study protocol examining feasibility, safety and efficacy	2017	English	No Model
Hashmi, H.	Post placental and immediate postpartum insertion of IUCD, an intervention and institutionalisation at Tertiary Care Centre, Liaquat National Hospital (LNH), Karachi, Pakistan	2016	English	No Model
Hassan, A. S., Mwaringa, S. M., Ndirangu, K. K., et al.	Incidence and predictors of attrition from antiretroviral care among adults in a rural HIV clinic in Coastal Kenya: a retrospective cohort study	2015	English	No Model

Haugland, B. S. M., Raknes, S., Haaland, A. T., et al.	School-based cognitive behavioral interventions for anxious youth: Study protocol for a randomized controlled trial	2017	English	No Model
Hawes, E., Lambert, E., Reid, A., et al.	Implementation and evaluation of a pharmacist-led electronic visit program for diabetes and anticoagulation care in a patient-centered medical home	2018		No Model
Hayashino, Y., Suzuki, H., Yamazaki, K., et al.	A cluster randomized trial on the effect of a multifaceted intervention improved the technical quality of diabetes care by primary care physicians: The Japan Diabetes Outcome Intervention Trial-2 (J-DOIT2)	2016	English	No Model
Hayes, S., Uszynski, M. K., Motl, R. W., et al.	Randomised controlled pilot trial of an exercise plus behaviour change intervention in people with multiple sclerosis: The Step it Up study	2017	English	No Model
Heale, R., James, S., & Garceau, M. L.	A Multiple-Case Study in Nurse Practitioner-Led Clinics: An Exploration of the Quality of Care for Patients with Multimorbidity	2016		No Model
Heber, E., Ebert, D. D., Lehr, D., et al.	The Benefit of Web- and Computer-Based Interventions for Stress: A Systematic Review and Meta-Analysis	2017	English	No Model
Hebert, J. R., Wirth, M. D., Harmon, B. E., et al.	A church-based diet, physical activity, and stress intervention results in lower waist to hip ratios and reduced chronic inflammation in African-American males	2017	English	No Model
Henao-Martinez, A. F., Colborn, K., & Parra-Henao, G.	Overcoming research barriers in Chagas disease-designing effective implementation science	2017	English	No Model
Henderson, C., & Gronholm, P. C.	Mental health related stigma as a 'wicked problem': The need to address stigma and consider the consequences	2018		No Model
Hendrick, C. E., & Canfield, C.	HIV Risk-Reduction Prevention Interventions Targeting African American Adolescent Women	2017	English	No Model
Henschen, B. L., Chapman, M., Toms, A., et al.	The complex high admission management program (CHAMP): Development and preliminary impact on hospital utilization	2017	English	No Model
Herbst, F. A., Heckel, M., Stiel, S., et al.	[Well connected - optimally cared for! : Beneficial factors of collaboration in hospice and palliative care networks in Bavaria]	2017	German	No Model

Herd, G., & Musaad, S.	Clinical governance and point-of-care testing at health provider level	2015	English	No Model
Hernandez, C., Alonso, A., Garcia-Aymerich, J., et al.	Integrated care services: lessons learned from the deployment of the NEXES project	2015	English	No Model
Herrel, L. A., Kaufman, S. R., Yan, P., et al.	Health Care Integration and Quality among Men with Prostate Cancer	2017	English	No Model
Herrera-Pantoja, M., & Hiscock, K. M.	Projected impacts of climate change on water availability indicators in a semi-arid region of central Mexico	2015	English	No Model
Herrero, M. B., & Loza, J.	Building a regional health agenda: A rights-based approach to health in South America	2017	English	No Model
Hershman, D. L., & Ganz, P. A.	Quality of care, including survivorship care plans	2015	English	No Model
Herzog, C. R., Berzins, D. W., DenBesten, P., et al.	Oral Sciences PhD Program Enrollment, Graduates, and Placement: 1994 to 2016	2018		No Model
Hespanhol, L. C., Jr., van Mechelen, W., & Verhagen, E.	Effectiveness of online tailored advice to prevent running-related injuries and promote preventive behaviour in Dutch trail runners: a pragmatic randomised controlled trial	2017	English	No Model
Hess, E., & Ashmore, J.	Translating an evidence-based psychosocial intervention into a real-world setting: Opportunities and challenges	2015	English	No Model
Hibbard, J. H., Greene, J., Sacks, R., et al.	Does compensating primary care providers to produce higher quality make them more or less patient centric?	2015	English	No Model
Hickey, M. D., Salmen, C. R., Omollo, D., et al.	Implementation and Operational Research: Pulling the Network Together: Quasiexperimental Trial of a Patient-Defined Support Network Intervention for Promoting Engagement in HIV Care and Medication Adherence on Mfangano Island, Kenya	2015	English	No Model
Hickman, G., Thrift, S., Dhaliwal, R., et al.	Sixteen years of the Brooklands Thinking Skills Offender Programme	2017		No Model
Hicks-Roof, K. K., & Beathard, K.	Development of a Sustainable Mentorship Program: Registered Dietitian Nutritionists Mentoring Undergraduate Dietetics Students	2018		No Model
Hignett, S., Wolf, L., Taylor, E., et al.	Firefighting to Innovation: Using Human Factors and Ergonomics to Tackle Slip, Trip, and Fall Risks in Hospitals	2015	English	No Model

Hislop, C., Doherty, T., Cameron, K., et al.	Barriers and enablers to survivorship care at the statewide level: A south australian perspective	2016	English	No Model
Hitziger, M., Esposito, R., Canali, M., et al.	Knowledge integration in One Health policy formulation, implementation and evaluation	2018		No Model
Ho, J., Odhiambo, G., Meng'anyi, L. W., et al.	Evaluation of medicine retail outlets for sale of typhoid fever vaccine among adults in two urban and rural settings in western Kenya: a proof-of-concept study	2016	English	No Model
Ho, L. H., Feng, S. Y., & Yen, T. M.	Using fuzzy gap analysis to measure service quality of medical tourism in Taiwan	2015	English	No Model
Holst, J., & Razum, O.	[Public Health as a Pathway towards Optimising Human Beings in Terms of Better Resilience? The Leopoldina Statement on Public Health in Germany]	2015	German	No Model
Holt, J., Meurer, J., Mitchell, J. L., et al.	Moving towards practice-wide blood pressure screening	2018		No Model
Honeycutt, S., Hermstad, A., Carvalho, M. L., et al.	Practice to Evidence: Using Evaluability Assessment to Generate Practice-Based Evidence in Rural South Georgia	2017		No Model
Hoogenboom, G., Thwin, M. M., Velink, K., et al.	Quality of intrapartum care by skilled birth attendants in a refugee clinic on the Thai-Myanmar border: A survey using WHO Safe Motherhood Needs Assessment	2015	English	No Model
Hoque, D. M. E., Kumari, V., Ruseckaite, R., et al.	Impact of clinical registries on quality of patient care and health outcomes: Protocol for a systematic review	2016	English	No Model
Horigian, V. E., Anderson, A. R., & Szapocznik, J.	Taking Brief Strategic Family Therapy from Bench to Trench: Evidence Generation Across Translational Phases	2016	English	No Model
Horne, M., McCracken, G., Walls, A., et al.	Organisation, practice and experiences of mouth hygiene in stroke unit care: a mixed-methods study	2015		No Model
Houston, D. K., Tooze, J. A., Demons, J. L., et al.	Delivery of a Vitamin D intervention in homebound older adults using a meals-on-wheels program: A pilot study	2015	English	No Model
Hsieh, F. I., Jeng, J. S., Chern, C. M., et al.	Quality improvement in acute ischemic stroke care in Taiwan: The breakthrough collaborative in stroke	2016	English	No Model
Hu, R., Liao, Y., Du, Z., et al.	Types of health care facilities and the quality of primary care: a study of characteristics and experiences of Chinese patients in Guangdong Province, China	2016	English	No Model

Huang, Y. C., Lee, M. C., Chou, Y. J., et al.	Disease-specific pay-for-performance programs	2016	English	No Model
Hunter, D., & Maniatopoulos, G.	Health system transformation in the UK: Making it happen	2017		No Model
Huq, M. S., Fraass, B. A., Dunscombe, P. B., et al.	The report of Task Group 100 of the AAPM: Application of risk analysis methods to radiation therapy quality management	2016	English	No Model
Huss, E., Kaufman, R., Avgar, A., et al.	Arts as a vehicle for community building and post-disaster development	2016	English	No Model
Hussaini, A., Pulido, C. L., Basu, S., et al.	Designing Place-Based Interventions for Sustainability and Replicability: The Case of GO! Austin/VAMOS! Austin	2018		No Model
Huthmaker, J. W.	Improving Dengue fever knowledge, attitude, and practices in primary school children in Florida through animation	2015	English	No Model
Huxley, C., Achten, J., Costa, M. L., et al.	A process evaluation of the WHiTE Two trial comparing total hip arthroplasty with and without dual mobility component in the treatment of displaced intracapsular fractures of the proximal femur: Can a trial investigating total hip arthroplasty for hip fracture be delivered in the NHS?	2016	English	No Model
Huyen, D. T. T., Binh, N. T., Tuan, T. M., et al.	Analyzing trends in hospital-cost payments of patients using ARIMA and GIS: Case study at the Hanoi Medical University Hospital, Vietnam	2017	English	No Model
Hvidt, E., Ammentorp, J., Søndergaard, J., et al.	Developing and evaluating a course programme to enhance existential communication with cancer patients in general practice	2018		No Model
Ibrahima, A. B.	Towards Indigenous National Policies and Programs: Maternal Health in Ethiopia	2016	English	No Model
Ingram, V., van den Berg, J., van Oorschot, M., et al.	Governance Options to Enhance Ecosystem Services in Cocoa, Soy, Tropical Timber and Palm Oil Value Chains	2018		No Model
Innes, G. D., Scheuermeyer, F. X., Marsden, J., et al.	Impact of physician payment mechanism on emergency department operational performance	2018		No Model
Insel, T. R.	Quality Counts	2015		No Model

Iriye, B. K.	Impact of Obstetrician/Gynecologist Hospitalists on Quality of Obstetric Care (Cesarean Delivery Rates, Trial of Labor After Cesarean/Vaginal Birth After Cesarean Rates, and Neonatal Adverse Events)	2015	English	No Model
Israelashvili, M.	The Unspoken Shift From Quality to Quantity Standards In Substance Use(r) Treatment and Prevention: A Challenge to Unfinished Intervention Business	2015	English	No Model
Iverson, L. J.	The role of social networks in intervention strategies to control tuberculosis: A case study of two communities in Lusaka, Zambia	2015	English	No Model
Iwashyna, T. J., & Deane, A. M.	Individualizing endpoints in randomized clinical trials to better inform individual patient care: The TARGET proposal	2016	English	No Model
Iwelunmor, J., Blackstone, S., Veira, D., et al. (a)	Erratum to: 'Toward the sustainability of health interventions implemented in sub-Saharan Africa: a systematic review and conceptual framework'. [Erratum for Implement Sci. 2016;11:43; PMID: 27005280]	2016	English	No Model
Iyengar, A., Adams, E., Eisenring, C., et al.	The in-hospital cost of heart transplantation	2017	English	No Model
Jabbour, C. J. C., Jugend, D., Jabbour, A. B. L. D. S., et al.	There is no carnival without samba: Revealing barriers hampering biodiversity-based R&D and eco-design in Brazil	2018	English	No Model
Jacobs, S., Hartmann, J., Eberhard, S., et al.	[The influence of framework conditions for integrated care programs on their potential of evaluation]	2015	German	No Model
Jadad, A. R.	Creating a pandemic of health: What is the role of digital technologies?	2016	English	No Model
Jain, S., Edgar, D., Bothe, J., et al.	Reflection on observation: A qualitative study using practice development methods to explore the experience of being a hand hygiene auditor in Australia	2016	English	No Model
James, D. H., Patrician, P. A., & Miltner, R. S.	Testing for Quality and Safety Education for Nurses (QSEN): Reflections From Using QSEN as a Framework for RN Orientation	2017	English	No Model
Jamison, T., & Schuttler, J.	Overview and Preliminary Evidence for a Social Skills and Self-Care Curriculum for Adolescent Females with Autism: The Girls Night Out Model	2017		No Model

Janssen, D., Jongen, W., & Schroder-Back, P.	Exploring the impact of austerity-driven policy reforms on the quality of the long-term care provision for older people in Belgium and the Netherlands	2016	English	No Model
Jarrett, S.	The meaning of 'community' in the lives of people with intellectual disabilities: An historical perspective	2015	English	No Model
Jenkins, A., Tales, A., Tree, J., et al.	Are We Ready? the Construct of Subjective Cognitive Impairment and its Utilization in Clinical Practice: A Preliminary UK-Based Service Evaluation	2015	English	No Model
Jeon, H. R., & Park, J. S.	[Development and Application of a Self-management Program based on Prothrombin INR Monitoring for Patients with Cardiac Valve Replacement]	2015	Korean	No Model
Jepson, R., Estrade, M., Malden, S., et al.	Landscape review of obesity research in Scotland	2017	English	No Model
Jiang, L., Eaves, S., Dhillon, N., et al.	Postoperative outcomes following trabeculectomy and nonpenetrating surgical procedures: a 5-year longitudinal study	2018		No Model
Jo, H. S., Kim, D. I., Chang, S. G., et al.	Development of Quality Management Systems for Clinical Practice Guidelines in Korea	2015	English	No Model
Johnson, R., Robertson, W., Towey, M., et al.	Changes over time in mental well-being, fruit and vegetable consumption and physical activity in a community-based lifestyle intervention: a before and after study	2017	English	No Model
Joly, F., Orsini, C., & Bonnetain, F.	QUALIOR study: the feasibility and efficacy of a home based standardised adapted physical activity programme of patients receiving oral targeted therapy for metastatic cancer: Randomised, phases II-III Unicancer-AFSOS supportive care intergroup study. [French]	2017	French	No Model
Jones, D. B., Propper, C., & Smith, S.	Wolves in sheep's clothing: Is non-profit status used to signal quality?	2017	English	No Model
Jones, D. J., Anton, M., Gonzalez, M., et al.	Incorporating Mobile Phone Technologies to Expand Evidence-Based Care	2015	English	No Model
Jones, D., Weiss, S., & Chitalu, N.	HIV Prevention in Resource Limited Settings: A Case Study of Challenges and Opportunities for Implementation	2015	English	No Model

Jordan, K. P., Edwards, J. J., Porcheret, M., et al.	Effect of a model consultation informed by guidelines on recorded quality of care of osteoarthritis (MOSAICS): a cluster randomised controlled trial in primary care	2017	English	No Model
Joshi, A., & Watts, C. R.	A Comparison of Indirect and Direct Methods for Estimating Transglottal Airflow Rate	2017	English	No Model
Joynt, K. E., Chan, D. C., Zheng, J., et al.	The impact of massachusetts health care reform on access, quality, and costs of care for the already-insured	2015	English	No Model
Jung, D., Lee, S. H., Kang, S. J., et al.	Development and evaluation of a clinical simulation for new graduate nurses: A multi-site pilot study	2017	English	No Model
Jung, M., Jonides, J., Northouse, L., et al.	Randomized Crossover Study of the Natural Restorative Environment Intervention to Improve Attention and Mood in Heart Failure	2017	English	No Model
Kahn, J. M., & Rubenfeld, G. D.	The myth of the workforce crisis. Why the United States does not need more intensivists physicians	2015	English	No Model
Kalb, T. H.	Increasing Quality Through Telemedicine in the Intensive Care Unit	2015	English	No Model
Kalenda, Y. D., Kato, K., Goto, Y., et al.	Tandem repeat recombinant proteins as potential antigens for the sero-diagnosis of Schistosoma mansoni infection	2015	English	No Model
Kalisch Ellett, L. M., Pratt, N. L., Sluggett, J. K., et al.	Patient-specific prescriber feedback can increase the rate of osteoporosis screening and treatment: results from two national interventions	2017	English	No Model
Kamal, A. H., Hanson, L. C., Casarett, D. J., et al.	The quality imperative for palliative care	2015	English	No Model
Kangethe, A., Franic, D. M., & Corso, P. S.	Comparing the validity of the payment card and structured haggling willingness to pay methods: The case of a diabetes prevention program in rural Kenya	2016	English	No Model
Kanzaria, H. K., Mattke, S., Detz, A. A., et al.	Quality measures based on presenting signs and symptoms of patients	2015	English	No Model
Kapiriri, L., & Razavi, D.	How have systematic priority setting approaches influenced policy making? A synthesis of the current literature	2017	English	No Model

Kapoor, S., Auerbach, M., O'Grady, M., et al.	Building sustainable screening, brief intervention, and referral to treatment within emergency departments in an integrated hospital system in New York: An implementation model	2016	English	No Model
Karralli, R., Tipton, J., Dumitru, D., et al.	Development of a metrics dashboard for monitoring involvement in the 340B Drug Pricing Program	2015		No Model
Kartashova, V. N., & Gerasimova, E. N.	The formation of a teacher in the context of consolidation of rural schools (Regional Experience)	2017		No Model
Katigbak, C., Flaherty, E., Chao, Y., et al.	A Systematic Review of Culturally Specific Interventions to Increase Physical Activity for Older Asian Americans	2018		No Model
Kaufman, J. L.	Reply: The concept of risk in comparative effectiveness research	2015	English	No Model
Kaye, D. L., Fornari, V., Scharf, M., et al.	Description of a multi-university education and collaborative care child psychiatry access program: New York State's CAP PC	2017	English	No Model
Kearns, A. D., Caglia, J. M., Ten Hoope-Bender, P., et al.	Antenatal and postnatal care: A review of innovative models for improving availability, accessibility, acceptability and quality of services in low-resource settings	2016	English	No Model
Kelly, E., Doyle, V., Weakliam, D., et al.	A rapid evidence review on the effectiveness of institutional health partnerships	2015	English	No Model
Kelly, R. P., Stoll, S. C., Bryant-Stephens, T., et al.	The Influence of Setting on Care Coordination for Childhood Asthma	2015		No Model
Kennedy, A., Jacobs, Z., Mwakalinga, H., et al.	Mentorship in Malawi: A model for empowering medical students with skills for coping, resilience, and career success	2017		No Model
Kersten, F. A. M., Hermens, R. P. G. M., Braat, D. D. M., et al.	Tailored expectant management in couples with unexplained infertility does not influence their experiences with the quality of fertility care	2016	English	No Model
Khanassov, V., Pluye, P., Descoteaux, S., et al.	Organizational interventions improving access to community-based primary health care for vulnerable populations: a scoping review	2016	English	No Model

Kiberu, V. M., Mars, M., & Scott, R. E.	Barriers and opportunities to implementation of sustainable e-Health programmes in Uganda: A literature review	2017	English	No Model
Kickbusch, I., & Reddy, K. S.	Global health governance - the next political revolution	2015	English	No Model
Kidd, S., Herman, Y., Virdee, G., et al.	From clinical trial to the clinic: Optimizing cognitive adaptation training for case management teams	2018		No Model
Kim, J. S., Park, J. H., Lee, K. B., et al.	Safety of sp-8203 in stroke patients requiring rtpa standard of care: A multicenter, randomized, double-blind, placebo-controlled phase iia study	2017	English	No Model
Kim, J., Young, L., Bekmuratova, S., et al.	Promoting colorectal cancer screening through a new model of delivering rural primary care in the USA: a qualitative study	2017	English	No Model
Kim, S. J., de Souza, R. J., Choo, V. L., et al.	Effects of dietary pulse consumption on body weight: a systematic review and meta-analysis of randomized controlled trials	2016	English	No Model
Kim, S., Nguyen, P., Sanghvi, T., et al.	Two-year sustained impacts of largescale social and behavior change communication interventions to improve infant and young child feeding in Bangladesh	2017		No Model
King, K., Nicholas, A., Fletcher, J., et al.	Why did Divisions of General Practice implement some Access to Allied Psychological Services mental health initiatives and not others?	2015		No Model
Kinley, J., & Hockley, J.	The sustainability of in-reach end-of-life care programmes into care homes	2018		No Model
Kirton, A., Andersen, J., Herrero, M., et al.	Brain stimulation and constraint for perinatal stroke hemiparesis	2016	English	No Model
Kissling, W. D., Ahumada, J. A., Bowser, A., et al.	Building essential biodiversity variables (EBVs) of species distribution and abundance at a global scale	2017	English	No Model
Kisuule, F., & Howell, E. E.	Hospitalists and Their Impact on Quality, Patient Safety, and Satisfaction	2015	English	No Model
Kliger, J., Singer, S. J., & Hoffman, F. H.	Using the integrated nurse leadership program to reduce sepsis mortality	2015	English	No Model
Kmieciak, B.	Is a psychiatric hospital (still) a total institution?. [Polish]	2017	Polish	No Model

Knowlden, A. P., & Conrad, E.	Two-Year Outcomes of the Enabling Mothers to Prevent Pediatric Obesity Through Web-Based Education and Reciprocal Determinism (EMPOWER) Randomized Control Trial	2017	English	No Model
Knudsen, H. K., & Roman, P. M.	Medicaid, Private Insurance, and the Availability of Smoking Cessation Interventions in Substance Use Disorder Treatment	2015	English	No Model
Koch, S. C., Mergheim, K., Raeke, J., et al.	The embodied self in Parkinson's Disease: Feasibility of a single tango intervention for assessing changes in psychological health outcomes and aesthetic experience	2016	English	No Model
Kohn, M., Belza, B., Petrescu-Prahova, M., et al.	Beyond Strength: Participant Perspectives on the Benefits of an Older Adult Exercise Program	2016	English	No Model
Koivusalo, M.	Global health policy in Sustainable Development Goals	2017		No Model
Koolhaas, W., Groothoff, J. W., de Boer, M. R., et al.	Effectiveness of a problem-solving based intervention to prolong the working life of ageing workers	2015	English	No Model
Koplan, J., Redmon, P., Duan, Y., et al.	The role of cities in reducing smoking in China	2015	English	No Model
Koso-Thomas, M., McClure, E. M., Belizan, J. M., et al.	The Global Network for Women's and Children's Health Research: A model of capacity-building research	2015	English	No Model
Kotlarczyk, M. P., Perera, S., Ferchak, M. A., et al.	Vitamin D deficiency is associated with functional decline and falls in frail elderly women despite supplementation	2017	English	No Model
Kowalczyk, S., Randolph, S., & Alexander, S.	Promoting health equity using cbpr and gender-based approaches to improve women and girls' health	2017	English	No Model
Koyle, M. A., Saunders, M., Stoute, M., et al.	Reducing same-day OR delays and cancellations using the model for improvement	2016	English	No Model
Kramer, B. J., Cote, S. D., Lee, D. I., et al.	Barriers and facilitators to implementation of VA home-based primary care on American Indian reservations: a qualitative multi-case study	2017	English	No Model
Kramer, D. M., Tenkate, T., Strahlendorf, P., et al.	Sun Safety at Work Canada: a multiple case-study protocol to develop sun safety and heat protection programs and policies for outdoor workers	2015	English	No Model

Kranz, J., Schmidt, S., Lebert, C., et al.	Clinical practice guideline:Uncomplicated bacterial community acquired urinary tract infection in adults-epidemiology, diagnosis, treatment, and prevention	2018		No Model
Krejcikova, M., Gkionis, K., Hemzal, D., et al.	Combining NMR (Nuclear Magnetic Resonance) and Raman spectroscopy reveals structural and functional features of a new cisplatin derivative	2016	English	No Model
Kreuze, E., Jenkins, C., Gregoski, M., et al.	Technology-enhanced suicide prevention interventions: A systematic review	2017	English	No Model
Krishna, S. G., Malli, A., McCarthy, S. T., et al.	The diagnostic accuracy of endoscopic ultrasonography (EUS)-guided needle based confocal laser endomicroscopy (NCLE) is superior to current standard of care for differentiating mucinous from non-mucinous pancreatic cystic lesions (PCLS)	2017		No Model
Krishna, V.	Combating malnutrition in maharashtra	2017		No Model
Krista, T., Laura, S., Rhonda, M. W., et al.	Enhancing integrated stroke care through the continuous quality improvement-management system (CQI-MS)	2017	English	No Model
Krystofik, M., Wagner, J., & Gaustad, G.	Leveraging intellectual property rights to encourage green product design and remanufacturing for sustainable waste management	2015	English	No Model
Kuhlmann, E., Rangnitt, Y., & von Knorring, M.	Medicine and management: looking inside the box of changing hospital governance	2016	English	No Model
Kutzin, J., & Sparkes, S. P.	Health systems strengthening, universal health coverage, health security and resilience	2016		No Model
Kwan, S. W., Talenfeld, A. D., & Brunner, M. C.	The Top Three Health Care Developments Impacting the Practice of Interventional Radiology in the Next Decade	2016	English	No Model
Kyoon-Achan, G., Lavoie, J., Avery Kinew, K., et al.	Innovating for Transformation in First Nations Health Using Community-Based Participatory Research	2018		No Model
Lacouture, A., Breton, E., Guichard, A., et al.	The concept of mechanism from a realist approach: a scoping review to facilitate its operationalization in public health program evaluation	2015	English	No Model
Lai, B., Kim, Y., Wilroy, J., et al.	Sustainability of exercise intervention outcomes among people with disabilities: a secondary review	2018		No Model

Lajos, P. S., & Carpentier, A. F.	Vien Tim Institut du Coeur: Success of a Congenital Heart Disease Center in a Developing Country	2016	English	No Model
Lake, A. A., Smith, S. A., Bryant, C. E., et al.	Exploring the dynamics of a free fruit at work intervention	2016	English	No Model
Lakshman, R., Sharp, S. J., Whittle, F., et al.	Randomised controlled trial of a theory-based behavioural intervention to reduce formula milk intake	2018		No Model
Lam, V. W., Cheung, W. W., Reygondeau, G., et al.	Projected change in global fisheries revenues under climate change	2016	English	No Model
Lam, W., Dawson, A., & Fowler, C.	Approaches to better engage parent-child in health home-visiting programmes: A content analysis	2016	English	No Model
Lamastra, L., Balderacchi, M., Di Guardo, A., et al.	A novel fuzzy expert system to assess the sustainability of the viticulture at the wine-estate scale	2016	English	No Model
Lamberton, P. H. L., Faust, C. L., & Webster, J. P.	Praziquantel decreases fecundity in Schistosoma mansoni adult worms that survive treatment: evidence from a laboratory life-history trade-offs selection study	2017	English	No Model
Lamus-Lemus, F., Correal-Munoz, C., Hernandez-Rincon, E., et al.	The pursuit of healthier communities through a community health medical education program	2017	English	No Model
Landgraf, K. M., Kakkar, R., Meigs, M., et al.	Open-source LIMS in Vietnam: The path toward sustainability and host country ownership	2016	English	No Model
Landolt, K., Brantschen, E., Nordt, C., et al.	Association of supported employment with cognitive functioning and employment outcomes	2016	English	No Model
Lang, T., & Mason, P.	Sustainable diet policy development: implications of multi-criteria and other approaches, 2008-2017	2017		No Model
Langdon, S. E., Golden, S. L., Arnold, E. M., et al.	Lessons Learned From a Community-Based Participatory Research Mental Health Promotion Program for American Indian Youth	2016	English	No Model
Langford, R., Bonell, C., Komro, K., et al.	The Health Promoting Schools Framework: Known Unknowns and an Agenda for Future Research	2017	English	No Model
Lapping, K., Hajeebhoy, N., Alayon, S., et al.	Alive & thrive generation 2: Expanding our learnings to new geographies; next steps and sustainability	2017		No Model
Lara Silva, K., Rosângela de Sena, R., Morais Silva, P., et al.	INSTITUTIONALIZATION OF HEALTH PROMOTION PROGRAMS: DEFINITIONS IN MUNICIPAL MANAGEMENT	2015		No Model

Lara, J., Turbett, E., McKeivic, A., et al.	The Mediterranean diet among British older adults: Its understanding, acceptability and the feasibility of a randomised brief intervention with two levels of dietary advice	2015	English	No Model
Larkin, M.	Developing the knowledge base about carers and personalisation: contributions made by an exploration of carers' perspectives on personal budgets and the carer-service user relationship	2015		No Model
Larsen, A. L., Liao, Y., Alberts, J., et al.	RE-AIM Analysis of a School-Based Nutrition Education Intervention in Kindergarteners	2017		No Model
Larson, D. B., Donnelly, L. F., Podberesky, D. J., et al.	Peer feedback, learning, and improvement: Answering the call of the Institute of Medicine report on diagnostic error	2017	English	No Model
Larson, P. R., Chege, P., Dahlman, B., et al.	Future of Family Medicine Faculty Development in Sub-Saharan Africa	2017	English	No Model
Larsson, I., Staland-Nyman, C., Svedberg, P., et al.	Children and young people's participation in developing interventions in health and well-being: a scoping review	2018		No Model
Lartey, S. T., Khanam, R., & Takahashi, S.	The impact of household wealth on child survival in Ghana	2016	English	No Model
Lauckner, H. M., & Hutchinson, S. L.	Peer support for people with chronic conditions in rural areas: a scoping review	2016	English	No Model
Lavelle, J., Schast, A., & Keren, R.	Standardizing Care Processes and Improving Quality Using Pathways and Continuous Quality Improvement	2015	English	No Model
Lavigne, J. V., Feldman, M., & Meyers, K. M.	Screening for Mental Health Problems: Addressing the Base Rate Fallacy for a Sustainable Screening Program in Integrated Primary Care	2016	English	No Model
Lawler, M., Gavin, A., Salto-Tellez, M., et al.	Delivering a research-enabled multistakeholder partnership for enhanced patient care at a population level: The Northern Ireland Comprehensive Cancer Program	2016	English	No Model
Lazorick, S., Fang, X., Hardison, G. T., et al.	Improved Body Mass Index Measures Following a Middle School-Based Obesity Intervention-The MATCH Program	2015	English	No Model
Le, H. G., Ehrlich, J. R., Venkatesh, R., et al.	A sustainable model for delivering high-quality, efficient cataract surgery in southern India	2016	English	No Model

Le, S., Spelman, T., Chong, C. P., et al.	Could Adherence to Quality of Care Indicators for Hospitalized Patients with Cirrhosis-Related Ascites Improve Clinical Outcomes?	2016	English	No Model
Lee, A. J., Kraemer, D. F., Smotherman, C., et al.	Providing Our Fellows in Training with Education on Inflammatory Bowel Disease Health Maintenance to Improve the Quality of Care in Our Health Care System	2016	English	No Model
Lee, B., Del Rosario, K., & Byron-Iyamah, C.	Incorporating Relationship-Based Care Into a Nurse Education Program for Managing Disruptive Patient Behaviors	2017		No Model
Lee, J. K.	Review on the current reformation of the physician surcharge in Korea. [Korean]	2015	Korean	No Model
Lee, M. Y., Hsu, K. S., Liu, C., et al.	Treatment Efficacy of Integrative Family and Systems Treatment (I-FAST) With and Without Consultation: The Role of Model Training in the Sustainability of Evidence-Based Family Treatments	2016	English	No Model
Lee, R. P., Bamford, C., Exley, C., et al.	Expert views on the factors enabling good end of life care for people with dementia: A qualitative study	2015	English	No Model
Lee, Y.	Research project on technology in global health: Finding a means to combat child malnutrition in the developing world	2016	English	No Model
Lee, Y. F., Pittet, D., Zingg, W., et al.	Are we using suitable behavioural interventions for healthcare workers' recidivist hand hygiene behaviour? A critique of management theories	2017		No Model
Leemans, K., Van den Block, L., Vander Stichele, R., et al.	How to implement quality indicators successfully in palliative care services: perceptions of team members about facilitators of and barriers to implementation	2015	English	No Model
Lemak, C. H., Nahra, T. A., Cohen, G. R., et al.	Michigan's fee-for-value physician incentive program reduces spending and improves quality in primary care	2015	English	No Model
Letendre, J., & Mogro-Wilson, C.	Practice Wisdom Meets Evidence-Based Practice: Building Capacity in Agencies	2016		No Model
Letourneau, N., Duffett-Leger, L., Stewart, M., et al.	Development of a telephone-based peer support program for new mothers with postpartum depression	2016	English	No Model

Leuschner, V., Fiedler, N., Schultze, M., et al.	Prevention of Targeted School Violence by Responding to Students' Psychosocial Crises: The NETWASS Program	2017	English	No Model
Leuthard, J. L., Beebe, L. A., Halstead, L., et al.	Increased evidence-based tobacco treatment through Oklahoma hospital system changes	2015	English	No Model
Lewis, D. R., Petersen, L. K., York, A. W., et al.	Sugar-based amphiphilic nanoparticles arrest atherosclerosis in vivo	2015	English	No Model
Li, J.	A Randomized Controlled Study to Evaluate the Efficacy of a Positive Psychology and Social Networking Intervention in Reducing Depressive Symptoms among HIV-infected Men Who Have Sex with Men in China	2015	English	No Model
Li, J., Lo, K., & Guo, M.	Do Socio-Economic Characteristics Affect Travel Behavior? A Comparative Study of Low-Carbon and Non-Low-Carbon Shopping Travel in Shenyang City, China	2018		No Model
Li, Z., Wang, C., Zhao, X., et al.	Substantial Progress Yet Significant Opportunity for Improvement in Stroke Care in China	2016		No Model
Li, Z., Xian, Y., Zhao, X., et al.	Rationale and design of a cluster-randomized multifaceted intervention trial to improve stroke care quality in China: The GOLDEN BRIDGE-Acute Ischemic Stroke	2015	English	No Model
Liao, S., Davoli, T., Leng, Y., et al.	A genetic interaction analysis identifies cancer drivers that modify EGFR dependency	2017	English	No Model
Liaropoulos, L., & Goranitis, I.	Health care financing and the sustainability of health systems	2015	English	No Model
Liddy, C., Singh, J., Guo, M., et al.	Physician perspectives on a tailored multifaceted primary care practice facilitation intervention for improvement of cardiovascular care	2016	English	No Model
Liew, R. S. I., Kong, R. H. T., & Ngian, H. U.	Long term effectiveness of a multi-modal approach in improving hand hygiene compliance in a sarawak district hospital	2015	English	No Model
Likhitpanichkul, M., Kim, Y., Torre, O. M., et al.	Fibrin-genipin annulus fibrosus sealant as a delivery system for anti-TNFalpha drug	2015	English	No Model
Lillrank, P. M.	Small and big quality in health care	2015	English	No Model

Lin, C. F., Lin, C. L., & Hua, H. H.	Comparison of the tissue hardness and pressure pain threshold of neck extensors between patients with neck pain and pain-free controls	2015	English	No Model
Linder, D. E., Sacheck, J. M., Noubary, F., et al.	Dog attachment and perceived social support in overweight/obese and healthy weight children	2017	English	No Model
Lindsay, D. L., Hagle, H., Lincoln, P., et al.	Exploring medical students' conceptions of substance use: A follow-up evaluation	2017	English	No Model
Ling, J., Robbins, L. B., & Wen, F., et al. (c)	Interventions to prevent and manage overweight or obesity in preschool children: A systematic review	2016	English	No Model
Ling, J., Robbins, L. B., Wen, F., et al. (a)	Lifestyle Interventions in Preschool Children: A Meta-analysis of Effectiveness	2017	English	No Model
Ling, J., Robbins, L. B., Wen, F., et al. (b)	Interventions to Increase Physical Activity in Children Aged 2-5 Years: A Systematic Review	2015	English	No Model
Linnenkamp, R., & Drenkard, K.	Coordinating Care: Shifts in Perspective	2016	English	No Model
Linzone, N., Coi, A., Lauriola, P., et al.	Participatory health impact assessment used to support decision-making in waste management planning: A replicable experience from Italy	2017	English	No Model
Linzer, M., Poplau, S., Brown, R., et al.	Do Work Condition Interventions Affect Quality and Errors in Primary Care? Results from the Healthy Work Place Study	2017	English	No Model
Liu, G., Hao, Y., Zhou, Y., et al.	China's low-carbon industrial transformation assessment based on Logarithmic Mean Divisia Index model	2016	English	No Model
Liu, M., Koh, H., Kurtz, Z. D., et al.	Oxalobacter formigenes-associated host features and microbial community structures examined using the American Gut Project	2017	English	No Model
Lluch, P., King, E. M., Clarke, K. A., et al.	A systematic review of animal based indicators of sheep welfare on farm, at market and during transport, and qualitative appraisal of their validity and feasibility for use in UK abattoirs	2015	English	No Model
Loblova, O.	Three worlds of health technology assessment: Explaining patterns of diffusion of HTA agencies in Europe	2016	English	No Model

Loehrer, A. P., Chang, D. C., Hutter, M. M., et al.	Health Insurance Expansion and Treatment of Pancreatic Cancer: Does Increased Access Lead to Improved Care?	2015	English	No Model
Loeliger, K. B., Niccolai, L. M., Mtungwa, L. N., et al.	i have to push him with a wheelbarrow to the clinic: Community health workers' roles, needs, and strategies to improve HIV care in rural South Africa	2016	English	No Model
Lohiniva, A. L., Bassim, H., Hafez, S., et al.	Determinants of hand hygiene compliance in Egypt: building blocks for a communication strategy	2015	English	No Model
Lolacono Merves, M., Rodgers, C. R. R., Silver, E. J., et al.	Engaging and sustaining adolescents in community-based participatory research: structuring a youth-friendly community-based participatory research environment	2015		No Model
Longo, M. C.	Good practices in health care "management experimentation models": insights from an international public-private partnership on transplantation and advanced specialized therapies	2015	English	No Model
Lonkar, S., & Gupte, R.	New product development and innovation for sustainable profitable businesses of Indian small and medium scale industries (SMEs) and startups	2017		No Model
Lopez-Toro, A. A., Rubio-Romero, J. C., Suarez-Cebador, M., et al.	Consideration of stakeholder interests in the planning of sustainable waste management programmes	2016	English	No Model
Lorch, S. A.	National Quality Measures in Perinatal Medicine	2017	English	No Model
Low, L. F., Fletcher, J., Goodenough, B., et al.	A systematic review of interventions to change staff care practices in order to improve resident outcomes in nursing homes	2015	English	No Model
Lowes, L. P., Noritz, G. H., Newmeyer, A., et al.	'Learn From Every Patient': implementation and early results of a learning health system	2017	English	No Model
Lu, M., Sajobi, T., Lucyk, K., et al.	Systematic Review of Risk Adjustment Models of Hospital Length of Stay (LOS)	2015		No Model
Lubans, D. R., Smith, J. J., Plotnikoff, R. C., et al.	Assessing the sustained impact of a school-based obesity prevention program for adolescent boys: the ATLAS cluster randomized controlled trial	2016	English	No Model

Ludwick, T., Turyakira, E., Kyomuhangi, T., et al.	Supportive supervision and constructive relationships with healthcare workers support CHW performance: Use of a qualitative framework to evaluate CHW programming in Uganda	2018		No Model
Luft, H. S.	Policy-Oriented Research on Improved Physician Incentives for Higher Value Health Care	2015	English	No Model
Lumpkins, C. Y., & Saint Onge, J. M.	Reducing Low Birth Weight among African Americans in the Midwest: A Look at How Faith-Based Organizations Are Poised to Inform and Influence Health Communication on the Developmental Origins of Health and Disease (DOHaD)	2017	English	No Model
Luo, X., Gu, Z., Yu, C., et al.	Efficacy of an air curtain system for local pit environmental control for relic preservation in archaeology museums	2016	English	No Model
Lusli, M., Peters, R., van Brakel, W., et al.	The Impact of a Rights-Based Counselling Intervention to Reduce Stigma in People Affected by Leprosy in Indonesia	2016	English	No Model
Lynch, M., & Steele, K. (a)	Compassionate end of life care in residential care settings- a quality improvement approach	2017		No Model
Lynch, M., & Steele, K. (b)	Compassionate end-of-life care in residential care settings - A quality improvement approach	2018		No Model
Lynch, T.	A Critique of Health System Performance Measurement	2015		No Model
Lyons, B., & Hall, R.	Outcomes of a Falls Prevention Education Program Among Older Adults in Grenada	2016		No Model
Lyons, K., Griggs, D., Lebovic, R., et al.	The University of North Carolina Medical Center pharmacy resident leadership certificate program	2017	English	No Model
M. Kamburova, S. Georgieva, M. Sandova, P. Karadzhova, D. Asenova and K. Romanov	Roma community-based health promotion in kneja (middle north Bulgaria)	2017		No Model
Ma, C., & Park, S. H.	Hospital Magnet Status, Unit Work Environment, and Pressure Ulcers	2015	English	No Model
Ma, F., Lv, F., Xu, P., et al.	Task shifting of HIV/AIDS case management to Community Health Service Centers in urban China: a qualitative policy analysis	2015	English	No Model

Maassen, E. F., Schrevel, S. J. C., Dedding, C. W. M., et al.	Comparing patients' perspectives of "good care" in Dutch outpatient psychiatric services with academic perspectives of patient-centred care	2017		No Model
MacDonald, M., Pauly, B., Wong, G., et al.	Supporting successful implementation of public health interventions: protocol for a realist synthesis	2016	English	No Model
Macias, C. G., Bartley, K. A., Rodkey, T. L., et al.	Creating a Clinical Systems Integration Strategy to Drive Improvement	2015	English	No Model
Mackenzie, K., Goyder, E., & Eves, F.	Acceptability and feasibility of a low-cost, theory-based and co-produced intervention to reduce workplace sitting time in desk-based university employees	2015	English	No Model
MacKinnon, R. J., Kennedy, C., Doherty, C., et al.	Fitness for purpose study of the Field Assessment Conditioning Tool (FACT): a research protocol	2015	English	No Model
Macmillan, A., Davies, M., Shrubsole, C., et al.	Integrated decision-making about housing, energy and wellbeing: a qualitative system dynamics model	2016	English	No Model
Maddison, R., Stewart, R., Doughty, R., et al.	Text4Heart II - improving medication adherence in people with heart disease: a study protocol for a randomized controlled trial	2018		No Model
Mader, E. M., Fox, C. H., Epling, J. W., et al.	A practice facilitation and academic detailing intervention can improve cancer screening rates in primary care safety net clinics	2016	English	No Model
Madia, V. A., Pfeil, S. K., Anderson, E. S., et al.	Nursing barriers with implementation of a public health screening program in an urban emergency department	2015	English	No Model
Maffey, G., Irvine, R. J., Reed, M., et al.	Can digital reinvention of ecological monitoring remove barriers to its adoption by practitioners? A case study of deer management in Scotland	2016	English	No Model
Magni, P., Bier, D. M., Pecorelli, S., et al.	Perspective: Improving Nutritional Guidelines for Sustainable Health Policies: Current Status and Perspectives	2017	English	No Model
Maiers, M. J., Foshee, W. K., & Henson Dunlap, H.	Culturally Sensitive Chiropractic Care of the Transgender Community: A Narrative Review of the Literature	2017	English	No Model
Mak, T. N., Storcksdieck Genannt Bonsmann, S., Caldeira, S., et al.	How to promote fruit and vegetable consumption in schools: A toolkit	2016	English	No Model

Malley, C. O., Summerbell, C., Moore, H., et al.	Exploring barriers and facilitators of fruit and vegetable consumption in pre-school children: A meta-synthesis using the theoretical domains framework (TDF)	2017	English	No Model
Malti, T., Beelmann, A., Noam, G. G., et al.	Innovation and Integrity in Intervention Research: Conceptual Issues, Methodology, and Knowledge Translation	2018		No Model
Mandl, L. A., Schell, J., Torralba, K., et al.	The class-rheum (critical literature assessment skills support-rheumatology) question-based tool is associated with sustained improvement in knowledge of relevant epidemiology and biostatistics in rheumatology fellows	2017	English	No Model
Manson, S. M., Martinez, D. F., Buchwald, D. S., et al.	Vision, Identity, and Career in the Clinical and Translational Sciences: Building upon the Formative Years	2015	English	No Model
Marath, U., & Ramachandra.	Sub Theme: Nursing Leadership--A Force For Change	2015	English	No Model
Marier-Deschenes, P., Swaine, B., Kairy, D., et al.	Protocol for the creation of gitools supporting evidence-based practices for the rehabilitation of moderate-to-severe traumatic brain injury	2017	English	No Model
Marino, M. A., Pennisi, O., Donia, A., et al.	Organizational and welfare mode of breast centers network: a survey of Sicilian radiologists	2017		No Model
Marmor, G. O., & Li, M. Y.	Improving emergency department medical clinical handover: Barriers at the bedside	2017	English	No Model
Marr, E., & Hill, D.	Optimising service provision for prescribed opioid analgesic dependence	2015	English	No Model
Marshall, M., & Roland, M.	The future of the Quality and Outcomes Framework in England	2017		No Model
Martin, J., Sheeran, P., & Slade, P.	'They've invited me into their world': a focus group with clinicians delivering a behaviour change intervention in a UK contraceptive service	2017	English	No Model
Martin, N. A., Hulland, K. R. S., Dreibelbis, R., et al.	Sustained adoption of water, sanitation and hygiene interventions: systematic review	2018		No Model

Martin, P., Tamblyn, R., Ahmed, S., et al.	A consumer-targeted, pharmacist-led, educational intervention to reduce inappropriate medication use in community older adults (D-PRESCRIBE trial): Study protocol for a cluster randomized controlled trial	2015	English	No Model
Martin, R. L., Tully, M., Kos, A., et al.	Increasing Colorectal Cancer Screening at an Urban FQHC Using iFOBT and Patient Navigation	2017	English	No Model
Martin, W. H., Sobel, J. L., Griest, S. E., et al.	Program Sustainability: Hearing Loss and Tinnitus Prevention in American Indian Communities	2017	English	No Model
Martinez, S., Johannsen, J., Gertner, G., et al.	Effects of a home-based participatory play intervention on infant and young child nutrition: a randomised evaluation among low-income households in El Alto, Bolivia	2018		No Model
Martinez-Schlurmann, N., Rampa, S., Romesh, N., et al.	Injuries due to legal interventions in United States: ARE there racial variations in outcomes?	2015	English	No Model
Martin-Ruiz, E., Balbino, J. E., Lemgruber, A., et al.	Adoption of trastuzumab for breast cancer in four emerging countries in the use of health technology assessment: A case study	2016	English	No Model
Martsof, G. R., Carle, A. C., & Scanlon, D. P.	Creating Unidimensional Global Measures of Physician Practice Quality Based on Health Insurance Claims Data	2017	English	No Model
Maughan, D., & Whittaker, B.	Future proofing occupational therapy in mental health through sustainable commissioning	2016		No Model
Mauricio, A. M., Tein, J. Y., Gonzales, N. A., et al.	Attendance Patterns and Links to Non-Response on Child Report of Internalizing among Mexican-Americans Randomized to a Universal Preventive Intervention	2016	English	No Model
Mavandadi, S., Wray, L. O., DiFilippo, S., et al.	Evaluation of a Telephone-Delivered, Community-Based Collaborative Care Management Program for Caregivers of Older Adults with Dementia	2017	English	No Model
Mazurek Melnyk, B., Gallagher-Ford, L., & Fineout-Overholt, E.	Improving healthcare quality, patient outcomes, and costs with evidence-based practice	2016		No Model
Mazzone, P., Powell, C. A., Arenberg, D., et al.	Components necessary for high-quality lung cancer screening: American college of chest physicians and American thoracic society policy statement	2015	English	No Model

McArthur, C., Gibbs, J., Papaioannou, A., et al.	Scoping review of physical rehabilitation interventions in long-term care: Protocol for tools, models of delivery, outcomes and quality indicators	2015	English	No Model
McCalman, J., Bainbridge, R., Brown, C., et al.	The Aboriginal Australian Family Wellbeing Program: A Historical Analysis of the Conditions That Enabled Its Spread	2018		No Model
McCollister, K., Baumer, P., Davis, M., et al.	Economic Evaluation of the Juvenile Drug Court/Reclaiming Futures (JDC/RF) Model	2018		No Model
McCullagh, M. C., Banerjee, T., & Yang, J.	Protocol of a test of hearing health education programs for farm and rural youth	2015	English	No Model
McCurdie, T., Sanderson, P., Aitken, L. M., et al.	Two sides to every story: The Dual Perspectives Method for examining interruptions in healthcare	2017	English	No Model
McDevitt, J. P., Criddle, C. S., Morse, M., et al.	Addressing the Issue of Microplastics in the Wake of the Microbead-Free Waters Act - A New Standard Can Facilitate Improved Policy	2017	English	No Model
McDonald, K. M., Su, G., Lisker, S., et al.	Implementation science for ambulatory care safety: a novel method to develop context-sensitive interventions to reduce quality gaps in monitoring high-risk patients	2017		No Model
McGillicuddy, J., Sox, L., Brunner-Jackson, B., et al.	Sustainability of mobile health medication adherence and blood pressure control program among kidney transplant patients: A one year follow up	2015	English	No Model
McGlynn, E. A., & McClellan, M.	Strategies For Assessing Delivery System Innovations	2017		No Model
McGrath, M., Botti, M., & Redley, B.	Clinicians' perceptions and recognition of practice improvement strategies to prevent harms to older people in acute care hospitals	2017		No Model
McKinnon, I. G., Thomas, S. D. M., Noga, H. L., et al.	Police custody health care: A review of health morbidity, models of care and innovations within police custody in the UK, with international comparisons	2016	English	No Model
McLeigh, J. D., Katz, C., Davidson-Arad, B., et al.	The Cultural Adaptation of a Community-Based Child Maltreatment Prevention Initiative	2017		No Model
McManners, P. J.	Developing policy integrating sustainability: A case study into aviation	2016	English	No Model

McManus, M. C., Taylor, C. M., Mohr, A., et al.	Challenge clusters facing LCA in environmental decision-making-what we can learn from biofuels	2015	English	No Model
McNabb, M., Chukwu, E., Salami, H., et al.	Assessing the feasibility and value of a pilot project using mobile applications and mobile money to enhance a maternal health conditional cash transfer (CCT) program in Nigeria leading to the development of a costed business model for scale up	2015	English	No Model
McNaughton, S. A.	Advancing nutrition promotion research and practice	2015		No Model
McNeil, R., Kerr, T., Anderson, S., et al.	Negotiating structural vulnerability following regulatory changes to a provincial methadone program in vancouver, canada: A qualitative study	2015	English	No Model
McQuade, J.	Osteoarthritis of the knee	2015	English	No Model
Mechanic, R. E.	Opportunities and Challenges for Payment Reform Observations from Massachusetts	2016		No Model
Meghani, S. H., & Hinds, P. S.	Policy brief: The Institute of Medicine report Dying in America: Improving quality and honoring individual preferences near the end of life	2015		No Model
Mendoza, A., Acena, J., Perez, S., et al.	Pharmaceuticals and iodinated contrast media in a hospital wastewater: A case study to analyse their presence and characterise their environmental risk and hazard	2015	English	No Model
Messiah, S. E., Jiang, S., Kardys, J., et al.	Reducing childhood obesity through coordinated care: Development of a park prescription program	2016	English	No Model
Mezei, A. K., Armstrong, H. L., Pedersen, H. N., et al.	Cost-effectiveness of cervical cancer screening methods in low- and middle-income countries: A systematic review	2017	English	No Model
Mihalic, S. F., & Elliott, D. S.	Evidence-based programs registry: blueprints for Healthy Youth Development	2015	English	No Model
Miller, C. A., & Wyborn, C.	Co-production in global sustainability: Histories and theories	2018		No Model
Miller, K., Briody, C., Casey, D., et al.	Using the Comprehensive Unit-based Safety Program model for sustained reduction in hospital infections	2016		No Model
Miller, R.	Changing organisational culture: another role for self-advocacy?	2015		No Model

Mills, A., Purkayastha, S., Addei, D., et al.	Exploring the variation in bariatric surgery across london: Does access follow need and to what extent do inequalities exist? basic science and research in bariatric surgery	2017		No Model
Mills, J., McClean, L., & Miller, A.	Enriching survivorship-empowering cancer survivors through education about exercise, nutrition and mindset utilising an evidence-based program in collaboration with allied health professionals	2017		No Model
Milton, K., & Bauman, A.	A critical analysis of the cycles of physical activity policy in England	2015	English	No Model
Min, J., Kim, G., Lim, H., et al.	A kindergarten-based child health promotion program: the Adapted National Aeronautics and Space Administration (NASA) Mission X for improving physical fitness in South Korea	2018		No Model
Mistry, S. K., Jhohura, F. T., Khanam, F., et al.	An outline of anemia among adolescent girls in Bangladesh: Findings from a cross-sectional study	2017	English	No Model
Mlotshwa, L., Harris, B., Schneider, H., et al.	Exploring the perceptions and experiences of community health workers using role identity theory	2015	English	No Model
Mofidi, R., Harunarashid, H., Wong, P., et al.	Assessment of quality of care in vascular surgery and the emergence of quality improvement programs	2016	English	No Model
Mohr, D. C., Rosen, C. S., Schnurr, P. P., et al.	The Influence of Team Functioning and Workload on Sustainability of Trauma-Focused Evidence-Based Psychotherapies	2018		No Model
Mokomane, Z., & Makoae, M.	An overview of programmes offered by shelters for street children in South Africa	2017		No Model
Montero, A. J., Stevenson, J., Guthrie, A. E., et al.	Can oncology readmissions be reduced? The Cleveland Clinic experience	2015	English	No Model
Montgomery, A., Doulougeri, K., & Panagopoulou, E.	Implementing action research in hospital settings: a systematic review	2015	English	No Model
Moore, J. E., Grouchy, M., Graham, I. D., et al.	The Council of Academic Hospitals of Ontario (CAHO) Adopting Research to Improve Care (ARTIC) program: Reach, sustainability, spread and lessons learned from an implementation funding model	2016	English	No Model

Moore, J. M., Wininger, D. A., & Martin, B.	Leadership for All: An Internal Medicine Residency Leadership Development Program	2016	English	No Model
Moore, J., & Prentice, D.	Oncology nurses' experience of collaboration: A case study	2015	English	No Model
Moore, L. A., Aarons, G. A., Davis, J. H., et al.	How do providers serving American Indians and Alaska Natives with substance abuse problems define evidence-based treatment?	2015	English	No Model
Morais, C., Pimenta, R., Ferreira, P. L., et al.	People, family and community involvement	2014		No Model
Morales, J., Lopez, A. M., Harding, G., et al.	Addressing rural disparities: Community outreach to assess the need for cancer prevention, screening, and access to treatment in rural Utah	2017	English	No Model
Morey, M. C., Hall, K., Deberry, J., et al.	Implementation of a new model of care of geriatric exercise in four va medical centers: Costs, barriers and promoters of success	2015	English	No Model
Morley, J., Kapoor, S., O'Grady, M., et al. (a)	Improving the reach and adoption of screening, brief intervention, and referral to treatment (SBIRT) services in a patient centered medical home (PCMH) using a multimodal implementation involving practice redesign	2015	English	No Model
Morley, J., Kapoor, S., O'Grady, M., et al. (b)	Building sustainable screening, brief intervention, and referral to treatment (SBIRT) within primary care in an integrated hospital system in New York, NYSBIRT-II: An implementation model	2015	English	No Model
Morley, K. E., Barysaukas, C. M., Carballo, V., et al.	Characteristics of Volunteer Coaches in a Clinical Process Improvement Program	2018		No Model
Moscou, K., Kohler, J. C., & MaGahan, A.	Governance and pharmacovigilance in Brazil: A scoping review	2016	English	No Model
Motta, P., Handel, I. G., Rydevik, G., et al.	Drivers of Live Cattle Price in the Livestock Trading System of Central Cameroon	2017		No Model
Moy, M. L., Martinez, C. H., Kadri, R., et al.	Long-term effects of an internet-mediated pedometer-based walking program in COPD: A randomized controlled trial	2015	English	No Model
Mueller, M., Purnell, T. S., Mensah, G. A., et al.	Reducing racial and ethnic disparities in hypertension prevention and control: what will it take to translate research into practice and policy?	2015	English	No Model

Muhayimana, C., Kennell-Heiling, S., Svoboda, L., et al.	Oncology nursing workforce capacity building in rural Rwanda: Strengthening specialized cancer care through nursing education and skill development	2016	English	No Model
Munce, S. E. P., Shepherd, J., Perrier, L., et al.	Online peer support interventions for chronic conditions: a scoping review protocol	2017	English	No Model
Munns, A., Toye, C., Hegney, D., et al.	Aboriginal parent support: A partnership approach	2017	English	No Model
Murayama, H., Spencer, M. S., Sinco, B. R., et al.	Does Racial/Ethnic Identity Influence the Effectiveness of a Community Health Worker Intervention for African American and Latino Adults With Type 2 Diabetes?	2017		No Model
Murdoch, J., Varley, A., Fletcher, E., et al.	Implementing telephone triage in general practice: a process evaluation of a cluster randomised controlled trial	2015	English	No Model
Murdoch, J., Varley, A., McCulloch, J., et al.	Process evaluation for the PREPARE-ABC study: Context mapping, pinchpoints and implications for implementation and theoretical fidelity	2017		No Model
Murphy, J. F. A.	Measuring healthcare in developed countries	2015	English	No Model
Murphy, J. W., Franz, B. A., & Callaghan, K. A.	Group Maturity in a Community-Based Project	2016	English	No Model
Murray, S. D., Hurley, J., & Ahmed, S. R.	Supporting the whole child through coordinated policies, processes, and practices	2015	English	No Model
Musielak-Hanold, K. A.	An evaluation of the effects of mediational intervention for sensitizing caregivers (MISC) and a health and nutrition education program on the sustained attention of Ugandan children with HIV	2016	English	No Model
Muzigaba, M., Kigozi, G., & Puoane, T.	Short-term and sustained effects of a health system strengthening intervention to improve mortality trends for paediatric severe malnutrition in rural South African hospitals	2017	English	No Model
Nabyonga-Orem, J., Gebrikidane, M., & Mwisongo, A.	Assessing policy dialogues and the role of context: Liberian case study before and during the Ebola outbreak	2016	English	No Model
Nabyonga-Orem, J., Tumusiime, P., Nyoni, J., et al.	Harmonisation and standardisation of health sector and programme reviews and evaluations - how can they better inform health policy dialogue?	2016	English	No Model

Narayana, M. R.	India's Proposed Universal Health Coverage Policy: Evidence for Age Structure Transition Effect and Fiscal Sustainability	2016	English	No Model
Naumovic, T., Jovanovic, V., Ilic, D., et al.	Performance indicators collected from primary health centres included in organised cervical cancer screening programme in the Republic of Serbia	2015	English	No Model
Nazir, A., Dennis, M. E., & Unroe, K. T.	Implementation of a heart failure quality initiative in a skilled nursing facility: lessons learned	2015	English	No Model
Nelson III, C. A.	Hazards to early development: The biological embedding of early life adversity	2018		No Model
Newman, A. W., & Behling-Kelly, E.	Quality Assurance and Quality Control in Point-of-Care Testing	2016	English	No Model
Newman, L. P., Mashalla, Y., O'Malley, G., et al.	Leadership training to build sustainable workforces and improve health in Africa	2016	English	No Model
Neyarapally, G. A., & Smith, M. A.	Variability in state Medicaid medication management initiatives	2017	English	No Model
Ng, G. M., & Ruppel, H.	Nursing Simulation Fellowships: An Innovative Approach for Developing Simulation Leaders	2016		No Model
Nhung, N. T. T., Schindler, C., Dien, T. M., et al.	Acute effects of ambient air pollution on lower respiratory infections in Hanoi children: An eight-year time series study	2018	English	No Model
Nicol, E., Dudley, L., & Bradshaw, D.	Assessing the quality of routine data for the prevention of mother-to-child transmission of HIV: An analytical observational study in two health districts with high HIV prevalence in South Africa	2016	English	No Model
Nielsen, O., McGorry, P., Castle, D., et al.	The RANZCP guidelines for Schizophrenia: Why is our practice so far short of our recommendations, and what can we do about it?	2017		No Model
Nijsten, D., Houweling, H., Durupt, A., et al.	Overlapping topics in advisory reports issued by five well-established European National Immunization Technical Advisory Groups from 2011 to 2014	2016	English	No Model
Nikolishin, A., Krivoshechekov, E., Cetta, F., et al.	Development of a sustainable newborn cardiac surgical program in Siberia	2017		No Model

Nikolov, M., Ouedraogo, A., Wenger, E., et al.	Vector "vaccination": Optimization of non-mendelian-based gene drives for mosquito population replacement	2016		No Model
Nikooyeh, B., Abdollahi, Z., Hajifaraji, M., et al.	Vitamin D Status, Latitude and their Associations with Some Health Parameters in Children: National Food and Nutrition Surveillance	2017	English	No Model
Nishigaki, S., Hamazaki, T., Tsuruhara, A., et al.	Clinical features of women with turner syndrome experiencing transition period in Japan	2017	English	No Model
Nix, K. A., & O'Shea, J. S.	Improving healthcare quality in the United States: A new approach	2015	English	No Model
Nixon, C., Flynn, G., Murphy, M., et al.	Cultural relevancy in capacity building: Community education to address the malnutrition spectrum	2015	English	No Model
Nnam, N. M.	Improving maternal nutrition for better pregnancy outcomes	2015	English	No Model
Nolan, M., Ghosh, K., & Warner, D. O.	Design, implementation and evaluation of a smoking cessation intervention for patients undergoing breast cancer surgery	2017	English	No Model
Norona, C. R., & Acker, M. L.	Implementation and Sustainability of Child-Parent Psychotherapy: The Role of Reflective Consultation in the Learning Collaborative Model	2016	English	No Model
Novaes, H. M. D., de Soarez, P. C., Silva, G. A., et al.	Cost-effectiveness analysis of introducing universal human papillomavirus vaccination of girls aged 11 years into the National Immunization Program in Brazil	2015	English	No Model
Novelli, B., & Banerjee, R.	Advanced Illness Care: Driving the Movement Forward	2017		No Model
Novick, G., Womack, J. A., & Sadler, L. S.	The Phoenix Project: Re-Introducing Group Prenatal Care...American College of Nurse-Midwives' 62nd Annual Meeting in May 2017	2017		No Model
Nowak, M., Pfaff, H., & Karbach, U.	Does Value Stream Mapping affect the structure, process, and outcome quality in care facilities? A systematic review	2017	English	No Model
Noyes, K., Holub, D., Rizvi, I., et al.	Cancer survivorship care in rural community: Provider perspective	2017	English	No Model
Nugent, R., Barnabas, R. V., Golovaty, I., et al.	Costs and cost-effectiveness of HIV/noncommunicable disease integration in Africa: from theory to practice	2018	Journal Article	No Model

Nuti, A., Pernas, M., & Krishnan, R.	Quality improvement project on iron infusion therapy in a paediatric haemodialysis unit	2015	English	No Model
Nuti, S.	Managing pharmaceutical innovation in Italy: Which regional governance tools can be adopted?. [Italian]	2016	Italian	No Model
Nuti, S., Vola, F., Bonini, A., et al.	Making governance work in the health care sector: evidence from a 'natural experiment' in Italy	2016	English	No Model
Nwagbara, V. C., Rasiah, R., & Aslam, M.	An approach toward public hospital performance assessment	2016	English	No Model
Nwosu, L. N., Mapp, P. I., Chapman, V., et al.	Blocking the tropomyosin receptor kinase A (TrkA) receptor inhibits pain behaviour in two rat models of osteoarthritis	2016	English	No Model
Nyoni, C. N., & Botma, Y.	Sustaining a newly implemented competence-based midwifery programme in Lesotho: Emerging issues	2018		No Model
O'Brien, C., Reyes, M., Santos, P., et al.	Microglial proliferation in the piglet brain is region specific after cardiac arrest	2016	English	No Model
O'Brien, S., Edge, N., & Clark, S.	A strategy to reposition the South Australian health system for quality and value	2016	English	No Model
Odetola, F. O., Freed, G., Shevrin, C., et al.	In-hospital quality-of-care measures for pediatric sepsis syndrome	2017	English	No Model
O'Dwyer, G., Konder, M. T., Reciputti, L. P., et al.	[Implementation of the Mobile Emergency Medical Service in Brazil: action strategies and structural dimension]	2017	Portuguese	No Model
Oesterle, S., Kuklinski, M. R., Hawkins, J. D., et al.	Long-Term Effects of the Communities That Care Trial on Substance Use, Antisocial Behavior, and Violence Through Age 21 Years	2018		No Model
Ojemeni, M. T., Niles, P., Mfaume, S., et al.	A case study on building capacity to improve clinical mentoring and maternal child health in rural Tanzania: the path to implementation	2017	English	No Model
Ojio, Y., & Sasaki, T.	Effectiveness of single 45-minute and school teacher-led program for mental health literacy in Japanese early teens	2017		No Model
Okello, W. P. O.	The Relationship between Youths' Risky Sexual Behavior and Race/Ethnicity	2017	English	No Model

Okoye, R. S., Bell, L., & Papadopoulos, I.	Investigating the level of glaucoma awareness and perception of its risk factors in Anambra State, Nigeria	2018		No Model
Oleribe, O. O.	Individual and Socioeconomic Factors Associated With Childhood Immunization Coverage in Nigeria	2017	English	No Model
Olfson, M.	The Rise of Primary Care Physicians in the Provision of US Mental Health Care	2016		No Model
O'Malley, C., Mazarello Paes, V., Hesketh, K., et al.	Systematic Review on the determinants of Fruit and Vegetable consumption in young children (aged 0-6)	2015	English	No Model
Omange, R. W., Ocholla, A. O., Kwallah, A. O., et al.	Meeting report: Unesco-merck africa research summit 2015- accelerating access and sustaining innovation 'from Africa for Africa	2017	English	No Model
Ong, C. J., Dhand, A., & Diringer, M. N.	Early Withdrawal Decision-Making in Patients with Coma After Cardiac Arrest: A Qualitative Study of Intensive Care Clinicians	2016	English	No Model
Ong, C., Dhand, A., & Diringer, M.	Components of the self-fulfilling prophesy among non-neurologists in hypoxic ischemic coma	2016	English	No Model
Opondo, C., Allen, E., Todd, J., et al.	The Paediatric Admission Quality of Care (PAQC) score: designing a tool to measure the quality of early inpatient paediatric care in a low-income setting	2016	English	No Model
Opondo, D., Visscher, S., Eslami, S., et al.	Quality of Co-prescribing NSAID and gastroprotective medications for elders in the netherlands and its association with the electronic medical record	2015	English	No Model
Örnerheim, M.	Policymaking through healthcare registries in Sweden	2018		No Model
Ory, M. G., Lee, S., Han, G., et al.	Effectiveness of a lifestyle intervention on social support, self-efficacy, and physical activity among older adults: Evaluation of Texercise select	2018		No Model
Otolorin, E., Gomez, P., Currie, S., et al.	Essential basic and emergency obstetric and newborn care: From education and training to service delivery and quality of care	2015	English	No Model
Owens, J.	Creating an impersonal NHS? Personalization, choice and the erosion of intimacy	2015	English	No Model

Owringi, A. M., Prisciandaro, J. I., Soliman, A., et al.	Magnetic resonance imaging-guided brachytherapy for cervical cancer: Initiating a program	2015	English	No Model
Ozawa, S., Singh, S., Singh, K., et al.	The Avahan Transition: Effects of Transition Readiness on Program Institutionalization and Sustained Outcomes	2016	English	No Model
Pamilo, K., Torkki, P., Peltola, M., et al.	Fast-tracking for total knee replacement reduces use of institutional care without compromising quality	2018		No Model
Pang, T., & Oestergaard, M.	Creating policy frameworks for public health genomics to benefit developing countries	2014		No Model
Pardue, M. T., Chrenek, M. A., Schmidt, R. H., et al.	Potential Role of Exercise in Retinal Health	2015	English	No Model
Parent, E. C., Schreiber, S., Moez, E. et al.	Effects of Schroth exercises added to standard care in adolescents with idiopathic scoliosis (AIS) on surface topography parameters-a randomized controlled trial (RCT)	2017		No Model
Parent, E. C., Ghaneei, M., Adeeb, S., et al.	Effects of Schroth exercises added to standard care in adolescents with idiopathic scoliosis (AIS) on marker-less surface topography asymmetry measurements-a randomized controlled trial (RCT)	2017		No Model
Parker, E. C., Kong, K., Watts, L. A., et al.	Visits to Registered Nurses: An Opportunity to Increase Contraceptive Access in California	2017		No Model
Paton, K., Sia, K. L., Peat, R., et al.	Implementing a School-Based Sleep Intervention in the First Year of Elementary School: Voices of the School Nurses as Intervention Deliverers	2017	English	No Model
Patouillard, E., Griffin, J., Bhatt, S., et al.	Global investment targets for malaria control and elimination between 2016 and 2030	2017		No Model
Pavlickova, H., Bremner, S. A., & Priebe, S.	The effect of financial incentives on adherence to antipsychotic depot medication: Does it change over time?	2015	English	No Model
Pavlidis, C., Nebel, J. C., Katsila, T., et al.	Nutrigenomics 2.0: The Need for Ongoing and Independent Evaluation and Synthesis of Commercial Nutrigenomics Tests' Scientific Knowledge Base for Responsible Innovation	2016	English	No Model
Pavolini, E., & Kuhlmann, E.	Health workforce development in the European Union: A matrix for comparing trajectories of change in the professions	2016	English	No Model

Pazandeh, F., Huss, R., Hirst, J., et al.	An evaluation of the quality of care for women with low risk pregnancy: The use of evidence-based practice during labour and childbirth in four public hospitals in Tehran	2015		No Model
Peabody, J. W., Huang, X., Shimkhada, R., et al.	Managing specialty care in an era of heightened accountability: Emphasizing quality and accelerating savings	2015	English	No Model
Peirson, B. R.	Plasticity, stability, and yield: the origins of Anthony David Bradshaw's model of adaptive phenotypic plasticity	2015	English	No Model
Pekkarinen, A. J., Kumpula, J., & Tahvonen, O.	Parameterization and validation of an ungulate-pasture model	2017	English	No Model
Pekny, C., Karwa, R., Miller, M. L., et al.	Impact of a global health pharmacy residency in western Kenya	2015	English	No Model
Peltier, H., Authier, M., Deaville, R., et al.	Small cetacean bycatch as estimated from stranding schemes: The common dolphin case in the northeast Atlantic	2016	English	No Model
Perez, S.	A sustainable medical anatomy program supported with small 3-D printed human parts	2016	English	No Model
Perez-Escamilla, R., & Hall Moran, V.	Scaling up breastfeeding programmes in a complex adaptive world	2016	English	No Model
Peter, N. A., Pandit, H., Le, G., et al.	A multicountry health partnership programme to establish sustainable trauma training in east, central, and southern African countries using a cascading trauma management course model	2015	English	No Model
Peters, A. T., Jacobs, R. H., Feldhaus, C., et al.	Trajectories of Functioning Into Emerging Adulthood Following Treatment for Adolescent Depression	2016	English	No Model
Petrosyan, Y., Sahakyan, Y., Barnsley, J. M., et al.	Quality indicators for care of depression in primary care settings: A systematic review	2017	English	No Model
Pettker, C. M., & Grobman, W. A.	Obstetric Safety and Quality	2015	English	No Model
Pettoello-Mantovani, M., Namazova-Baranova, L., & Ehrich, J.	Integrating and rationalizing public healthcare services as a source of cost containment in times of economic crises	2016	English	No Model
Pham, M. D., Romero, L., Parnell, B., et al.	Feasibility of antiretroviral treatment monitoring in the era of decentralized HIV care: a systematic review	2017	English	No Model

Phuong-Tan, N.-H., Howrie, D., Crowley, K., et al.	A Quality Assessment of a Collaborative Model of a Pediatric Antimicrobial Stewardship Program	2016		No Model
Pinaire, J., Aze, J., Bringay, S., et al.	Patient healthcare trajectory. An essential monitoring tool: A systematic review	2017	English	No Model
Pincus, H. A., Li, M., Scharf, D. M., et al.	Prioritizing quality measure concepts at the interface of behavioral and physical healthcare	2017	English	No Model
Plum, A., & Kaljee, L.	Achieving Sustainable, Community-Based Health in Detroit Through Adaptation of the UNSDGs	2016	English	No Model
Pope, N., Tallon, M., McConigley, R., et al.	Experiences of acute pain in children who present to a healthcare facility for treatment: A systematic review of qualitative evidence	2017	English	No Model
Portillo, M. C., Kennedy, A., Todorova, E., et al.	Interventions and working relationships of voluntary organisations for diabetes self-management: A cross-national study	2017		No Model
Portrait, F. R. M., Van Der Galien, O., & Van Den Berg, B.	Measuring Healthcare Providers' Performances Within Managed Competition Using Multidimensional Quality and Cost Indicators	2016	English	No Model
Post, M. T., Scott, M. K., McCleery, E., et al.	Impact of a regional collaborative to reduce bloodstream infections in outpatient hemodialysis facilities	2015	English	No Model
Poteat, T., Wirtz, A. L., Radix, A., et al.	HIV risk and preventive interventions in transgender women sex workers	2015	English	No Model
Potigailo, V. L., Christoforidis, G. A., & Katzman, G. L.	Acute spinal cord compression: CQI framework increases resource efficiency while promoting delivery of high-quality care	2015	English	No Model
Powwattana, A., Thammaraksa, P., & Manora, S.	Culturally-grounded mother–daughter communication-focused intervention for Thai female adolescents	2018		No Model
Prabhakaran, S., Lee, J., & O'Neill, K.	Regional learning collaboratives produce rapid and sustainable improvements in stroke thrombolysis times	2016	English	No Model
Premji, S. S., & Hatfield, J.	Call to Action for Nurses/Nursing	2016		No Model
Prendergast, B. J., Cable, E. J., Stevenson, T. J., et al.	Circadian Disruption Alters the Effects of Lipopolysaccharide Treatment on Circadian and Ultradian Locomotor Activity and Body Temperature Rhythms of Female Siberian Hamsters	2015	English	No Model

Prendiville, V.	Developing an outcomes framework for the dietetic service	2016		No Model
Price, C. P., John, A. S., Christenson, R., et al.	Leveraging the real value of laboratory medicine with the value proposition	2016	English	No Model
Pringle, J. L., Lee Rucker, N., Domann, D., et al.	Applying value-based incentive models within community pharmacy practice	2016	English	No Model
Przylog, A., Stroka, M. A., Engel, S., et al.	[Do nursing homes with higher quality ratings provide a better quality of care? : Empirical study based on administrative data]	2016	German	No Model
Puras, D.	Human rights and mental health care-can we find a common ground?	2016	English	No Model
Puszka, S., Nagel, T., Matthews, V., et al.	Monitoring and assessing the quality of care for youth: Developing an audit tool using an expert consensus approach	2015	English	No Model
Pyszkowski, L.	Models of cancer	2015	English	No Model
Quaglio, G., Dario, C., Karapiperis, T., et al.	Information and communications technologies in low and middle-income countries: Survey results on economic development and health	2016	English	No Model
Quimbo, S., Wagner, N., Florentino, J., et al.	Do Health Reforms to Improve Quality Have Long-Term Effects? Results of a Follow-Up on a Randomized Policy Experiment in the Philippines	2016	English	No Model
Racchi, M., Govoni, S., Lucchelli, A., et al.	Insights into the definition of terms in European medical device regulation	2016	English	No Model
Rahman, M. J., Nizame, F. A., Nuruzzaman, M., et al.	Toward a Scalable and Sustainable Intervention for Complementary Food Safety	2016	English	No Model
Rahman, M., & Mistry, S.	Anemia and its socio-demographic correlates among adolescent girls in bangladesh	2017		No Model
Rahman, N., Vinayakarao, L., Pathak, S., et al.	Evaluation of training programme uptake in an attempt to reduce obstetric anal sphincter injuries: the SUPPORT programme	2017	English	No Model
Raju, R. S., Guy, G. S., Majid, A. J., et al.	The Australian and New Zealand Audit of Surgical Mortality-birth, deaths, and carriage	2015	English	No Model

Ralph, A. P., Read, C., Johnston, V., et al.	Improving delivery of secondary prophylaxis for rheumatic heart disease in remote Indigenous communities: Study protocol for a stepped-wedge randomised trial	2016	English	No Model
Ramly, E., Panyard, D., Lauer, D., et al.	Sustained improvement in follow-up of hypertension in rheumatology patients: Results of an intervention sustainability assessment	2016	English	No Model
Ramsay, J., Schwindt, T., Nguyen, T., et al.	Translating a Proven Pediatric Healthy Homes Asthma Intervention to Adults	2018		No Model
Rapport, F., Clay-Williams, R., Churrua, K., et al.	The struggle of translating science into action: Foundational concepts of implementation science	2017	English	No Model
Rasmussen, C. D. N., Hojberg, H., Bengtsen, E., et al.	Identifying knowledge gaps between practice and research for implementation components of sustainable interventions to improve the working environment - A rapid review	2018	English	No Model
Raviglione, M., & Maher, D.	Ending infectious diseases in the era of the Sustainable Development Goals	2017	English	No Model
Ravnic, D. J., Leberfinger, A. N., Koduru, S. V., et al.	Transplantation of Bioprinted Tissues and Organs: Technical and Clinical Challenges and Future Perspectives	2017	English	No Model
Recine, U., Scotti, E., Bruzzese, V., et al.	The change of hospital internal medicine: A study on patients admitted in internal medicine wards of 8 hospitals of the Lazio area, Italy	2015	English	No Model
Redaelli, M., Vollmar, H. C., Simic, D., et al.	[Guideline implementation study on asthma: Results of a pragmatic implementation approach]	2015	German	No Model
Reddy, A., Stone, J., Chui, M., et al.	Using participatory design to develop a pharmacy-based intervention to improve OTC medication safety for older adults	2018		No Model
Redley, B., Bucknall, T. K., Evans, S., et al.	Inter-professional clinical handover in postanaesthetic care units: Tools to improve quality and safety	2016	English	No Model
Reid, Z. Z., Regan, S., Kelley, J. H., et al.	Comparative Effectiveness of Post-Discharge Strategies for Hospitalized Smokers: study protocol for the Helping HAND 2 randomized controlled trial	2015	English	No Model

Rewa, O., Villeneuve, P. M., Eurich, D. T., et al.	Quality indicators in continuous renal replacement therapy (CRRT) care in critically ill patients: Protocol for a systematic review	2015	English	No Model
Reyes, N. F. S., Jaimes, M. C., Becerra, A. F. G., et al.	Successful model of a sustainable program for low income pediatric children with congenital heart diseases in developing countries	2017		No Model
Reynolds, S. S., McLennon, S. M., Ebright, P. R., et al.	Program evaluation of neuroscience competency programs to implement evidence-based practices	2017	English	No Model
Rezapour, M., Ali, S., & Gerson, L.	Efficacy of fecal microbiota transplantation (FMT) for ulcerative colitis (UC): Systematic review and meta-analysis	2017		No Model
Rhodes, R. E., & Kates, A.	Can the Affective Response to Exercise Predict Future Motives and Physical Activity Behavior? A Systematic Review of Published Evidence	2015	English	No Model
Ricci-Cabello, I., Violan, C., Foguet-Boreu, Q., et al.	Impact of multi-morbidity on quality of healthcare and its implications for health policy, research and clinical practice. A scoping review	2015	English	No Model
Richard, P., Shin, P., Beeson, T., et al.	Quality and Cost of Diabetes Mellitus Care in Community Health Centers in the United States	2015	English	No Model
Richards, A. K., Bryg, R. J., Cheng, E. M., et al.	Global risk reduction: A novel method to estimate the impact of multiple intervention trials to reduce stroke disparities	2016	English	No Model
Richardson, L. D.	Integrating Health Equity Into Practice and Policy	2016	English	No Model
Richter, K. P., Hunt, J. J., Cupertino, A. P., et al.	Commitment and capacity for providing evidence-based tobacco treatment in US drug treatment facilities	2017		No Model
Risalde, M. A., Lopez, V., Contreras, M., et al.	Control of mycobacteriosis in zebrafish (Danio rerio) mucosally vaccinated with heat-inactivated Mycobacterium bovis	2018		No Model
Ritte, R. E., Lawton, P., Hughes, J. T., et al.	Chronic kidney disease and socio-economic status: a cross sectional study	2017	English	No Model
Roberts, D. A., Ng, M., Ikilezi, G., et al.	Benchmarking health system performance across regions in Uganda: A systematic analysis of levels and trends in key maternal and child health interventions, 1990-2011	2015	English	No Model

Roberts, E. B., & Jette, S. L.	Implementing participatory research with an urban American Indian community: Lessons learned	2016	English	No Model
Roberts, L. R., & Montgomery, S. B.	Mindfulness-based Intervention for Perinatal Grief after Stillbirth in Rural India	2015	English	No Model
Roberts, M. C., Kennedy, A. E., Chambers, D. A., et al.	The current state of implementation science in genomic medicine: Opportunities for improvement	2017	English	No Model
Robinson, M., Raine, G., Robertson, S., et al.	Peer support as a resilience building practice with men	2015		No Model
Roche, S. D., Ketheeswaran, P., & Wirtz, V. J.	International short-term medical missions: a systematic review of recommended practices	2017	English	No Model
Roche, T. E., Gardner, G., & Lewis, P. A.	Effectiveness of an emergency nurse practitioner service for adults presenting to rural hospitals with chest pain: Protocol for a multicentre, longitudinal nested cohort study	2015	English	No Model
Rocker, G. M., Amar, C., Laframboise, W. L., et al.	Spreading improvements for advanced COPD care through a Canadian Collaborative	2017	English	No Model
Rocque, G. B., & Partridge, E. E.	Sustainability of patient navigation programs: Lessons learned from a Medicare innovation project	2015	English	No Model
Rodgers, H., Shaw, L., Cant, R., et al.	Evaluating an extended rehabilitation service for stroke patients (EXTRAS): Study protocol for a randomised controlled trial	2015	English	No Model
Rodriguez Ferrucci, H., Razuri, H., Casapia, M., et al.	Governance, organization, accountability and sustainability of a region-wide school-based deworming program in Loreto, Peru	2016	English	No Model
Rodriguez, M. A., Suarez-Almazor, M. E., Lewis-Patterson, P. A., et al.	A novel strategy to build research capacity in survivorship science	2017	English	No Model
Rodriguez, M. I., Darney, B. G., Elman, E., et al.	Examining quality of contraceptive services for adolescents in Oregon's family planning program	2015	English	No Model
Rodriguez-Llanes, J. M., Ranjan-Dash, S., Mukhopadhyay, A., et al.	Looking upstream: enhancers of child nutritional status in post-flood rural settings	2016	English	No Model
Rohenkohl, A. C., Sommer, R., Kahrs, S., et al.	[Evaluation of a Self-Help Supported Counseling Concept for Children and Adolescents with Disproportional Short Stature]	2016	German	No Model

Rosas, S. R., Behar, L. B., & Hydaker, W. M.	Community Readiness Within Systems of Care: The Validity and Reliability of the System of Care Readiness and Implementation Measurement Scale (SOC-RIMS)	2016	English	No Model
Rosenbek, J. C.	Tyranny of the randomised clinical trial	2016		No Model
Rossberg, A. G., Uusitalo, L., Berg, T., et al.	Quantitative criteria for choosing targets and indicators for sustainable use of ecosystems	2017	English	No Model
Rossos, P. G., St-Cyr, O., Purdy, B., et al.	Hype, harmony and human factors: applying user-centered design to achieve sustainable telehealth program adoption and growth	2015	English	No Model
Rouleau, G., Gagnon, M. P., Cote, J., et al.	Impact of Information and Communication Technologies on Nursing Care: Results of an Overview of Systematic Reviews	2017	English	No Model
Routray, P., Torondel, B., Jenkins, M. W., et al.	Processes and challenges of community mobilisation for latrine promotion under Nirmal Bharat Abhiyan in rural Odisha, India	2017	English	No Model
Rubert, J., Lacina, O., Zachariasova, M., et al.	Erratum: Corrigendum to "Saffron authentication based on liquid chromatography high resolution tandem mass spectrometry and multivariate data analysis" (Food Chem. (2016) 204 (201-209))	2017	English	No Model
Rulisa, A., Ingabire, C., Hakizimana, E., et al.	Rice farmers' willingness to pay for malarial vector larval source management: The case of Ruhuha community in Eastern Rwanda	2015	English	No Model
Rustagi, A. S., Gimbel, S., Nduati, R., et al.	Health facility factors and quality of services to prevent mother-to-child HIV transmission in Cote d'Ivoire, Kenya, and Mozambique	2017	English	No Model
Rynes, J., Harnos, J., Bryja, V., et al.	Modulation of cell signaling via interfering specific protein-protein interactions of a hub scaffold protein	2016	English	No Model
Saarela, S. R., Soderman, T., & Lyytimaki, J.	Knowledge brokerage context factors - What matters in knowledge exchange in impact assessment?	2015	English	No Model
Sacco, R. L., Gardener, H., Wang, K., et al.	Racial-ethnic disparities in acute stroke care in the Florida-Puerto Rico collaboration to reduce stroke disparities study	2017	English	No Model
Safarnejad, A., Pavlova, M., Son, V. H., et al.	Criteria for prioritization of HIV programs in Viet Nam: a discrete choice experiment	2017	English	No Model

Sahay, S., Melendres-Groves, L., Pawar, L., et al.	Pulmonary Hypertension Care Center Network: Improving Care and Outcomes in Pulmonary Hypertension	2017	English	No Model
Sahlen, K. G., Boman, K., & Brannstrom, M.	A cost-effectiveness study of person-centered integrated heart failure and palliative home care: Based on a randomized controlled trial	2016	English	No Model
Saito, S., Howard, A. A., Chege, D., et al.	Monitoring quality at scale: implementing quality assurance in a diverse, multicountry HIV program	2015	English	No Model
Salazar-Ospina, A., Amariles, P., Hincapie-Garcia, J. A., et al.	Effectiveness of the Dader Method for Pharmaceutical Care on Patients with Bipolar I Disorder: Results from the EMDADER-TAB Study	2017	English	No Model
Salyers, M. P., Bonfils, K. A., Luther, L., et al.	The Relationship Between Professional Burnout and Quality and Safety in Healthcare: A Meta-Analysis	2017	English	No Model
Samaan, Z., Dennis, B. B., Kalbfleisch, L., et al.	Behavioral activation group therapy for reducing depressive symptoms and improving quality of life: a feasibility study	2016	English	No Model
Samad, L., Iqbal, M., Tariq, A., et al.	Equitable access to comprehensive surgical care: the potential of indigenous private philanthropy in low-income settings	2015	English	No Model
Sanchez-Arreola, S. V., & Garnica-Garza, H. M.	Feasibility of robotic stereotactic body radiotherapy of lung tumors with kilovoltage x-ray beams	2017	English	No Model
Sarpe, V., & Schriemer, D. C.	Supporting metabolomics with adaptable software: design architectures for the end-user	2017	English	No Model
Sarwar, A., Boland, G., Monks, A., et al.	Metrics for Radiologists in the Era of Value-based Health Care Delivery	2015	English	No Model
Saunbury, E., & Howarth, G.	Improving communication between phlebotomists and doctors: a quality improvement project	2016	English	No Model
Scales, C. D., Bergman, J., Carter, S., et al.	Quality of Acute Care for Patients With Urinary Stones in the United States	2015	English	No Model
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Schaller, A., Dejonghe, L., Alayli-Goebbels, A., et al.	Promoting physical activity and health literacy: study protocol for a longitudinal, mixed methods evaluation of a cross-provider workplace-related intervention in Germany (The AtRisk study)	2016	English	No Model
Schalock, R. L., Gomez, L. E., Verdugo, M. A., et al.	Evidence and Evidence-Based Practices: Are We There Yet?	2017	English	No Model
Schnell-Inderst, P., Mayer, J., Lauterberg, J., et al.	Health technology assessment of medical devices: What is different? An overview of three European projects	2015	English	No Model
Schoenberg, N. E., Ciciurkaite, G., & Greenwood, M. K.	Community to clinic navigation to improve diabetes outcomes	2017	English	No Model
Schoenfeld, A. J., Davies, J. M., Marafino, B. J., et al.	Variation in quality of urgent health care provided during commercial virtual visits	2016	English	No Model
Schoenrock, D. L., Hartkopf, K., & Boeckelman, C.	Development and implementation of a pharmacist-run comprehensive medication review program in Wisconsin	2016	English	No Model
Schumacher, P. M., Kaune, A., Merckenschlager, A., et al.	Optimizing parents' performance in anticonvulsant rescue medication administration	2018		No Model
Schwerdtle, P., Morphet, J., & Hall, H.	A scoping review of mentorship of health personnel to improve the quality of health care in low and middle-income countries	2017	English	No Model
Seangpraw, K., Somrongthong, R., Choowanthanapakorn, M., et al.	The Effect Of Sex Education And Life Skills For Preventive Sexual Risk Behaviours Among University Of Students In Thailand	2017		No Model
Seddon, D., & Robinson, C.	Carer assessment: continuing tensions and dilemmas for social care practice	2015		No Model
Seidel, N., Stolzel, F., Herrmann, S., et al.	Skin cancer prevention starts early in life - The 'SonnenschutzClown' preschool program	2018		No Model
Sen, D. R., Kaminski, J., Barnitz, R. A., et al.	The epigenetic landscape of T cell exhaustion	2016	English	No Model
Seow, H., & Bainbridge, D.	A Review of the Essential Components of Quality Palliative Care in the Home	2018		No Model
Sepahzad, A.	Patient academy-empowering parents and patients in the role of educators & developing a platform for collaborative working to improve paediatric health	2016	English	No Model

Sepers, C. E., Jr., Fawcett, S. B., Lipman, R., et al.	Measuring the Implementation and Effects of a Coordinated Care Model Featuring Diabetes Self-management Education Within Four Patient-Centered Medical Homes	2015	English	No Model
Serowoky, M. L., George, N., & Yarandi, H.	Using the Program Logic Model to Evaluate Cuidate!: A Sexual Health Program for Latino Adolescents in a School-Based Health Center	2015	English	No Model
Shadman, K. A., Ralston, S. L., Garber, M. D., et al.	Sustainability in the AAP Bronchiolitis Quality Improvement Project	2017	English	No Model
Shah, N., Castro-Sanchez, E., Charani, E., et al.	Towards changing healthcare workers' behaviour: a qualitative study exploring non-compliance through appraisals of infection prevention and control practices	2015	English	No Model
Shankar, R.	Getting medical innovation to patients in developing countries-a systemic approach to setting price and access	2016	English	No Model
Sharp, W. G., Volkert, V. M., Scahill, L., et al.	A Systematic Review and Meta-Analysis of Intensive Multidisciplinary Intervention for Pediatric Feeding Disorders: How Standard Is the Standard of Care?	2017	English	No Model
Shaw, C. D.	How can healthcare standards be standardised?	2015	English	No Model
Sheehan, O. C., Weinstein, M. G., Ahuja, A., et al.	The effect of caregivers on motivation to improve daily physical activity after stroke	2017	English	No Model
Shelgikar, A. V., Priddy, C., & Van Harrison, R.	Meeting ACGME and ABMS quality improvement requirements in a sleep medicine fellowship program	2017	English	No Model
Sheriff, S., Zawahrah, H. J., Chang, L. V., et al.	What is the Cost of Free Cleft Surgery in the Middle East?	2017	English	No Model
Sherwood, G., & McNeill, J.	Reflective practice: Providing safe quality patient-centered pain management	2017	English	No Model
Shikuku, D. N., Milimo, B., Ayebare, E., et al.	Quality of Care during Neonatal Resuscitation in Kakamega County General Hospital, Kenya: A Direct Observation Study	2017		No Model
Shin, C. N., Keller, C., & Sim, J.	Cultural Factors relevant to Korean Americans in Health Research: A Systematic Review	2017	English	No Model
Shingleton, R. M., & Palfai, T. P.	Technology-delivered adaptations of motivational interviewing for health-related behaviors: A systematic review of the current research	2016	English	No Model

Shogren, K. A., Dean, E., Griffin, C., et al.	Promoting change in employment supports: Impacts of a community-based change model	2017		No Model
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Silove, D., Ventevogel, P., & Rees, S.	The contemporary refugee crisis: an overview of mental health challenges	2017	English	No Model
Silva, A., Rosano, M., Stocker, L., et al.	From waste to sustainable materials management: Three case studies of the transition journey	2017	English	No Model
Sim, L. A., Lebow, J., Wang, Z., et al.	Brief primary care obesity interventions: A meta-analysis	2016	English	No Model
Simmons, E., Viles, A., Booth, K. A., et al.	Stepwise approach to securing key stakeholder support for inpatient geriatric models of care	2015	English	No Model
Simoneau, T. L., Kilbourn, K., Spradley, J., et al.	An evidence-based stress management intervention for allogeneic hematopoietic stem cell transplant caregivers: development, feasibility and acceptability	2017	English	No Model
Singh, L. G., Accursi, M., & Black, K. K.	Implementation and outcomes of a pharmacist-managed clinical video telehealth anticoagulation clinic	2015		No Model
Singla, D. R., & Kumbakumba, E.	The development and implementation of a theory-informed, integrated mother-child intervention in rural Uganda	2015		No Model
Sivasankar, S.	Use of National Electronic Health Record (EHR) Data Warehouse to Identify Inappropriate HbA1c Orders for Sickle Cell Disease Patients	2018	English	No Model
Small, R., Belkora, J., Jow, A., et al.	Integrating outpatient palliative care into a metastatic breast oncology clinic	2015	English	No Model
Smith, C. S., Weppner, W. G., Willis, J. V., et al..	Technology-supported dissemination: Implementation kits for training in team-based care	2018		No Model
Smith, C., Gibbard, D., & Higgins, L.	An evaluation of an integrated model of speech and language therapy in public health practice for early language development	2017		No Model
Smith, J. E., Withnall, R. D. J., Rickard, R. F., et al.	A pilot study to evaluate the utility of live training (LIVEX) in the operational preparedness of UK military trauma teams	2016	English	No Model

Smolow, J., Huruba, E., & Badza, A.	Second chance education in Zimbabwe: An inclusive model to achieve education for all	2015	English	No Model
Song, S., Araiza, D., Reyes, C., et al.	Worth the walk: a randomized controlled trial of a walking intervention to decrease stroke risk among minority seniors	2017	English	No Model
Song, S., Son, J., Barry, F., et al.	A culturally tailored education intervention for Korean seniors increases stroke knowledge	2015	English	No Model
Sonntag, D., Jarczok, M. N., & Ali, S.	DC-Obesity: A New Model for Estimating Differential Lifetime Costs of Overweight and Obesity by Socioeconomic Status	2017	English	No Model
Sorensen, J. S., Galvin, S. R., & Maitland, A. R.	Implementing targeted interdisciplinary solutions to health barriers through experiential learning projects: The Northwestern access to health project in Mali	2016	English	No Model
Sorensen, S. S., Pedersen, K. M., Weinreich, U. M., et al.	Design, and participant enrollment, of a randomized controlled trial evaluating effectiveness and cost-effectiveness of a community-based case management intervention, for patients suffering from COPD	2015	English	No Model
Spatz, E. S., Lipska, K. J., Dai, Y., et al.	Risk-standardized acute admission rates among patients with diabetes and heart failure as a measure of quality of accountable care organizations rationale, methods, and early results	2016	English	No Model
Spees, C. K., Hill, E. B., Grainger, E. M., et al.	Feasibility, preliminary efficacy, and lessons learned from a garden-based lifestyle intervention for cancer survivors	2016	English	No Model
Spencer, L., Rollo, M., Hauck, Y., et al.	The effect of weight management interventions that include a diet component on weight-related outcomes in pregnant and postpartum women: a systematic review protocol	2015	English	No Model
Spencer, M. S., Kieffer, E. C., Sinco, B., et al.	Outcomes at 18 Months From a Community Health Worker and Peer Leader Diabetes Self-Management Program for Latino Adults	2018		No Model
Spoorenberg, V., Geerlings, S. E., Geskus, R. B., et al.	Appropriate antibiotic use for patients with complicated urinary tract infections in 38 Dutch Hospital Departments: A retrospective study of variation and determinants	2015	English	No Model

Springfield, S., Buscemi, J., Fitzgibbon, M. L., et al.	A randomized pilot study of a community-based weight loss intervention for African-American women: Rationale and study design of Doing Me! Sisters Standing Together for a Healthy Mind and Body	2015	English	No Model
Stalker, K. C., Rose, R. A., Bacallao, M., et al.	Parenting Wisely Six Months Later: How Implementation Delivery Impacts Program Effects at Follow-Up	2018		No Model
Stancliffe, R.	Sustainable choices	2016	English	No Model
Stapleton, C.	Motivational enhancement therapykeeping our patients motivated!	2015	English	No Model
Steffen, K., Doctor, A., & Hoerr, J.	Controlling Phlebotomy Volume Diminishes PICU Transfusion: Implementation Processes and Impact	2017		No Model
Steinmann, P., Reed, S. G., Mirza, F., et al.	Innovative tools and approaches to end the transmission of Mycobacterium leprae	2017	English	No Model
Stengel, D., Kirschner, S., Ekkernkamp, A., et al.	[Evidence-based trauma and orthopedic surgery : 20 years after Sackett]	2016	German	No Model
Stephen, J., Rojubally, A., Linden, W., et al.	Online support groups for young women with breast cancer: a proof-of-concept study	2017	English	No Model
Stephens, J., Hall, S., Harrison, C., et al.	Building near-peer teaching into the anatomy curriculum-a national perspective from anatomy educators and students	2017	English	No Model
Stetler, K., Silva, C., Manning, S., et al.	Lessons Learned: Implementation of Pilot Universal Postpartum Nurse Home Visiting Program, Massachusetts 2013-2016	2018		No Model
Steuber, T., Sharma, V., Decaestecker, K., et al.	Standard of care versus metastasis-directed therapy for nodal oligorecurrent prostate cancer following multimodality treatment: A case-control study	2017	English	No Model
Stevely, A. K., Buykx, P., Brown, J., et al.	Exposure to revised drinking guidelines and 'COM-B' determinants of behaviour change: descriptive analysis of a monthly cross-sectional survey in England	2018		No Model
Stevens, B. J., Yamada, J., Promislow, S., et al.	Pain Assessment and Management After a Knowledge Translation Booster Intervention	2016	English	No Model
Stolk-Vos, A. C., Van De Klundert, J. J., Maijers, N., et al.	Multi-stakeholder perspectives in defining health-services quality in cataract care	2017	English	No Model

Storcksdieck Genannt Bonsmann, S., Mak, T. N., Caldeira, S., et al.	How to promote water intake in schools: A toolkit	2016	English	No Model
Stordeur, S., Vrijens, F., & Leroy, R.	Reference centres for adults with rare and complex cancers - Policy recommendations to improve the organisation of care in Belgium	2016	English	No Model
Streber, R., Gawlik, A., Kuld, S., et al.	Effects of a behavioural internet-based after-care program on physical activity and self-concordance in persons with Multiple Sclerosis	2018		No Model
Strudwick, K., Nelson, M., Martin-Khan, M., et al.	Quality indicators for musculoskeletal injury management in the emergency department: A systematic review	2015	English	No Model
Stuart-Shor, E. M., Cunningham, E., Foradori, L., et al.	The Global Health Service Partnership: An Academic-Clinical Partnership to Build Nursing and Medical Capacity in Africa	2017	English	No Model
Stuchlikova, E., Zahradnikova, M., Nenutil, R., et al.	[Ascites May Provide Useful Information for Diagnosis of Ovarian Cancer]	2017	Czech	No Model
Stuckey, E. M., Miller, J. M., Littrell, M., et al.	Operational strategies of anti-malarial drug campaigns for malaria elimination in Zambia's southern province: a simulation study	2016	English	No Model
Su, S., Bao, H., Wang, X., et al.	The quality of invasive breast cancer care for low reimbursement rate patients: A retrospective study	2017	English	No Model
Subramanian, L., Simon, C., & Daniel, E. E.	Increasing Contraceptive Use Among Young Married Couples in Bihar, India: Evidence From a Decade of Implementation of the PRACHAR Project	2018		No Model
Such, E., Salway, S., Copeland, R., et al.	A formative review of physical activity interventions for minority ethnic populations in England	2017		No Model
Suiter, S. V., Thurber, A., & Sullivan, C.	A Co-Learning Model for Community-Engaged Program Evaluation	2016	English	No Model
Sulzgruber, P., Pesce, M., Schnaubelt, S., et al.	Severe aortic stenosis is an independent predictor for mortality in patients with in-hospital cardiac arrest after acute coronary syndrome	2018		No Model
Sun, S., Raja, J., Atteya, G., et al.	If you build it, they will come: A point-of-care ultrasound curriculum for internal medicine residents	2016	English	No Model

Sureshkumar, K., & Dineshraj, P.	Is managerial convergence sufficient for implementing stroke services within the NPCDCS program in India?-a critical appraisal	2016	English	No Model
Suter, L. G., Smith, S. R., Katz, J. N., et al.	Projecting Lifetime Risk of Symptomatic Knee Osteoarthritis and Total Knee Replacement in Individuals Sustaining a Complete Anterior Cruciate Ligament Tear in Early Adulthood	2017	English	No Model
Sutton, R., Lahuerta, M., Abacassamo, F., et al.	Feasibility and acceptability of health communication interventions within a combination intervention strategy for improving linkage and retention in HIV care in mozambique	2017	English	No Model
Swanney, M. P., O'Dea, C. A., Ingram, E. R., et al.	Spirometry training courses: Content, delivery and assessment - a position statement from the Australian and New Zealand Society of Respiratory Science	2017	English	No Model
Swiatek, P. R., Chung, K. C., & Mahmoudi, E.	Surgery and Research: A Practical Approach to Managing the Research Process	2016	English	No Model
Swinglehurst, D., & Greenhalgh, T.	Caring for the patient, caring for the record: an ethnographic study of 'back office' work in upholding quality of care in general practice	2015	English	No Model
Taddei, C., Gnesotto, R., Forni, S., et al.	Cycling promotion and non-communicable disease prevention: Health impact assessment and economic evaluation of cycling to work or school in Florence	2015	English	No Model
Takahashi, P. Y., Naessens, J. M., Peterson, S. M., et al.	Short-term and long-term effectiveness of a post-hospital care transitions program in an older, medically complex population	2016	English	No Model
Tang, J. C., Abraham, C., Greaves, C. J., et al.	Self-directed interventions to promote weight loss: a systematic review and meta-analysis	2016	English	No Model
Tanis, E., Caballero, C., Collette, L., et al.	The European Organization for Research and Treatment for Cancer (EORTC) strategy for quality assurance in surgical clinical research: Assessment of the past and moving towards the future	2016	English	No Model

Teichert, U., Kaufhold, C., Rissland, J., et al.	[Proposal for a Nationwide Johann-Peter Frank Cooperation Model under the National Leopoldina Initiative for Public Health and Global Health]	2016	German	No Model
Temkin-Greener, H., Ladwig, S., Ye, Z., et al.	Improving palliative care through teamwork (IMPACTT) in nursing homes: Study design and baseline findings	2017	English	No Model
Tempels, T. H., & Van den Belt, H.	Once the rockets are up, who should care where they come down? The problem of responsibility ascription for the negative consequences of biofuel innovations	2016	English	No Model
Temple, R. M.	Delivering the future hospital	2017		No Model
Teunissen, E., Gravenhorst, K., Dowrick, C., et al.	Implementing guidelines and training initiatives to improve cross-cultural communication in primary care consultations: A qualitative participatory European study	2017	English	No Model
Thiel, C., Woods, N., & Bilec, M.	Strategies to Reduce Greenhouse Gas Emissions From Laparoscopic Surgery	2018		No Model
Thinggaard, E.	Take-Home Training in Laparoscopy	2017	English	No Model
Thogersen-Ntoumani, C., Wright, A., Quested, E., et al.	Protocol for the residents in action pilot cluster randomised controlled trial (RiAT): Evaluating a behaviour change intervention to promote walking, reduce sitting and improve mental health in physically inactive older adults in retirement villages	2017	English	No Model
Tichanek, F., Salomova, M., Jelinkova, D., et al.	Forced activity subtly mitigates motor and behavioural deficits in Lurcher mutant mice	2018		No Model
Tingey, L., Chambers, R., Rosenstock, S., et al.	The Impact of a Sexual and Reproductive Health Intervention for American Indian Adolescents on Predictors of Condom Use Intention	2017	English	No Model
Tissera, H., Pannila-Hetti, N., Samaraweera, P., et al.	Sustainable dengue prevention and control through a comprehensive integrated approach: the Sri Lankan perspective	2016	English	No Model
Tobin-West, C. I., & Isodje, A.	Quality and rural-urban comparison of tuberculosis care in Rivers State, Nigeria	2016	English	No Model

Tolentino-Zondervan, F., Berentsen, P., Bush, S. R., et al.	Fisher-level decision making to participate in Fisheries Improvement Projects (FIPs) for yellowfin tuna in the Philippines	2016	English	No Model
Tolma, E. L., Thomas, C., Stoner, J., et al.	Native women's health project: An innovative approach toward promoting screening mammography in an American Indian community in Oklahoma	2015	English	No Model
Tomlinson, M., Rotheram-Borus, M. J., le Roux, I. M., et al.	Thirty-Six-Month Outcomes of a Generalist Paraprofessional Perinatal Home Visiting Intervention in South Africa on Maternal Health and Child Health and Development	2016	English	No Model
Tonna, J., Kawamoto, K., Presson, A., et al.	Pragmatic single intervention for a sustained reduction in portable chest radiography (PCXR) in cardiovascular and surgical/trauma ICU and associated outcomes	2016	English	No Model
Torrao, G., Fontes, T., Coelho, M., et al.	Integrated indicator to evaluate vehicle performance across: Safety, fuel efficiency and green domains	2016	English	No Model
Torre, S. B. D., Dudley-Martin, F., & Kruseman, M.	Croque&bouge: A feasible and acceptable programme for obesity prevention in preschoolers at risk and their parents	2015	English	No Model
Torres, J., Travis, D., & Wong, S.	Standard of care for non-muscle invasive bladder carcinoma is induction followed by maintenance intra-vesical BCG therapy after trans-urethral bladder tumour resection. But how well is it tolerated?	2015	English	No Model
Torres, L. P. V.	Living Undocumented: An Ethnographic Study of the Mental Health and Wellbeing of Undocumented Mexican Migrant Men	2018	English	No Model
Townsend, B.	International medicines governance 1940s to 1970s: lessons for public health	2016	English	No Model
Townsend, R., Mahmood, A., Foye, R., et al.	Not another teach and run: Local staff initiated multidisciplinary teaching in a regional referral hospital in Western Uganda in the context of a long term sustainable volunteering programme	2016	English	No Model
Toye, C., Jiwa, M., Holloway, K., et al.	Can a community of practice enhance a palliative approach for people drawing close to death with dementia?	2015		No Model

Tran, B. X., Nguyen, L. H., Tran, T. T., et al.	Social and structural barriers for adherence to methadone maintenance treatment among Vietnamese opioid dependence patients	2018		No Model
Trimmel, H., Beywinkler, C., Hornung, S., et al.	Success rates of pre-hospital difficult airway management: a quality control study evaluating an in-hospital training program	2018		No Model
Trude, A. C. B., Anderson Steeves, E., Shipley, C., et al.	A Youth-Leader Program in Baltimore City Recreation Centers: Lessons Learned and Applications	2017	English	No Model
Truong, L., Tat, J., Booy, M., et al.	The Asian Grocery Store-Based Cancer Education Program: Creating New Education Modules	2016	English	No Model
Tsai, C., Blinkhorn, A., & Irving, M.	Oral Health Programmes in Indigenous Communities Worldwide-Lessons learned from the field: A qualitative systematic review	2017		No Model
Tsai, T. C., Greaves, F., Jie, Z., et al.	Better Patient Care At High-Quality Hospitals May Save Medicare Money And Bolster Episode-Based Payment Models	2016		No Model
Tsao, P. C., Shiao, Y. S., Chiang, S. H., et al.	Development of a newborn screening program for critical congenital heart disease (CCHD) in Taipei	2016	English	No Model
Tse, A. C. Y., Lee, P. H., Zhang, J., et al.	Study protocol for a randomised controlled trial examining the association between physical activity and sleep quality in children with autism spectrum disorder based on the melatonin-mediated mechanism model	2018		No Model
Turcotte-Tremblay, A.-M., Gali-Gali, I. A., De Allegri, M., et al.	The unintended consequences of community verifications for performance-based financing in Burkina Faso	2017		No Model
Turner, L., & Chaloupka, F. J.	Reach and Implementation of Physical Activity Breaks and Active Lessons in Elementary School Classrooms	2017		No Model
Turunen, E., Miettinen, M., Setälä, L., et al.	The impact of a structured preoperative protocol on day of surgery cancellations	2018		No Model
Tzeng, I. S., Liu, S. H., Chen, K. F., et al.	Impact of performance grading on annual numbers of acute myocardial infarction-associated emergency department visits in Taiwan: Results of segmented regression analysis	2016	English	No Model

Uittenbroek, R. J., Kremer, H. P. H., Spoorenberg, S. L. W., et al.	Integrated Care for Older Adults Improves Perceived Quality of Care: Results of a Randomized Controlled Trial of Embrace	2017	English	No Model
Ukawa, N., Tanaka, M., Morishima, T., et al.	Organizational culture affecting quality of care: Guideline adherence in perioperative antibiotic use	2015	English	No Model
Um, I. S., Krass, I., Armour, C., et al.	Developing and testing evidence-based weight management in Australian pharmacies: A Healthier Life Program	2015	English	No Model
Umoren, R., Vaucher, Y., Kurbasic, M., et al.	International community access to child health programme 10 years of supporting global child health	2017		No Model
Valentini, R. P.	Patient safety and quality improvement: What the pediatric trainee needs to know	2017	English	No Model
Vali, P., Chandrasekharan, P., Rawat, M., et al.	Continuous chest compressions during sustained inflations in a perinatal asphyxial cardiac arrest lamb model	2017	English	No Model
Van Belle, S., Rifkin, S., & Marchal, B.	The challenge of complexity in evaluating health policies and programs: the case of women's participatory groups to improve antenatal outcomes	2017	English	No Model
van Daalen, F. V., Prins, J. M., Opmeer, B. C., et al.	A cluster randomized trial for the implementation of an antibiotic checklist based on validated quality indicators: The AB-checklist	2015	English	No Model
Van Dooren, C., Keuchenius, C., De Vries, J., et al.	Identifying the sustainability and health impact of diets in Dutch population subgroups	2015	English	No Model
Van Gelder, V. A., Scherpbier-De Haan, N. D., De Grauw, W. J. C., et al.	Quality of chronic kidney disease management in primary care: a retrospective study	2016		No Model
Van Harten, W. H., & Retel, V. P.	Innovations that reach the patient: Early health technology assessment and improving the chances of coverage and implementation	2016	English	No Model
van Holland, B. J., Reneman, M. F., Soer, R., et al.	Effectiveness and Cost-benefit Evaluation of a Comprehensive Workers' Health Surveillance Program for Sustainable Employability of Meat Processing Workers	2017	English	No Model
Van Puymbroeck, M., Miller, K. K., Dickes, L. A., et al.	Perceptions of Yoga Therapy Embedded in Two Inpatient Rehabilitation Hospitals: Agency Perspectives	2015	English	No Model

VanArsdale, L., Curran-Everett, D., Haugen, H., et al.	For Diabetes Shared Savings Programs, 1 Year of Data Is Not Enough	2017		No Model
VandeKieft, G., Kallestad, J., Hess, D., et al.	An exercise in futility? Developing policy and shaping practice to address demands for "nonbeneficial medical treatment"	2015	English	No Model
Vedula, S. S., & Hager, G. D.	Surgical data science: The new knowledge domain	2017	English	No Model
Vermeij, W. P., Dolle, M. E., Reiling, E., et al.	Restricted diet delays accelerated ageing and genomic stress in DNA-repair-deficient mice	2016	English	No Model
Vesel, L., Otieno, J., & Fotso, J.	The innovations initiative: Technological approaches for addressing maternal, newborn and child health	2015	English	No Model
Vettoretto, N., Foglia, E., Ferrario, L., et al.	Why laparoscopists may opt for three-dimensional view: a summary of the full HTA report on 3D versus 2D laparoscopy by S.I.C.E. (Societa Italiana di Chirurgia Endoscopica e Nuove Tecnologie)	2018		No Model
Villa-Torres, L., & Svanemyr, J.	Ensuring youth's right to participation and promotion of youth leadership in the development of sexual and reproductive health policies and programs	2015	English	No Model
Visher, C. A., Yang, Y., Mitchell, S. G., et al.	Understanding the sustainability of implementing HIV services in criminal justice settings	2015	English	No Model
Vo, A., Shore, J., Waugh, M., et al.	Meaningful use: a national framework for integrated telemedicine	2015	English	No Model
Vogler, S., Osterle, A., & Mayer, S	Inequalities in medicine use in Central Eastern Europe: an empirical investigation of socioeconomic determinants in eight countries	2015	English	No Model
Vokurka, S., Votavova, M., Arnetova, V., et al.	[Everolimus in Daily Clinical Practice Focusing to Oral Mucosa Damage Issues - Single Oncology Centre Experience within the Course of the Year 2016]	2017	Czech	No Model
Volland, J., & Blockberger-Miller, S.	Closing the transition gaps the changing context of home healthcare coordination	2015	English	No Model
von Davier, M.	Automated Item Generation with Recurrent Neural Networks	2018		No Model

Von Lengerke, T., Lutze, B., Krauth, C., et al.	Sustainability takes time: Effects of the psychologically tailored interventions on hand hygiene compliance in the PSYGIENE cluster-randomized controlled trial after two years of follow-up	2016	English	No Model
Wagman, J. A., King, E. J., Namatovu, F., et al.	Combined Intimate Partner Violence and HIV/AIDS Prevention in Rural Uganda: Design of the SHARE Intervention Strategy	2016		No Model
Wagner, S. J., & Reeves, S.	Milestones and entrustable professional activities: The key to practically translating competencies for interprofessional education?	2015	English	No Model
Waheed, U. W., & Zaheer, H. A. Z.	Establishment of national blood transfusion services in Pakistan	2015	English	No Model
Wahlberg, H., Valle, P. C., Malm, S., et al.	Impact of referral templates on the quality of referrals from primary to secondary care: a cluster randomised trial	2015	English	No Model
Wainer, A. L., Hepburn, S., & McMahon Griffith, E.	Remembering parents in parent-mediated early intervention: An approach to examining impact on parents and families	2017	English	No Model
Walker, J. M., Dixit, S., Saulsberry, A. C., et al.	Reversal of high fat diet-induced obesity improves glucose tolerance, inflammatory response, beta-amyloid accumulation and cognitive decline in the APP/PSEN1 mouse model of Alzheimer's disease	2017	English	No Model
Walker, S. C., Bumbarger, B. K., & Phillippi, S. W.	Achieving successful evidence-based practice implementation in juvenile justice: The importance of diagnostic and evaluative capacity	2015	English	No Model
Walker, T. R.	Green Marine: An environmental program to establish sustainability in marine transportation	2016	English	No Model
Walsh, K. S., Noll, R. B., Annett, R. D., et al.	Standard of Care for Neuropsychological Monitoring in Pediatric Neuro-Oncology: Lessons From the Children's Oncology Group (COG)	2016	English	No Model
Walsh, M. T., Dublin, B. A., Ishigami, E. M., et al.	The architecture of a shared leadership model for health systems strengthening initiatives led by a U.S.-based academic hospital	2015	English	No Model

Walsh, S. M., Meyer, M. R., Gamble, A., et al.	A Systematic Review of Rural, Theory-based Physical Activity Interventions	2017	English	No Model
Walter, U., Nocker, G., Pawils, S., et al.	[Memorandum on sustainable reinforcement of prevention and health promotion: challenges at the federal, state and local level]	2015	German	No Model
Wang, S. M., Taylor, P. R., Fan, J. H., et al.	Effects of Nutrition Intervention on Total and Cancer Mortality: 25-Year Post-trial Follow-up of the 5.25-Year Linxian Nutrition Intervention Trial	2018		No Model
Wang, X., Jin, L., Garrett, H., et al.	Attitudes and knowledge towards corneal donation in a population-based sample of urban Chinese adults	2015	English	No Model
Waring, J., Allen, D., Braithwaite, J., et al.	Healthcare quality and safety: a review of policy, practice and research	2016		No Model
Wartman, S. A., Zhou, Y., & Knettel, A. J.	Health Reform and Academic Health Centers: Commentary on an Evolving Paradigm	2015	English	No Model
Warwick-Giles, L.C.	Integrated care	2018		No Model
Waserman, S., Avilla, E., Harada, L., et al.	Implementation of stock epinephrine (stock epi) program in malls and food service establishments: A pilot implementation study	2017	English	No Model
Watson, A. J. M., Patience, L., Pisano, U., et al.	Introduction of an inflammatory bowel disease smart phone 'app': A qualitative study	2015	English	No Model
Wattayu, N., Wenzel, J., & Panchareounworakul, K.	Applying qualitative data derived from a Rapid Assessment and Response (RAR) approach to develop a community-based HIV prevention program for adolescents in Thailand	2015	English	No Model
Watts, J., & Weinrath, M.	The Winnipeg Mental Health Court: Preliminary Findings on Program Implementation and Criminal Justice Outcomes	2017		No Model
Webb, M. J., Wadley, G., & Sancj, L. A.	Experiences of General Practitioners and Practice Support Staff Using a Health and Lifestyle Screening App in Primary Health Care: Implementation Case Study	2018		No Model
Weber, M., Belala, N., Clemson, L., et al.	Feasibility and Effectiveness of Intervention Programmes Integrating Functional Exercise into Daily Life of Older Adults: A Systematic Review	2017	English	No Model

Webster, J., Kim, J. H., Hawley, C. B., et al.	Development, implementation, and outcomes of a residential vocational rehabilitation program for injured Service members and Veterans	2018		No Model
Wegman, M. P., Herndon, J. B., Muller, K. E., et al.	Quality of Care for Chronic Conditions Among Disabled Medicaid Enrollees: An Evaluation of a 1915 (b) and (c) Waiver Program	2015		No Model
Wei, C., Bajpai, R., Sharma, H., et al.	Development of GLUT4-selective antagonists for multiple myeloma therapy	2017	English	No Model
Wellings, K., Palmer, M. J., Geary, R. S., et al.	Changes in conceptions in women younger than 18 years and the circumstances of young mothers in England in 2000-12: an observational study	2016	English	No Model
Welsh, W. N., Lin, H. J., Peters, R. H., et al.	Effects of a strategy to improve offender assessment practices: Staff perceptions of implementation outcomes	2015	English	No Model
Wenzler, E., Wang, F., Goff, D. A., P et al.	An Automated, Pharmacist-Driven Initiative Improves Quality of Care for Staphylococcus aureus Bacteremia	2017	English	No Model
Wesselink, S. F. O., Lingsma, H. F., Ketelaars, C. A. J., et al.	Effects of government supervision on quality of integrated diabetes care a cluster randomized controlled trial	2015	English	No Model
White, A., Thomas, D. S., Ezeanochie, N., et al.	Health Worker mHealth Utilization: A Systematic Review	2016	English	No Model
White, H. D., Stewart, R. A., Dalby, A. J., et al.	Association between achievement of risk factor standard of care goals and major adverse cardiovascular events in patients with stable coronary artery disease in the stability trial	2015	English	No Model
White, J. N., & Corker, J.	Applying a Total Market Lens: Increased IUD Service Delivery Through Complementary Public- and Private-Sector Interventions in 4 Countries	2016	English	No Model
White-Means, S. I., & Osmani, A. R.	Racial and Ethnic Disparities in Patient-Provider Communication With Breast Cancer Patients: Evidence From 2011 MEPS and Experiences With Cancer Supplement	2017	English	No Model
Whitman, E.	Rapid adoption of bundled payments remains an act of faith	2016		No Model
Whitton, S. W., Scott, S. B., Dyar, C., et al.	Piloting relationship education for female same-sex couples: Results of a small randomized waitlist-control trial	2017	English	No Model

Wibowo, S., & Deng, H.	Multi-criteria group decision making for evaluating the performance of e-waste recycling programs under uncertainty	2015	English	No Model
Wiener, L., Viola, A., Koretski, J., et al.	Pediatric psycho-oncology care: Standards, guidelines, and consensus reports	2015	English	No Model
Wier, L., & Federspiel, F.	A novel framework for evaluating the private profitability of investments in employee health in low-and middle-income countries	2016	English	No Model
Wiklund, S., Fagerberg, I., Ortqvist, A., et al.	Staff experiences of caring for patients with extended-spectrum beta-lactamase-producing bacteria: A qualitative study	2015	English	No Model
Wilby James Williamson, W. J., Reid, H., Kelly, P., et al.	Physical activity to reduce blood pressure in young adults with increased cardiovascular risk: A systematic review and meta-analysis	2015	English	No Model
Wild, B., Hunnemeyer, K., Sauer, H., et al.	Sustained effects of a psychoeducational group intervention following bariatric surgery: follow-up of the randomized controlled BaSE study	2017	English	No Model
Willeboordse, M., Jansen, M. W., van den Heijkant, S. N., et al.	The Healthy Primary School of the Future: study protocol of a quasi-experimental study.[Erratum appears in BMC Public Health. 2017 Apr 11;17 (1):314; PMID: 28399826]	2016	English	No Model
William, A. G., Kate, M. P., Norrving, B., et al.	Strategies to Improve Stroke Care Services in Low- and Middle-Income Countries: A Systematic Review	2017	English	No Model
Williams, E. A., Nikolai de, A., Ladwig, L., et al. (b)	Development of "SWARM" as a Model for High Reliability, Rapid Problem Solving, and Institutional Learning	2015	English	No Model
Williams, E. A., Nikolai, D. A., Ladwig, L., et al. (a)	Tool Tutorial. Development of "SWARM" as a Model for High Reliability, Rapid Problem Solving, and Institutional Learning	2015		No Model
Williamson, W., Reid, H., Boardman, H., et al.	The effectiveness of physical activity interventions to reduce blood pressure in young adults with increased cardiovascular risk: A systematic review and meta-analysis	2015	English	No Model
Willis, T. A., West, R., Rushforth, B., et al.	Variations in achievement of evidence-based, high-impact quality indicators in general practice: An observational study	2017	English	No Model

Wilson, N. J., Kennedy, E., Edmonds, T., et al.	Towards improved Rheumatic Heart Disease control and prevention in Fiji Islands	2015	English	No Model
Winer, R. A., Bennett, E., Murillo, I., et al.	Monitoring Compliance to Promote Quality Assurance: Development of a Mental Health Clinical Chart Audit Tool in Belize, 2013	2015	English	No Model
Winkfield, K., Powell, E., Osuagwa, C., et al.	Developing a community-based partnership to facilitate a multilevel community engaged study exploring barriers to cancer care and clinical trial participation among black Bostonians	2015	English	No Model
Witchger Hansen, A. M.	Crossing Borders: A Qualitative Study of How Occupational Therapy Educators and Scholars Develop and Sustain Global Partnerships	2015	English	No Model
Woiski, M. D., Belfroid, E., Liefers, J., et al.	Influencing factors for high quality care on postpartum haemorrhage in the Netherlands: Patient and professional perspectives	2015	English	No Model
Wolf, J., Mausezahl, D., Powell, A., et al.	Adoption of clean cooking technologies after improved stove promotion interventions, a case-study in three Peruvian Andean regions	2015	English	No Model
Wolk, C. B., Jager-Hyman, S., Marcus, S. C., et al.	Developing implementation strategies for firearm safety promotion in paediatric primary care for suicide prevention in two large US health systems: A study protocol for a mixed-methods implementation study	2017	English	No Model
Wong, C., Desrochers, M., Brill-Conway, M., et al.	Feasibility of an ambulatory central line care coaching program for pediatric oncology and stem cell transplant families	2017	English	No Model
Wrenn, K. C., Boscardin, C. K., Ristow, A., et al.	Development, implementation, and assessment of a curriculum for internal medicine residents on electronic communication with patients	2015	English	No Model
Wu, W., Ye, C., Zheng, Q., et al.	A therapeutic delivery system for chronic osteomyelitis via a multi-drug implant based on three-dimensional printing technology	2016	English	No Model

Xu, P., Burgess, J. F., Cabral, H., et al.	Relationships between medicare advantage contract characteristics and quality-of-care ratings: An observational analysis of medicare advantage star ratings	2015	English	No Model
Yager, P. H., Clark, M., Cummings, B. M., et al.	Parent Participation in Pediatric Intensive Care Unit Rounds via Telemedicine: Feasibility and Impact	2017	English	No Model
Yan, J. Z., Wang, M. Y., & Shao, R.	Research on policy environment of pharmaceutical industry innovation under reform of the supply front base on American experience. [Chinese]	2017	Chinese	No Model
Yang, D. H., Weinreich, M., Dickason, S., et al.	Early mobilization program in the parkland MICU: 18 month follow-up	2017	English	No Model
Yang, T., Yu, L., Jiang, S., et al.	Household smoking restrictions among urban residents in China: individual and regional influences	2015	English	No Model
Yankah, C., Fynn-Thompson, F., Yuko-Jowi, C., et al.	Concepts for regional referral cardiac centers in sub-Saharan Africa	2017		No Model
Yi Mohammadi, J. J., Franks, K., & Hines, S.	Effectiveness of professional oral health care intervention on the oral health of residents with dementia in residential aged care facilities: a systematic review protocol	2015	English	No Model
Yip, B. H. K., Li, X., Leung, C. H. Y., et al.	Trial Protocol: The use of mindfulness-based intervention for improving bracing compliance for adolescent idiopathic scoliosis patients: protocol for a randomised, controlled trial	2018		No Model
Young, C., Tong, A., Nixon, J., et al.	Perspectives on childhood resilience among the Aboriginal community: an interview study	2017		No Model
Young, J., & Snowden, A.	A randomized control trial comparing holistic needs assessment with standard care in an outpatient cancer setting: Preliminary findings	2016	English	No Model
Yourkavitch, J., Prosnitz, D., Herrera, S., et al.	Strengthening national integrated community case management (ICCM) programs: An evaluation of rapid access expansion (RACE) contributions in DRC, Malawi, Mozambique, Niger and Nigeria	2017		No Model
Yu, S. W. Y., Hill, C., Ricks, M. L., et al.	The scope and impact of mobile health clinics in the United States: a literature review	2017	English	No Model

Yuan, B., Jian, W., He, L., et al.	The role of health system governance in strengthening the rural health insurance system in China	2017	English	No Model
Zabala-Letona, A., Arruabarrena-Aristorena, A., Martin-Martin, N., et al.	mTORC1-dependent AMD1 regulation sustains polyamine metabolism in prostate cancer	2017	English	No Model
Zender, C. A., Clancy, K., Thuener, J. E., et al.	Surgical outreach and microvascular surgery in developing countries	2018		No Model
Zerm, R., Helbrecht, B., Pranga, D., et al.	A multimodal therapy concept for lifestyle optimization in Type 2 Diabetes-design and methodology of the AIM DIABETES study	2017		No Model
Zhang, Y., Ji, G., Xu, M., et al.	Recovery of brain structural abnormalities in morbidly obese patients after bariatric surgery	2016	English	No Model
Zhang, Y., Padman, R., & Patel, N.	Paving the COWpath: Learning and visualizing clinical pathways from electronic health record data	2015	English	No Model
Zhou, H., Zhang, L., Ye, F., et al.	The Effect of Maternal Death on the Health of the Husband and Children in a Rural Area of China: A Prospective Cohort Study	2016	English	No Model
Zhu, Z., Gui, Y., Wang, L., et al.	Innovative development path of ethnomedicines: a case study	2017	English	No Model
Abar, B., DeRienzo, V., Glick, J., et al.	Implementation of an Emergency Medicine Research Associates Program: Sharing 20 Years of Experience	2018		Not a sustainability model
Abdullah, M. A., & Shaikh, B. T.	Review of HIV response in Pakistan using a system thinking framework	2015	English	Not a sustainability model
Aboumatar, H. J., Weaver, S. J., Rees, D., et al.	Towards high-reliability organising in healthcare: a strategy for building organisational capacity	2017		Not a sustainability model
Adams, R. N.	Measures of cancer-related loneliness and negative social expectations: Development and preliminary validation	2016	English	Not a sustainability model
Adams, S. H., Gregorich, S. E., Rising, S. S., et al.	Integrating a Nurse-Midwife-Led Oral Health Intervention Into CenteringPregnancy Prenatal Care: Results of a Pilot Study	2017	English	Not a sustainability model
Afriyie-Boateng, M., Loftus, C., Wiesenfeld, L., et al.	Safe patients/safe staff™: An innovative interdisciplinary approach to the care of hospitalized older adults with behavioral disturbances due to delirium, dementia and mental illness	2015	English	Not a sustainability model

Aiemjoy, K., Stoller, N. E., Gebresillasie, S., et al.	Is using a latrine "a strange thing to do"? A mixed-methods study of sanitation preference and behaviors in rural Ethiopia	2017	English	Not a sustainability model
Akintola, O., & Chikoko, G.	Factors influencing motivation and job satisfaction among supervisors of community health workers in marginalized communities in South Africa	2016	English	Not a sustainability model
Alfandre, D.	Clinical Recommendations in Medical Practice: A Proposed Framework to Reduce Bias and Improve the Quality of Medical Decisions	2016		Not a sustainability model
Ali, M., Debela, M., & Bamud, T.	Technical efficiency of selected hospitals in Eastern Ethiopia	2017	English	Not a sustainability model
Allard, A., Serrano, M. A., Garcia-Perez, G., et al.	The geometric nature of weights in real complex networks	2017	English	Not a sustainability model
Allen, K., & Ouslander, J.	Age-Friendly Health Systems: Their Time Has Come	2018		Not a sustainability model
Alonazi, W. B.	Exploring shared risks through public-private partnerships in public health programs: a mixed method	2017	English	Not a sustainability model
Altermark, N.	The post-institutional era: visions of history in research on intellectual disability	2017		Not a sustainability model
Andreoli, J. M., Feig, A., Chang, S., et al.	A research-based inter-institutional collaboration to diversify the biomedical workforce: ReBUILDetroit	2017		Not a sustainability model
Andrews, C. A., Northam, S., & Gosselin, K.	Evaluation of an Innovative Program To Improve Outcomes among Military Beneficiaries with Diabetes	2015	English	Not a sustainability model
Andronis, L., & Barton, P. M.	Adjusting Estimates of the Expected Value of Information for Implementation: Theoretical Framework and Practical Application	2016	English	Not a sustainability model
Anger, W. K., Elliot, D. L., Bodner, T., et al.	Effectiveness of total worker health interventions	2015	English	Not a sustainability model
Anonymous (a)	CMS oncology care model names NCCN guidelines as high-quality care and evidence-based recommendations	2015	English	Not a sustainability model
Arbelaez, C., Soskin, P., Greenough, G., et al.	The post-conflict colombia public health project: A global health diplomacy case study	2017		Not a sustainability model
Arenz, J. R., Mavandadi, S., Foust, K., et al.	Improving access to collaborative behavioral health care for rural-dwelling older adults	2017		Not a sustainability model

Ariffin, F., Ramli, A. S., Daud, M. H., et al.	Feasibility of implementing chronic care model in the malaysian public primary care setting	2017	English	Not a sustainability model
Aroh, D., Colella, J., Douglas, C., et al.	An Example of Translating Value-Based Purchasing Into Value-Based Care	2015	English	Not a sustainability model
Ashton T.	Measuring health system performance: A new approach to accountability and quality improvement in New Zealand	2015	English	Not a sustainability model
Asirwa, F. C., Greist, A., Busakhala, N., et al.	Medical education and training: Building in-country capacity at all levels	2016	English	Not a sustainability model
Attard, M., Loupis, Y., Togher, L., et al.	The efficacy of an inter-disciplinary community aphasia group for living well with aphasia	2018		Not a sustainability model
Aveling, E. L., Martin, G., Herbert, G., et al.	Optimising the community-based approach to healthcare improvement: Comparative case studies of the clinical community model in practice	2017	English	Not a sustainability model
Ayanian, J. Z., & Markel, H.	Donabedian's Lasting Framework for Health Care Quality	2016		Not a sustainability model
Azzopardi-Muscat, N., Clemens, T., Stoner, D., et al.	EU Country Specific Recommendations for health systems in the European Semester process: Trends, discourse and predictors	2015	English	Not a sustainability model
B. E. Nichols, S. Girdwood, T. Crompton, L. E. Stewart-Isherwood, L. Berrie, D. Chimhamhiwa, C. Moyo, J. Kuehnle and S. Rosen	Sustainable viral load monitoring scale-up: Geospatial optimization model for Zambia	2018		Not a sustainability model
Back, A., Jackson, V., Steinhauer, K., et al.	A new framework for resilience skills to prevent burnout and ensure sustainability	2016	English	Not a sustainability model
Baicker, K., & Chernew, M. E.	Alternative alternative payment models	2017	English	Not a sustainability model
Balck, F., Zimmermann, A., & Neumann, A.	Conception and Associated Evaluation of a Problem-Solving Training (PST) for Patients in the Hospital Context of Hematopoietic Stem Cell Transplantation (HSCT)	2015		Not a sustainability model
Baldwin, C. D., Chandran, L., & Gusic, M. E.	Building Sustainable Professional Development Programs: Applying Strategies From Implementation Science to Translate Evidence Into Practice	2017	English	Not a sustainability model
Balfour, M. E., Tanner, K., Jurica, P. J., et al.	Using Lean to Rapidly and Sustainably Transform a Behavioral Health Crisis Program: Impact on Throughput and Safety	2017	English	Not a sustainability model

Ball, L., Ball, D., Leveritt, M., et al.	Using logic models to enhance the methodological quality of primary health-care interventions: Guidance from an intervention to promote nutrition care by general practitioners and practice nurses	2017	English	Not a sustainability model
Ballard, C., Corbett, A., Orrell, M., et al.	Impact of person-centred care training and person-centred activities on quality of life, agitation, and antipsychotic use in people with dementia living in nursing homes: A cluster-randomised controlled trial	2018		Not a sustainability model
Bamberger, M., Tarsilla, M., & Hesse-Biber, S.	Why so many "rigorous" evaluations fail to identify unintended consequences of development programs: How mixed methods can contribute	2016	English	Not a sustainability model
Banda, J. H. K.	Impacts of congregation-based hiv/aids programmes in lusaka, zambia: how abstinence and marital fidelity efforts function in overall strategies addressing hiv/aids	2017	English	Not a sustainability model
Banfield, M., McGorm, K., & Sargent, G.	Health promotion in schools: a multi-method evaluation of an Australian School Youth Health Nurse Program	2015	English	Not a sustainability model
Barasa, S., & Donald A. J.	The Impact of Different Insurance Benefits for Skilled Nursing Care on Patient Recovery in the Long-Term Care Setting	2018		Not a sustainability model
Barbui, C., Dua, T., Kolappa, K., et al.	Mapping actions to improve access to medicines for mental disorders in low and middle income countries	2017	English	Not a sustainability model
Barratt, H., Turner, S., Hutchings, A., et al.	Mixed methods evaluation of the Getting it Right First Time programme - improvements to NHS orthopaedic care in England: study protocol	2017	English	Not a sustainability model
Baughman, A., Cain, G., Ruopp, M., et al.	Improving Access to Care by Admission Process Redesign in a Veterans Affairs Skilled Nursing Facility	2018		Not a sustainability model
Bay, E. H., & Tschannen, D. J.	An Academic-Service Partnership: A System-Wide Approach and Case Report	2017		Not a sustainability model
Beaulieu, L., Lize, J. F., Chaudhury, P., et al.	A global strategy to increase organ donation at hospital and jurisdictional levels: A road map for hospital administrators and clinicians-the transplant Quebec experience base on the organizational framework for organ donation and tissue donation services	2017	English	Not a sustainability model

Begley, C., Hall, J., Shenoy, A., et al.	Design and Implementation of the Texas Medicaid DSRIP Program	2017		Not a sustainability model
Belza, B., Altpeter, M., Smith, M. L., et al.	The Healthy Aging Research Network: Modeling Collaboration for Community Impact	2017	English	Not a sustainability model
Berkman, N. D., Lohr, K. N., Ansari, M. T., et al.	Grading the strength of a body of evidence when assessing health care interventions: an EPC update	2015	English	Not a sustainability model
Berlitz, F. A., Ghanem Filho, O. A., & Ghanem, M. A.	Strategic planning in the clinical laboratory: Aligning greater participation of professionals, management excellence criteria and execution effectiveness	2015	English	Not a sustainability model
Berry, J. H.	An efficient and effective use of buprenorphine in the management of opioid addiction: The West Virginia model	2015	English	Not a sustainability model
Berti, C., Gaffey, M. F., Bhutta, Z. A., et al.	Multiple-micronutrient supplementation: Evidence from large-scale prenatal programmes on coverage, compliance and impact	2017		Not a sustainability model
Bido, J., Ghazinouri, R., Collins, J., et al.	A Conceptual Model for the Evaluation of Surgical Missions	2018		Not a sustainability model
Binanay, C. A., Akwanalo, C. O., Aruasa, W., et al.	Building Sustainable Capacity for Cardiovascular Care at a Public Hospital in Western Kenya	2015	English	Not a sustainability model
Bingham, D., & Ruhl, C.	Planning and evaluating evidence-based perinatal nurse staffing	2015	English	Not a sustainability model
Biondo, P. D., Lee, L. D., Davison, S. N., et al.	How healthcare systems evaluate their advance care planning initiatives: Results from a systematic review	2016		Not a sustainability model
Bishop, J., Kong, D., Schulz, T. R., et al.	Meeting the challenge for effective antimicrobial stewardship programs in regional, rural and remote hospitals - what can we learn from the published literature?	2018		Not a sustainability model
Biskup, T., Phan, P., & Grunauer, M.	Lessons from the Design and Implementation of a Pediatric Critical Care and Emergency Medicine Training Program in a Low Resource Country-The South American Experience	2017	English	Not a sustainability model
Bjarnadottir, R. I., Herzig, C. T. A., Travers, J. L., et al.	Implementation of Electronic Health Records in US Nursing Homes	2017		Not a sustainability model
Bjurling-Sjoberg, P., Wadensten, B., Poder, U., et al.	Factors affecting the implementation process of clinical pathways: A mixed method study within the context of Swedish intensive care	2015	English	Not a sustainability model

Blanarova, L., Rogers, E., Magen, C., et al.	Taking Severe Acute Malnutrition Treatment Back to the Community: Practical Experiences from Nutrition Coverage Surveys	2016	English	Not a sustainability model
Boccia, D., Pedrazzoli, D., Wingfield, T., et al.	Towards cash transfer interventions for tuberculosis prevention, care and control: Key operational challenges and research priorities	2016	English	Not a sustainability model
Bogetz, J. F., Gabhart, J. M., Rassbach, C. E., et al.	Outcomes of a Randomized Controlled Educational Intervention to Train Pediatric Residents on Caring for Children With Special Health Care Needs	2015	English	Not a sustainability model
Bolderdijk, J. W., Brouwer, C., & Cornelissen, G.	When Do Morally Motivated Innovators Elicit Inspiration Instead of Irritation?	2017		Not a sustainability model
Bonanno, L.S.	Teamwork training for interprofessional students: Improving the quality of care for veterans and diverse populations with behavioral health disorders	2018		Not a sustainability model
Bond, C., Foley, W., & Askew, D.	It puts a human face on the researched--A qualitative evaluation of an Indigenous health research governance model	2016	English	Not a sustainability model
Bornemann-Shepherd, M., Le-Lazar, J., Makic, M. B. F., et al.	Caring for Inpatient Boarders in the Emergency Department: Improving Safety and Patient and Staff Satisfaction	2015		Not a sustainability model
Borrayo, B. D., & O'Lawrence, H.	A Post Analysis of a Preventive and Chronic Healthcare Tool	2016	English	Not a sustainability model
Bosko, T., & Wilson, K.	Assessing the relationship between patient satisfaction and clinical quality in an ambulatory setting	2016	English	Not a sustainability model
Bottorff, J. L., Oliffe, J. L., Sarbit, G., et al.	Assessing the feasibility, acceptability and potential effectiveness of an integrated approach to smoking cessation for new and expectant fathers: The Dads in Gear study protocol	2017	English	Not a sustainability model
Boudreaux, E. D., Haskins, B., Harralson, T., et al.	The remote brief intervention and referral to treatment model: Development, functionality, acceptability, and feasibility	2015	English	Not a sustainability model
Boustani, M. A.	Implementing the collaborative dementia care model in the real world	2017		Not a sustainability model

Bradley Williams, R., Bryant-Mallory, D., Coleman, K., et al.	An Evidence-Based Approach to Reducing Disproportionality in Special Education and Discipline Referrals	2017		Not a sustainability model
Brady, B., Canavan, J., & Redmond, S.	Bridging the gap: Using Veerman and Van Yperen's (2007) framework to conceptualise and develop evidence informed practice in an Irish youth work organisation	2016	English	Not a sustainability model
Bragge, P., Grimshaw, J. M., Lokker, C., et al.	AIMD - a validated, simplified framework of interventions to promote and integrate evidence into health practices, systems, and policies	2017	English	Not a sustainability model
Brand, D. J., & Alston, R. J.	The Brand's PREACH Model: Predicting Readiness to Engage African American Churches in Health	2017	English	Not a sustainability model
Bravo, G., Sene, M., & Arcand, M.	Surrogate inaccuracy in predicting older adults' desire for life-sustaining interventions in the event of decisional incapacity: Is it due in part to erroneous quality-of-life assessments?	2017	English	Not a sustainability model
Breckenridge-Sproat, S. T., Swiger, P. A., Belew, D. L., et al.	A program evaluation of the Patient CaringTouch System: A pre- and postimplementation assessment	2017		Not a sustainability model
Breithaupt, L., Eickman, L., Byrne, C. E., et al. (a)	REbel Peer Education: A model of a voluntary, after-school program for eating disorder prevention	2017	English	Not a sustainability model
Breithaupt, L., Eickman, L., Byrne, C. E., et al. (b)	Enhancing empowerment in eating disorder prevention: Another examination of the REbel peer education model	2017	English	Not a sustainability model
Brekke, K. R., Levaggi, R., Siciliani, L., et al.	Patient mobility and health care quality when regions and patients differ in income	2016	English	Not a sustainability model
Briggs, R., Herrick, J., Bloomfield, D., et al.	How to succeed or fail in implementing an integrated pediatric behavioral health program	2016	English	Not a sustainability model
Brink, E., Postma-Smeets, A., Stafleu, A., et al.	Dutch food-based dietary guidelines: Health and sustainability combined in the wheel of five	2017		Not a sustainability model
Broom, J. K., Broom, A. F., Kirby, E. R., et al.	How do professional relationships influence surgical antibiotic prophylaxis decision making? A qualitative study	2017	English	Not a sustainability model
Browman, G. P., Somerfield, M. R., Lyman, G. H., et al.	When is good, good enough? Methodological pragmatism for sustainable guideline development	2015	English	Not a sustainability model

Brown, L. D., Wells, R., Jones, E. C., et al.	Effects of Sectoral Diversity on Community Coalition Processes and Outcomes	2017	English	Not a sustainability model
Bufalino, V. J., Berkowitz, S. A., Gardner, T. J., et al.	American Heart Association's Call to Action for Payment and Delivery System Reform	2017		Not a sustainability model
Burke, J. A., Greenslade, J., Chabrowska, J., et al.	Two Hour Evaluation and Referral Model for Shorter Turnaround Times in the emergency department	2017	English	Not a sustainability model
Butler, M., Epstein, R. A., Totten, A., et al.	AHRQ series on complex intervention systematic reviews- paper 3: adapting frameworks to develop protocols	2017	English	Not a sustainability model
Calvo, G., & Valero, A.	Assessing maximum production peak and resource availability of non-fuel mineral resources: Analyzing the influence of extractable global resources	2017	English	Not a sustainability model
Campbell, S. M., Godman, B., Diogene, E., et al.	Quality indicators as a tool in improving the introduction of new medicines	2015	English	Not a sustainability model
Carai, S., Bivol, S., & Chandra-Mouli, V.	Assessing youth-friendly-health-services and supporting planning in the Republic of Moldova	2015	English	Not a sustainability model
Carlson, R. W., Scavone, J. L., Koh, W. J., et al.	NCCN framework for resource stratification: A framework for providing and improving global quality oncology care	2016	English	Not a sustainability model
Carman, K. L., & Workman, T. A.	Engaging patients and consumers in research evidence: Applying the conceptual model of patient and family engagement	2017	English	Not a sustainability model
Carter, B. L., Coffey, C. S., Chrischilles, E. A., et al.	A Cluster-Randomized Trial of a Centralized Clinical Pharmacy Cardiovascular Risk Service to Improve Guideline Adherence	2015	English	Not a sustainability model
Carvalho, M. S., Honorio, N. A., Garcia, L. M. T., et al.	Aedes aegypti control in urban areas: A systemic approach to a complex dynamic	2017	English	Not a sustainability model
Casalini, F., Salvetti, S., Memmini, S., et al.	Unplanned readmissions within 30 days after discharge: Improving quality through easy prediction	2017	English	Not a sustainability model
Cason, J.	Telehealth and Occupational Therapy: Integral to the Triple Aim of Health Care Reform	2015	English	Not a sustainability model
Cates, J. R., Crandell, J. L., Diehl, S. J., et al.	Immunization effects of a communication intervention to promote preteen HPV vaccination in primary care practices	2018		Not a sustainability model

Cavaliere, A., De Marchi, E., & Banterle, A.	Exploring the Adherence to the Mediterranean Diet and Its Relationship with Individual Lifestyle: The Role of Healthy Behaviors, Pro-Environmental Behaviors, Income, and Education	2018		Not a sustainability model
Chamberlain, P.	Toward Creating Synergy Among Policy, Procedures, and Implementation of Evidence-Based Models in Child Welfare Systems: Two Case Examples	2017	English	Not a sustainability model
Chanda, E., Amenshewa, B., Angula, H. A., et al.	Strengthening tactical planning and operational frameworks for vector control: the roadmap for malaria elimination in Namibia	2015	English	Not a sustainability model
Chanturidze, T., Adams, O., Tokezhanov, B., et al.	Building policy-making capacity in the Ministry of Health: the Kazakhstan experience	2015	English	Not a sustainability model
Chapman, A., & Shigetomi, Y.	Visualizing the shape of society: An analysis of public bads and burden allocation due to household consumption using an input-output approach	2018		Not a sustainability model
Chaudhary, A., Carrasco, L. R., & Kastner, T.	Linking national wood consumption with global biodiversity and ecosystem service losses	2017	English	Not a sustainability model
Cheah, S. K. A., Yeow, P. H. P., Nair, S. R., et al.	Behavioural modification framework to address wastage in household electricity consumption	2017	English	Not a sustainability model
Cheah, S. K. A., Yeow, P. H. P., Nair, S. R., et al.	Behavioural modification framework to address wastage in household electricity consumption	2018		Not a sustainability model
Cheang, K. M., & Cheok, C. C. S.	A 17-Month Review of the Care Model, Service Structure, and Design of THRIVE, a Community Mental Health Initiative in Northern Singapore	2015		Not a sustainability model
Chegade, M. J., Gill, T. K., Kopansky-Giles, D., et al.	Building multidisciplinary health workforce capacity to support the implementation of integrated, people-centred Models of Care for musculoskeletal health	2016	English	Not a sustainability model
Chen, C.-I.	An exploratory study of value-centric business model innovation in connected health: a study from the taiwanese healthcare sector	2016	English	Not a sustainability model
Chen, J., Mullins, C. D., Novak, P., et al.	Personalized Strategies to Activate and Empower Patients in Health Care and Reduce Health Disparities	2016		Not a sustainability model

Chen, S. C., & Kim, S. Y. H.	A framework for analysis of research risks and benefits to participants in standard of care pragmatic clinical trials	2016	English	Not a sustainability model
Chen, Y., Meinecke, J., & Sivey, P.	A Theory of Waiting Time Reporting and Quality Signaling	2016	English	Not a sustainability model
Cheng, A. S. K., Chiu, F. P. F., Fung, M. S. M., et al.	A review of supported employment services for people with mental disabilities in Hong Kong	2015	English	Not a sustainability model
Cheng, A., Grant, V., Huffman, J., et al.	Coaching the Debriefer: Peer Coaching to Improve Debriefing Quality in Simulation Programs	2017	English	Not a sustainability model
Chomkamsri, K., Mungcharoen, T., & Yuvaniyama, C.	10-year experience with the Thai national LCI database: case study of "refinery products"	2016	English	Not a sustainability model
Chowdhary, N., Anand, A., Dimidjian, S., et al.	The healthy activity program lay counsellor delivered treatment for severe depression in India: Systematic development and randomised evaluation	2016	English	Not a sustainability model
Chuengsatiansup, K., Tengrang, K., Posayanonda, T., et al.	Citizens' Jury and Elder Care: Public Participation and Deliberation in Long-Term Care Policy in Thailand	2018		Not a sustainability model
Cisneros-Montemayor, A. M., Singh, G. G., & Cheung, W. W. L.	A fuzzy logic expert system for evaluating policy progress towards sustainability goals	2017		Not a sustainability model
Clapham, K., Hunter, K., Cullen, P., et al.	Addressing the barriers to driver licensing for Aboriginal people in New South Wales and South Australia	2017	English	Not a sustainability model
Close, R. A., Friedman, M., Lloyd, G. T., et al.	Evidence for a Mid-Jurassic Adaptive Radiation in Mammals	2015	English	Not a sustainability model
Clossey, L., Simms, S., Hu, C., et al.	A Pilot Evaluation of the Rapid Response Program: A Home Based Family Therapy	2018		Not a sustainability model
Coccia, M.	Problem-driven innovations in drug discovery: Co-evolution of the patterns of radical innovation with the evolution of problems	2016	English	Not a sustainability model
Coffey, M., Thomson, K., Li, S. A., et al.	Resident Experiences With Implementation of the I-PASS Handoff Bundle	2017	English	Not a sustainability model
Cohen, E. V., Hagestuen, R., Gonzalez-Ramos, G., et al.	Interprofessional education increases knowledge, promotes team building, and changes practice in the care of Parkinson's disease	2016	English	Not a sustainability model
Coker, T. R., Chacon, S., Elliott, M. N., et al.	A Parent coach model for well-child care among low-income children: A randomized controlled trial	2016	English	Not a sustainability model

Colebatch-Bourn, A. N., Conaghan, P. G., Arden, N. K., et al.	Raising the quality of rheumatology management recommendations: lessons from the EULAR process 10 years after provision of standard operating procedures	2015	English	Not a sustainability model
Coleman, C., Formenti, S., Williams, T., et al.	The International Cancer Expert Corps (ICEC): A unique global mentoring model for building sustainable expertise in low- and lower-middle income countries and geographically remote areas in resource-rich countries	2015	English	Not a sustainability model
Coleman, M., & Alonso, A.	A Qualitative Study Exploring How Family Planning Beliefs and Attitudes Contribute to Family Planning Behavior in Rural, Southeastern Kenya: Application of the Social Ecological Model	2016	English	Not a sustainability model
Colombi, C., Valeri, G., Siracusano, R., et al.	Effectiveness and feasibility of the early start denver model (ESDM) intervention within the italian public health system	2015	English	Not a sustainability model
Conrad, D. A.	The Theory of Value-Based Payment Incentives and Their Application to Health Care	2015		Not a sustainability model
Cookson, R., Asaria, M., Ali, S., et al.	Health equity monitoring for healthcare quality assurance	2018		Not a sustainability model
Cord, A. F., Brauman, K. A., Chaplin-Kramer, R., et al.	Priorities to Advance Monitoring of Ecosystem Services Using Earth Observation	2017	English	Not a sustainability model
Corrales, J., Kristofco, L. A., Steele, W. B., et al.	Toward the Design of Less Hazardous Chemicals: Exploring Comparative Oxidative Stress in Two Common Animal Models	2017	English	Not a sustainability model
Courtenay, T. M.	Improving inpatient experience utilizing an Empathy Enhancement Program	2016	English	Not a sustainability model
Cramm, J. M., & Nieboer, A. P.	The changing nature of chronic care and coproduction of care between primary care professionals and patients with COPD and their informal caregivers	2016	English	Not a sustainability model
Czaja, S. J., Valente, T. W., Nair, S. N., et al.	Characterizing implementation strategies using a systems engineering survey and interview tool: a comparison across 10 prevention programs for drug abuse and HIV sexual risk behavior	2016	English	Not a sustainability model
Dalkin, S. M., Greenhalgh, J., Jones, D., et al.	What's in a mechanism? Development of a key concept in realist evaluation	2015	English	Not a sustainability model

Damani, Z., MacKean, G., Bohm, E., et al.	The use of a policy dialogue to facilitate evidence-informed policy development for improved access to care: the case of the Winnipeg Central Intake Service (WCIS)	2016	English	Not a sustainability model
Damari, B., & Riazi-Isfahani, S.	Achievements and future path of Tehran municipality in urban health domain: An Iranian experience	2016	English	Not a sustainability model
Daniels, L. A., Mallan, K. M., Nicholson, J. M., et al.	An Early Feeding Practices Intervention for Obesity Prevention	2015	English	Not a sustainability model
Dare, A. J., Lee, K. C., Bleicher, J., et al.	Prioritizing Surgical Care on National Health Agendas: A Qualitative Case Study of Papua New Guinea, Uganda, and Sierra Leone	2016	English	Not a sustainability model
Daughtry, D., & Engelke, M. K.	Demonstrating the Relationship Between School Nurse Workload and Student Outcomes	2018		Not a sustainability model
De Neve, J. W., Boudreaux, C., Gill, R., et al.	Harmonizing community-based health worker programs for HIV: a narrative review and analytic framework	2017	English	Not a sustainability model
de Zulueta, P. C.	Developing compassionate leadership in health care: an integrative review	2016		Not a sustainability model
Degregorio, G., Manga, S., Kiyang, E., et al.	Implementing a Fee-for-Service Cervical Cancer Screening and Treatment Program in Cameroon: Challenges and Opportunities	2017		Not a sustainability model
Devescovi, R., Monasta, L., Mancini, A., et al.	Early diagnosis and Early Start Denver Model intervention in autism spectrum disorders delivered in an Italian Public Health System service	2016	English	Not a sustainability model
Dhand, A.	Quality Metrics in Inpatient Neurology	2015	English	Not a sustainability model
Di Minin, E., Laitila, J., Montesino-Pouzols, F., et al.	Identification of policies for a sustainable legal trade in rhinoceros horn based on population projection and socioeconomic models	2015	English	Not a sustainability model
Dorn, E., & Hitch, D.	Reflections on a yearly camp at an adult mental health rehabilitation unit	2016		Not a sustainability model
Doucette, J. N.	Leadership Q&A. Safety: More than a quality model	2015		Not a sustainability model
Dramowski, A., Cotton, M. F., & Whitelaw, A.	A framework for preventing healthcare-associated infection in neonates and children in South Africa	2017	English	Not a sustainability model

Dumas, S. E., Lungu, L., Mulambya, N., et al.	Sustainable smallholder poultry interventions to promote food security and social, agricultural, and ecological resilience in the Luangwa Valley, Zambia	2016	English	Not a sustainability model
Dunne, S., Lunn, C., Kirwan, M., et al.	Planning and Selecting Evaluation Designs for Leadership Training: A Toolkit for Nurse Managers and Educators	2015	English	Not a sustainability model
Dyer, T. A., Owens, J., & Robinson, P. G.	The acceptability of healthcare: from satisfaction to trust	2016		Not a sustainability model
Ebhuoma, O., & Gebreslasie, M.	Remote Sensing-Driven Climatic/Environmental Variables for Modelling Malaria Transmission in Sub-Saharan Africa	2016	English	Not a sustainability model
Ebhuoma, O., Gebreslasie, M., & Magubane, L.	Modeling malaria control intervention effect in KwaZulu-Natal, South Africa using intervention time series analysis	2017	English	Not a sustainability model
Edwards, N., & Saltman, R. B.	Re-thinking barriers to organizational change in public hospitals	2017	English	Not a sustainability model
El-Akel, W., El-Sayed, M. H., El Kassas, M., et al.	National treatment programme of hepatitis C in Egypt: Hepatitis C virus model of care	2017	English	Not a sustainability model
Eldin, N., & Devlin, J.	Obesity policy and action plan - A whole of government and a whole of society approach, the Irish model?	2017	English	Not a sustainability model
Elliott, M. N., Cohea, C. W., Lehrman, W. G., et al.	Accelerating Improvement and Narrowing Gaps: Trends in Patients' Experiences with Hospital Care Reflected in HCAHPS Public Reporting	2015		Not a sustainability model
Elsinga, J., Van Der Veen, H. T., Gerstenbluth, I., et al.	Community participation in mosquito breeding site control: an interdisciplinary mixed methods study in Curacao	2017	English	Not a sustainability model
Eng, M. S., Patel, A. V., Libman, R. B., et al.	Improving Regional Stroke Systems of Care	2017	English	Not a sustainability model
Engl, M., Orach, S., Shumba, C., et al.	A qualitative analysis of the northern Ugandan catholic health system	2017	English	Not a sustainability model
Erismann, S., Diagbouga, S., Schindler, C., et al.	School Children's Intestinal Parasite and Nutritional Status One Year after Complementary School Garden, Nutrition, Water, Sanitation, and Hygiene Interventions in Burkina Faso	2017	English	Not a sustainability model
Escaron, A. L., Martinez-Donate, A. P., Riggall, A. J., et al.	Developing and Implementing "Waupaca Eating Smart": A Restaurant and Supermarket Intervention to Promote Healthy Eating Through Changes in the Food Environment	2016	English	Not a sustainability model

Essiet, I. A., Baharom, A., Shahar, H. K., et al.	Application of the Socio-Ecological Model to predict physical activity behaviour among Nigerian University students	2017	English	Not a sustainability model
Eum, R. S., Seel, R. T., Goldstein, R., et al.	Predicting institutionalization after traumatic brain injury inpatient rehabilitation	2015	English	Not a sustainability model
Eun-Shim, N., Diblasi, C., Gonzales, E., et al.	Patient-Centered Personal Health Record and Portal Implementation Toolkit for Ambulatory Clinics: A Feasibility Study	2017		Not a sustainability model
Evans, R., Brockman, R., Grey, J., et al.	A cluster randomised controlled trial of the Wellbeing in Secondary Education (WISE) Project - an intervention to improve the mental health support and training available to secondary school teachers: protocol for an integrated process evaluation	2018		Not a sustainability model
Evison, M., Crosbie, P., Martin, J., et al.	EBUS-guided mediastinal lung cancer staging: Monitoring of quality standards improves performance	2016	English	Not a sustainability model
Fanelli, S., & Zangrandi, A.	Assessment for improving the performance of NICUs: The Italian experience	2017	English	Not a sustainability model
Fantini, G., Tibaldi, G., Rucci, P., et al.	Quality of care indicators for schizophrenia: Determinants of observed variations among Italian Departments of Mental Health. Results from the ETAS DSM study	2017	English	Not a sustainability model
Farash, M. S., Nawaz, O., Mahmood, K., et al.	A Provably Secure RFID Authentication Protocol Based on Elliptic Curve for Healthcare Environments	2016	English	Not a sustainability model
Farbman, K. S., Michelson, K. A., Neuman, M. I., et al.	Reducing hospitalization rates for children with anaphylaxis	2017	English	Not a sustainability model
Farrow, D., & Robertson, S.	Development of a Skill Acquisition Periodisation Framework for High-Performance Sport	2017		Not a sustainability model
Fassier, J. B., Lamort-Bouche, M., Sarnin, P., et al.	[The intervention mapping protocol: A structured process to develop, implement and evaluate health promotion programs]	2016	French	Not a sustainability model
Fatti, G., Monteith, L., Shaikh, N., et al.	A comparison of two task-shifting models of pharmaceutical care in antiretroviral treatment programs in South Africa	2016	English	Not a sustainability model

Feachem, N. S., Afshar, A., Pruett, C., et al.	Mapping healthcare systems: A policy relevant analytic tool	2017	English	Not a sustainability model
Fehlings, M. G., Cheng, C. L., Chan, E., et al.	Using Evidence To Inform Practice and Policy To Enhance the Quality of Care for Persons with Traumatic Spinal Cord Injury	2017	English	Not a sustainability model
Feldacker, C., Makunike-Chikwinya, B., Holec, M., et al.	Implementing voluntary medical male circumcision using an innovative, integrated, health systems approach: experiences from 21 districts in Zimbabwe	2018		Not a sustainability model
Fields, B. G., Behari, P. P., McCloskey, S., et al.	Remote ambulatory management of Veterans with obstructive sleep apnea	2016	English	Not a sustainability model
Fiset, V., Luciani, T., Hurtubise, A., et al.	Clinical Nursing Leadership Education in Long-Term Care: Intervention Design and Evaluation	2017	English	Not a sustainability model
Fish J.	Co-producing knowledge about lesbian and bisexual women with breast cancer: Messages for nursing professionals from a knowledge exchange project	2016		Not a sustainability model
Fisher, C., Cusack, G., Cox, K., et al.	Developing Competency to Sustain Evidence-Based Practice	2016	English	Not a sustainability model
Fisher, E., Spangler, J., & Huebner, R.	Tensions and Opportunities: Building Meaningful Partnerships Between Child Welfare Decision-makers and Evaluators	2015		Not a sustainability model
Fitzgerald, T. M., Williams, P. A., Dodge, J. A., et al.	Program Implementation Approaches to Build and Sustain Health Care Coordination for Type 2 Diabetes	2017	English	Not a sustainability model
Fonjungo, P. N., Osmanov, S., Kuritsky, J., et al.	Ensuring quality: A key consideration in scaling-up HIV-related point-of-care testing programs	2016	English	Not a sustainability model
Foo, S., Tagore, S., Mathur, M., et al.	A sustainable model to improve maternal health and promote early obstetric care in resource poor regions	2018		Not a sustainability model
Foot, K.	Using cultural-historical activity theory to analyze social service practices evolving from the Norwegian HUSK projects	2015	English	Not a sustainability model
Forgatch, M. S., & Kjøbli, J.	Parent Management Training-Oregon Model: Adapting Intervention with Rigorous Research	2016		Not a sustainability model

Foster, K., Bilir, P., Kruger, E., et al.	Cost-effectiveness (CE) of an autologous regenerative epithelial suspension (RES) versus standard of care (SOC) for treatment of severe burns in the United States	2018		Not a sustainability model
Francio, V. T., Conley, A., Germany, L., et al.	Developing an integrative pain management program in the private setting: Successes, challenges and current status	2017		Not a sustainability model
Franks, R. P., & Bory, C. T.	Who Supports the Successful Implementation and Sustainability of Evidence-Based Practices? Defining and Understanding the Roles of Intermediary and Purveyor Organizations	2015	English	Not a sustainability model
Fry, D., & Zask, A.	Applying the Ottawa Charter to inform health promotion programme design	2017		Not a sustainability model
Fujita, M., Poudel, K. C., Green, K., et al.	HIV service delivery models towards 'Zero AIDS-related Deaths': a collaborative case study of 6 Asia and Pacific countries	2015	English	Not a sustainability model
Fuller, J., Oster, C., Muir Cochrane, E., et al.	Testing a model of facilitated reflection on network feedback: a mixed method study on integration of rural mental healthcare services for older people	2015	English	Not a sustainability model
Gadbury-Amyot, C. C., Overman, P. R., Grzesikowski, T., et al.	ADEA/AAL Institute for Allied Health Educators: Program Evaluation	2015	English	Not a sustainability model
Gainforth, H. L., Jarvis, J. W., Berry, T. R., et al.	Evaluating the ParticipACTION "Think Again" Campaign	2016		Not a sustainability model
Gardner, K., Davies, G. P., Edwards, K., et al.	A rapid review of the impact of commissioning on service use, quality, outcomes and value for money: implications for Australian policy	2016	English	Not a sustainability model
Gardner, K., Jr., Kanaskie, M. L., Knehans, A. C., et al.	Implementing and Sustaining Evidence Based Practice Through a Nursing Journal Club	2016	English	Not a sustainability model
Garg, M., Peck, G. L., Arquilla, B., et al.	A Comprehensive Framework for International Medical Programs: A 2017 consensus statement from the American College of Academic International Medicine	2017		Not a sustainability model
Garner, S., Lopatina, E., Rankin, J. A., et al.	Nurse-led care for patients with rheumatoid arthritis: A systematic review of the effect on quality of care	2017	English	Not a sustainability model

Gasparini, R., Mennini, F. S., Panatto, D., et al.	How can the results of Health Technology Assessment (HTA) evaluations applied to vaccinations be communicated to decision-makers and stakeholders? The ISPOR Rome chapter project	2015	English	Not a sustainability model
Gast, K. C., Allen, S. V., Ruddy, K. J., et al.	Novel approaches to support breast cancer survivorship care models	2017	English	Not a sustainability model
Gauld, R., & Horsburgh, S.	Are some health professionals more cognizant of clinical governance development concepts than others? Findings from a New Zealand study	2016		Not a sustainability model
Geissler, K. H., & Leatherman, S.	Providing primary health care through integrated microfinance and health services in Latin America	2015	English	Not a sustainability model
George, A. S., & Branchini, C.	Principles and processes behind promoting awareness of rights for quality maternal care services: A synthesis of stakeholder experiences and implementation factors	2017	English	Not a sustainability model
Gershan, L. A.	Acupuncture in pediatric academic health centers: A blueprint for integration	2015	English	Not a sustainability model
Gillmor, L., Patel, L., & Thompson, C.	Rounding third: Bringing pediatric palliative care home	2017	English	Not a sustainability model
Goett, R., Lamba, S., Wang, D., et al.	Joining forces with the emergency department: Successful programs, initiatives, and emerging practices	2018		Not a sustainability model
Goicolea, I., Vives-Cases, C., Hurtig, A. K., et al. (a)	Mechanisms that trigger a good health-care response to intimate partner violence in Spain. Combining realist evaluation and qualitative comparative analysis approaches	2015	English	Not a sustainability model
Goldberg, M. J.	POSNA precourse quality, safety, value: From theory to practice management session 3 aaos and abos initiatives: "historical perspective"	2015	English	Not a sustainability model
Goldenberg, A. J., Comeau, A. M., Grosse, S. D., et al.	Evaluating Harms in the Assessment of Net Benefit: A Framework for Newborn Screening Condition Review	2016	English	Not a sustainability model
Goldkind, L.	Leaning Out: Exploring Organizational Advocacy Activities From an Open Systems Perspective	2015		Not a sustainability model
Gomes, P., Malheiros, T., Fernandes, V., et al.	Environmental indicators for sustainability: A strategic analysis for the sugarcane ethanol context in Brazil	2016	English	Not a sustainability model

Gonçalves, J., Gomes, M. I., Fonseca, M., et al.	Selfie Aging Index: An Index for the Self-assessment of Healthy and Active Aging	2017		Not a sustainability model
Gonin, A., & Regimbal, F.	A collaborative intervention in residential centre. Looking back at La cle des champs	2017	English, French	Not a sustainability model
Gordon, E. J., Lee, J., Kang, R. H., et al.	A complex culturally targeted intervention to reduce Hispanic disparities in living kidney donor transplantation: an effectiveness-implementation hybrid study protocol	2018		Not a sustainability model
Gordon, J. N.	Empowering Oncology Nurses to Lead Change Through a Shared Governance Project	2016		Not a sustainability model
Gray-Burrows, K. A., Day, P. F., Marshman, Z., et al.	Using intervention mapping to develop a home-based parental-supervised toothbrushing intervention for young children	2016	English	Not a sustainability model
Grindrod, A., & Rumbold, B.	Healthy End of Life Project (HELP): a progress report on implementing community guidance on public health palliative care initiatives in Australia	2018		Not a sustainability model
Gruenewald, D. A., Gabriel, M., Rizzo, D., et al.	IMPROVING FAMILY MEETINGS IN INTENSIVE CARE UNITS: A QUALITY IMPROVEMENT CURRICULUM	2017		Not a sustainability model
Grunseit, A. C., Rowbotham, S., Pescud, M., et al.	Beyond fun runs and fruit bowls: an evaluation of the meso-level processes that shaped the Australian Healthy Workers Initiative	2016	English	Not a sustainability model
Guerrero, L. R., Ho, J., Christie, C., et al.	Using collaborative approaches with a multi-method, multi-site, multi-target intervention: evaluating the National Research Mentoring Network	2017		Not a sustainability model
Guest, M., Miller, M., Smith, M., et al.	Office for the Study of Aging at the University of South Carolina: Promoting Healthy Aging Through Program Development, Evaluation, Education/Training, and Research for South Carolina's Older Adults	2018		Not a sustainability model
Guzman, J., Tompa, E., Koehoorn, M., et al.	Economic evaluation of occupational health and safety programmes in health care	2015	English	Not a sustainability model
Gyllstrom, E., Gearin, K., Nease, D., Jr., et al.	Measuring Local Public Health and Primary Care Collaboration: A Practice-Based Research Approach	2018		Not a sustainability model

Haas, S. A.	Developing Staffing Models to Support Population Health Management And Quality Outcomes in Ambulatory Care Settings	2016		Not a sustainability model
Haldeman, S., Nordin, M., Outerbridge, G., et al.	Creating a sustainable model of spine care in underserved communities: The World Spine Care (WSC) charity	2015	English	Not a sustainability model
Hall, K. L., Rafalson, L., Mariano, K., et al.	Evaluation of Hospital-Based Palliative Care Programs	2016	English	Not a sustainability model
Halpin, E., & Shyu, J.	How to do it: Quality and process improvement in emergency radiology	2017	English	Not a sustainability model
Halton, K., Hall, L., Gardner, A., et al. (b)	Exploring the context for effective clinical governance in infection control	2017	English	Not a sustainability model
Hamilton, K., Nutter, F., Olson, D. K., et al.	USAID RESPOND project's global one health core competencies and one health modules	2015	English	Not a sustainability model
Hanlon, C., Eshetu, T., Alemayehu, D., et al.	Health system governance to support scale up of mental health care in Ethiopia: A qualitative study	2017	English	Not a sustainability model
Hanna, E., Dorey, J., Aballea, S., et al.	Will stem cells for heart failure be the next sofosbuvir issue?	2016	English	Not a sustainability model
Hanna, E., Ma, F., Cheng, X., et al.	Future innovative therapies for Parkinson's disease may question sustainability of our health care system	2016	English	Not a sustainability model
Hanna, E., Zhou, J., Cheng, X., et al.	Advanced therapy medicinal products for Alzheimer's disease will shrink the national health service budget	2016	English	Not a sustainability model
Hansel, T., Rohrer, G., Osofsky, J., et al.	Integration of Mental and Behavioral Health in Pediatric Health Care Clinics	2017	English	Not a sustainability model
Harding, K.	Global Health Innovation Technology Models	2016		Not a sustainability model
Hargreaves, M., Orfield, C., Honeycutt, T., et al.	Addressing Childhood Obesity Through Multisector Collaborations: Evaluation of a National Quality Improvement Effort	2017		Not a sustainability model
Harvey, G., Jas, P., & Walshe, K.	Analysing organisational context: case studies on the contribution of absorptive capacity theory to understanding inter-organisational variation in performance improvement	2015	English	Not a sustainability model
Hasebrook, J. P., Hinkelmann, J., Volkert, T., et al.	Securing the Continuity of Medical Competence in Times of Demographic Change: A Proposal	2016	English	Not a sustainability model

Hauser, J. M., Preodor, M., Roman, E., et al.	The Evolution and Dissemination of the Education in Palliative and End-of-Life Care Program	2015		Not a sustainability model
Hauswald, E., & Sklar, D.	Will the "fixes" fall flat? prospects for quality measures and payment incentives to control healthcare spending	2017	English	Not a sustainability model
Havaei, F., & MacPhee, M.	The Nursing Leadership Institute program evaluation: a critique	2015		Not a sustainability model
Haw, C., Hawton, K., Gunnell, D., et al.	Economic recession and suicidal behaviour: Possible mechanisms and ameliorating factors	2015	English	Not a sustainability model
Hawkes, D., Hingley, D., Wood, S., et al.	Evaluating the VERA framework for communication	2015		Not a sustainability model
Hawkes, S., B, K. A., Jadeja, N., Jimenez, M., et al.	Strengthening capacity to apply health research evidence in policy making: experience from four countries	2016	English	Not a sustainability model
Hawkins, K.-E. H.	Assessing Teachers' Confidence in Implementing Food Allergy Emergency Plans	2017	English	Not a sustainability model
Haybarker, B. D.	Reducing Emergency Department Length of Stay by System Change	2015	English	Not a sustainability model
Haynes, A., Brennan, S., Redman, S., et al.	Figuring out fidelity: a worked example of the methods used to identify, critique and revise the essential elements of a contextualised intervention in health policy agencies	2016	English	Not a sustainability model
Heibeck, M., Westerhout, K. Y., Naciben, V., et al.	Simeprevir plus peginterferon/ribavirin cost-effectiveness analysis for the treatment of chronic genotype 1 hepatitis C in Mexico	2015	English	Not a sustainability model
Hekler, E. B., Klasnja, P., Riley, W. T., et al.	Agile science: creating useful products for behavior change in the real world	2016	English	Not a sustainability model
Henderson, S., Dalton, M., & Cartmel, J.	Using Interprofessional Learning for Continuing Education: Development and Evaluation of the Graduate Certificate Program in Health Professional Education for Clinicians	2016		Not a sustainability model
Henize, A. W., Beck, A. F., Klein, M. D., et al.	A road map to address the social determinants of health through community collaboration	2015	English	Not a sustainability model
Herens, M., Wagemakers, A., Vaandrager, L., et al.	Contexts, Mechanisms, and Outcomes That Matter in Dutch Community-Based Physical Activity Programs Targeting Socially Vulnerable Groups	2017		Not a sustainability model

Heun, R., & Gaebel, W.	The relevance of EPA guidance papers in the framework of the European Psychiatric Association	2015	English	Not a sustainability model
Hickey, K.	Developing and Sustaining a Career as a Transdisciplinary Nurse Scientist	2018		Not a sustainability model
Hides, L., Quinn, C., Cockshaw, W., et al.	Efficacy and outcomes of a mobile app targeting alcohol use in young people	2018	English	Not a sustainability model
Hill, J. N., Guihan, M., Hogan, T. P., et al.	Use of the PARIHS Framework for Retrospective and Prospective Implementation Evaluations	2017	English	Not a sustainability model
Hillis, R., Ling, J., Quinn, C., et al.	Evaluating a pilot paediatric hospice-at-home service: a literature review	2016	English	Not a sustainability model
Hilton, J., Mazzarello, S., Fergusson, D., et al.	Novel Methodology for Comparing Standard-of-Care Interventions in Patients With Cancer	2016	English	Not a sustainability model
Hocking, J. S., Goller, J. L., & Lim, M. S. C.	A verbal invitation and specimen collection on the spot are crucial to maximise sexually transmissible infection testing uptake in non-traditional settings	2015	English	Not a sustainability model
Hoffer, E. R.	Green building policy and capital investment decision-making: A grounded theory study	2015	English	Not a sustainability model
Honeycutt, S., Leeman, J., McCarthy, W. J., et al.	Evaluating Policy, Systems, and Environmental Change Interventions: Lessons Learned From CDC's Prevention Research Centers	2015	English	Not a sustainability model
Honig, P. K., & Hirsch, G.	Adaptive Biomedical Innovation	2016	English	Not a sustainability model
Horowitz, C. R., Shameer, K., Gabrilove, J., et al.	Accelerators: Sparking Innovation and Transdisciplinary Team Science in Disparities Research	2017	English	Not a sustainability model
Huang, Y., Ma, L., Sabljak, L., & Puhala, Z.	Development of sustainable community paramedicine programmes: a case study in Pennsylvania	2018		Not a sustainability model
Hudson, J. N., Farmer, E. A., Weston, K. M., et al.	Using a framework to implement large-scale innovation in medical education with the intent of achieving sustainability	2015	English	Not a sustainability model
Huebner, R. A., Posze, L., Willauer, T. M., et al.	Sobriety Treatment and Recovery Teams: Implementation Fidelity and Related Outcomes	2015	English	Not a sustainability model
Hughes, C. M., Cadogan, C. A., & Ryan, C. A.	Development of a pharmacy practice intervention: lessons from the literature	2016	English	Not a sustainability model

Huicho, L., Huayanay-Espinoza, C. A., Herrera-Perez, E., et al.	Factors behind the success story of under-five stunting in Peru: a district ecological multilevel analysis	2017	English	Not a sustainability model
Hull, L., Athanasiou, T., & Russ, S.	Implementation science: A neglected opportunity to accelerate improvements in the safety and quality of surgical care	2017	English	Not a sustainability model
Hulme, A., Salmon, P. M., Nielsen, R. O., et al.	From control to causation: Validating a 'complex systems model' of running-related injury development and prevention	2017	English	Not a sustainability model
Hunter, K. F., Murphy, R. S., Babb, M., et al.	Benefits and Challenges Faced by a Nurse Practitioner Working in an Interprofessional Setting in Rural Alberta	2016	English	Not a sustainability model
Iachini, A. L., Clone, S., Dehart, D. D., et al.	Project STRONG: A Capacity-Building Intervention to Improve Grant Writing Among Substance Abuse Organizations	2016		Not a sustainability model
Jacob, S. A., Ng, W. L., & Do, V.	Estimation of an Optimal Chemotherapy Utilisation Rate for Cancer: Setting an Evidence-based Benchmark for Quality Cancer Care	2015	English	Not a sustainability model
Jagannathan, R., Camasso, M. J., & Delacalle, M.	The effectiveness of a head-heart-hands model for natural and environmental science learning in urban schools	2017	English	Not a sustainability model
Janssens, J., de Kort, S. J., Achterberg, W. P., et al.	Medical and moral considerations regarding complex medical decisions in older patients with multimorbidity: a compact deliberation framework	2018		Not a sustainability model
Jansson, A., Savikko, N., & Pitkälä, K.	Training professionals to implement a group model for alleviating loneliness among older people - 10-year follow-up study	2018		Not a sustainability model
Jefferds, M. E., & Flores-Ayala, R.	Introducing a new monitoring manual for home fortification and strengthening capacity to monitor nutrition interventions	2015	English	Not a sustainability model
Jenkin, K., Sellar, B., Stanley, M., et al.	How sustainable development is understood in World Federation of Occupational Therapy policy	2016		Not a sustainability model
Jennings, L. A., Tan, Z., Wenger, N. S., et al.	Quality of Care Provided by a Comprehensive Dementia Care Comanagement Program	2016	English	Not a sustainability model
Jesus, T. S., & Hoenig, H.	Postacute rehabilitation quality of care: Toward a shared conceptual framework	2015	English	Not a sustainability model

Johnson, K., Collins, D., Shamblen, S., et al.	Long-Term Sustainability of Evidence-Based Prevention Interventions and Community Coalitions Survival: a Five and One-Half Year Follow-up Study	2017	English	Not a sustainability model
Johnson, M.	Mapping design things: making design explicit in the discourse of change	2016	English	Not a sustainability model
Johnson, M. R., Kenworthy-Heinige, T., Beck, D. J., et al.	Research site mentoring: A novel approach to improving study recruitment	2018		Not a sustainability model
Johnstone, W., Busby, M., & Page, B.	A collaborative model for service delivery: The community navigator program for stroke survivors in BC	2015	English	Not a sustainability model
Jones, B. H., Hauschild, V. D., & Canham-Chervak, M.	Musculoskeletal training injury prevention in the U.S. Army: Evolution of the science and the public health approach	2018		Not a sustainability model
Jones, D. K.	Health Reform in the South: Re-Tracing Robert Kennedy's Steps in Mississippi and Kentucky	2017	English	Not a sustainability model
Jones, E. R., & Hostetter, T. H.	Integrated renal care: Are nephrologists ready for change in renal care delivery models?	2015	English	Not a sustainability model
Jones, P., Le Fevre, J., Harper, A., et al.	Effect of the shorter stays in emergency departments time target policy on key indicators of quality of care	2017	English	Not a sustainability model
Joseph, J. P., Jerome, G., Lambert, W., et al.	Going beyond the vertical: Leveraging a national HIV quality improvement programme to address other health priorities in Haiti	2015	English	Not a sustainability model
Kaizer, L., Simanovski, V., Lalonde, C., et al.	Using data from Ontario's episode-based funding model to assess quality of chemotherapy	2016	English	Not a sustainability model
Kapiriri, L.	International validation of quality indicators for evaluating priority setting in low income countries: process and key lessons	2017		Not a sustainability model
Kara, H., & Arvidson, M.	To what extent can evaluation frameworks help NGOs to address health inequalities caused by social exclusion?	2015	English	Not a sustainability model
Karlen, E., & McCathie, B.	Implementation of a Quality Improvement Process Aimed to Deliver Higher-Value Physical Therapy for Patients With Low Back Pain: Case Report	2015		Not a sustainability model

Kassahun, A., Braka, F., Gallagher, K., et al.	Introducing an accountability framework for polio eradication in Ethiopia: results from the first year of implementation 2014-2015	2017	English	Not a sustainability model
Kastien-Hilka, T., Rosenkranz, B., Bennett, B., et al.	How to evaluate health-related quality of life and its association with medication adherence in pulmonary tuberculosis - designing a prospective observational study in South Africa	2016	English	Not a sustainability model
Katz, A. S., Cheff, R. M., & O'Campo, P.	Bringing stakeholders together for urban health equity: hallmarks of a compromised process	2015	English	Not a sustainability model
Katz, L., Donnelly, J., Gresens, C., et al.	Report of a workshop on ensuring sustainable access to safe blood in developing countries: International Blood Safety Forum, March 24, 2017	2018		Not a sustainability model
Kelly, M., Rivas, C., Foell, J., et al.	Unmasking quality: exploring meanings of health by doing art	2015	English	Not a sustainability model
Kennedy, E., Kamunaga, M., Naiceru, E., et al.	Towards improved rheumatic heart disease control and prevention in Fiji Islands	2016	English	Not a sustainability model
Kesselheim, J. C., Atlas, M., Adams, D., et al.	Humanism and professionalism education for pediatric hematology-oncology fellows: A model for pediatric subspecialty training	2015	English	Not a sustainability model
Kharrazi, H., Lasser, E. C., W, A. Y., et al.	A proposed national research and development agenda for population health informatics: Summary recommendations from a national expert workshop	2017	English	Not a sustainability model
Khodyakov, D., Ridgely, M. S., Huang, C., et al.	Project JOINTS: What factors affect bundle adoption in a voluntary quality improvement campaign?	2015	English	Not a sustainability model
Kieslich, K., & Littlejohns, P.	Does accountability for reasonableness work? A protocol for a mixed methods study using an audit tool to evaluate the decision-making of clinical commissioning groups in England	2015	English	Not a sustainability model
Kim Yeary, K. H. C., Long, C. R., Bursac, Z., et al.	Design of a randomized, controlled, comparative-effectiveness trial testing a Family Model of Diabetes Self-Management Education (DSME) vs. Standard DSME for Marshallese in the United States	2017	English	Not a sustainability model

Kolandai-Matchett, K., Bellringer, M., Landon, J., et al.	A process evaluation of the 'Aware' and 'Supportive Communities' gambling harm-minimisation programmes in New Zealand	2017	English	Not a sustainability model
Kolovou, V.	A critical realism approach to public health interventions that aim to prevent obesity in selected european countries	2015	English	Not a sustainability model
Lachman, P., Linkson, L., Evans, T., et al.	Developing person-centred analysis of harm in a paediatric hospital: A quality improvement report	2015	English	Not a sustainability model
Lance, J. C.	Collective Efficacy & Its Influence on School-Based Mental Health Services	2015	English	Not a sustainability model
Lanzarone, E., Pasquali, S., Gilioli, G., et al.	A Bayesian estimation approach for the mortality in a stage-structured demographic model	2017	English	Not a sustainability model
Lassi, Z. S., Aftab, W., Ariff, S., et al.	Impact of service provision platforms on maternal and newborn health in conflict areas and their acceptability in Pakistan: a systematic review	2015	English	Not a sustainability model
Lavender, D. T.	Improving quality of care during labour and childbirth and in the immediate postnatal period	2016	English	Not a sustainability model
Leader, A., Cadet, C., Lazala, D., et al.	Collaborative Implementation Strategy for Newborn Resuscitation and Essential Care Training in the Dominican Republic	2017	English	Not a sustainability model
Lee, R. E., Parker, N. H., Soltero, E. G., et al.	Sustainability via Active Garden Education (SAGE): results from two feasibility pilot studies	2017	English	Not a sustainability model
Lee, Y., Anderson, E., Quranta, J., et al.	An interdisciplinary family-centered program: An innovative approach to better meet the multifaceted needs of grandparent-headed families	2018		Not a sustainability model
Leech, L., Zouiten, A., & Graaff, P.	Who DARES wins. Delivering accelerated results effectively and sustainably	2018		Not a sustainability model
Leggat, S. G., & Balding, C.	A qualitative study on the implementation of quality systems in Australian hospitals	2017	English	Not a sustainability model
Leonard, C., Lawrence, E., McCreight, M., et al.	Implementation and dissemination of a transition of care program for rural veterans: a controlled before and after study	2017	English	Not a sustainability model

Lewis, C. C., Stanick, C. F., Martinez, R. G., et al.	The Society for Implementation Research Collaboration Instrument Review Project: a methodology to promote rigorous evaluation	2015	English	Not a sustainability model
Lewis, C. C., Weiner, B. J., Stanick, C., et al.	Advancing implementation science through measure development and evaluation: a study protocol	2015	English	Not a sustainability model
Lewis, V. A., Tierney, K. I., Colla, C. H., et al.	The new frontier of strategic alliances in health care: New partnerships under accountable care organizations	2017	English	Not a sustainability model
Li, Y., Xiong, L., & Zhu, W.	A Carbon Cycle Model for the Social-Ecological Process in Coastal Wetland: A Case Study on Gouqi Island, East China	2017	English	Not a sustainability model
Liddy, C., & Keely, E.	Using the quadruple aim framework to measure impact of health technology implementation: A case study of eConsult	2018		Not a sustainability model
Ling, S., Watson, A., & Gehrs, M.	Developing an Addictions Nursing Competency Framework Within a Canadian Context	2017		Not a sustainability model
Liu, J., Li, Y., Huang, G., et al.	Identification of water quality management policy of watershed system with multiple uncertain interactions using a multi-level-factorial risk-inference-based possibilistic-probabilistic programming approach	2017	English	Not a sustainability model
Llopis-Albert, C., Merigó, J. M., Xu, Y., et al.	Improving Regional Climate Projections by Prioritized Aggregation via Ordered Weighted Averaging Operators	2017		Not a sustainability model
Locke, J., Beidas, R. S., Marcus, S., et al.	A mixed methods study of individual and organizational factors that affect implementation of interventions for children with autism in public schools	2016	English	Not a sustainability model
Lopes Sauer, A., Sauer, E., & Valier, A.	Quality Improvement in Athletic Health Care	2017		Not a sustainability model
Luck, J., York, L. S., Bowman, C., et al.	Implementing a user-driven online quality improvement toolkit for cancer care	2015	English	Not a sustainability model
Lunsford, S. S., Fatta, K., Stover, K. E., et al.	Supporting close-to-community providers through a community health system approach: case examples from Ethiopia and Tanzania	2015	English	Not a sustainability model
Luoma, K., Leavitt, I. M., Marrs, J. C., et al.	How can clinical practices pragmatically increase physical activity for patients with type 2 diabetes? a systematic review	2016	English	Not a sustainability model

Mackinson, L., Corey, J., Kelly, V., et al.	Nurse Project Consultant: Critical Care Nurses Move Beyond the Bedside to Affect Quality and Safety	2018		Not a sustainability model
Madon, S., Malecela, M., Mashoto, K., et al.	The role of community participation for sustainable integrated neglected tropical diseases and water, sanitation and hygiene intervention programs: A pilot project in Tanzania	2018		Not a sustainability model
Mador, R. L., Kornas, K., Simard, A., et al.	Using the Nine Common Themes of Good Practice checklist as a tool for evaluating the research priority setting process of a provincial research and program evaluation program	2016	English	Not a sustainability model
Maeder, A., Gray, K., Borda, A., et al.	Achieving greater consistency in telehealth project evaluations to improve organisational learning	2015	English	Not a sustainability model
Magasana, V., Zembe, W., Tabana, H., et al.	An assessment of quality of home-based HIV counseling and testing performed by lay counselors in a rural sub-district of KwaZulu-Natal, South Africa	2016		Not a sustainability model
Mainsbridge, C. P., Cooley, D., Fraser, S. P., et al.	A workplace intervention designed to interrupt prolonged occupational sitting: Self-reported perceptions of health from a cohort of desk-based employees over 26 weeks	2016	English	Not a sustainability model
Mainz, J., Kristensen, S., & Bartels, P.	Quality improvement and accountability in the Danish health care system	2015	English	Not a sustainability model
Malagoni, A. M., Cavazza, S., Ferraresi, G., et al.	Effects of a "test in-train out" walking program versus supervised standard rehabilitation in chronic stroke patients: a feasibility and pilot randomized study	2016	English	Not a sustainability model
Mantziki, K., Renders, C. M., Vassilopoulos, A., et al.	Inequalities in energy-balance related behaviours and family environmental determinants in European children: changes and sustainability within the EPHE evaluation study	2016	English	Not a sustainability model
Marshall, M., Eyre, L., Lalani, M., et al.	Increasing the impact of health services research on service improvement: the researcher-in-residence model	2016	English	Not a sustainability model
Martin, B. A., Chewning, B. A., Margolis, A. R., et al.	Med Wise: A theory-based program to improve older adults' communication with pharmacists about their medicines	2016	English	Not a sustainability model

Martin, M. A., Perry-Bell, K., Minier, M., et al.	A Real-World Community Health Worker Care Coordination Model for High-Risk Children	2018		Not a sustainability model
Masamha, J., Skaggs, B., Pinto, I., et al.	Working toward a sustainable laboratory quality improvement programme through country ownership: Mozambique's SLMTA story	2014		Not a sustainability model
Masso, M., Quinsey, K., & Fildes, D.	Evolution of a multilevel framework for health program evaluation	2017	English	Not a sustainability model
Mathews, K. S., & Long, E. F.	A conceptual framework for improving critical care patient flow and bed use	2015	English	Not a sustainability model
Mausezahl, D., Hartinger, S., Muela, J., et al.	Using regional socio-ecologic models to identify system barriers and enablers for the adoption of Improved Cook Stoves in rural Peru	2015	English	Not a sustainability model
McCalman, J., Bainbridge, R., Percival, N., et al.	The effectiveness of implementation in Indigenous Australian healthcare: An overview of literature reviews	2016	English	Not a sustainability model
McClellan, W. M., Plantinga, L. C., Wilk, A. S., et al.	ESRD databases, public policy, and quality of care: Translational medicine and nephrology	2017	English	Not a sustainability model
McConnico, N., Boynton-Jarrett, R., Bailey, C., et al.	A Framework for Trauma-Sensitive Schools	2016		Not a sustainability model
McCullough, C., Degennaro, V., Bagley, J. K., et al.	A national trauma capacity assessment of Haiti	2016	English	Not a sustainability model
McGinn, T.	Putting Meaning into Meaningful Use: A Roadmap to Successful Integration of Evidence at the Point of Care	2016	English	Not a sustainability model
McGinnis, S. M., McKeon, T., Desai, R., et al.	A Systematic Review: Costing and Financing of Water, Sanitation, and Hygiene (WASH) in Schools	2017	English	Not a sustainability model
McGoey, T., Root, Z., Bruner, M. W., et al.	Evaluation of physical activity interventions in children via the reach, efficacy/effectiveness, adoption, implementation, and maintenance (RE-AIM) framework: A systematic review of randomized and non-randomized trials	2016	English	Not a sustainability model
McGrath, S. E.	Childhood Obesity Comorbidities Awareness Hospital-based Education Program	2017	English	Not a sustainability model
McGrath, S. P., & Blike, G. T.	Building a Foundation of Continuous Improvement in a Rapidly Changing Environment: The Dartmouth-Hitchcock Value Institute Experience	2015	English	Not a sustainability model

McIntosh, N., Grabowski, A., Jack, B., et al.	A public-private partnership improves clinical performance in a hospital network in Lesotho	2015	English	Not a sustainability model
McKay, V. R., Dolcini, M. M., & Catania, J. A.	Impact of Human Resources on Implementing an Evidence-Based HIV Prevention Intervention	2017	English	Not a sustainability model
McKay, V. R., Hoffer, L. D., Combs, T. B., et al.	The dynamic influence of human resources on evidence-based intervention sustainability and population outcomes: an agent-based modeling approach	2018		Not a sustainability model
McVeigh, J., MacLachlan, M., Gilmore, B., et al.	Promoting good policy for leadership and governance of health related rehabilitation: a realist synthesis	2016	English	Not a sustainability model
Mechanick, J. I., Hurley, D. L., & Garvey, W. T.	Adiposity-based chronic disease as a new diagnostic term: The American association of clinical endocrinologists and American college of endocrinology position statement	2017	English	Not a sustainability model
Meeker-O'connell, A., Borda, M. M., Little, J. A., et al.	Enhancing quality and efficiency in clinical development through a clinical QMS conceptual framework: Concept paper vision and outline	2015	English	Not a sustainability model
Meier, A., McGovern, M. P., Lambert-Harris, C., et al.	Adherence and competence in two manual-guided therapies for co-occurring substance use and posttraumatic stress disorders: clinician factors and patient outcomes	2015	English	Not a sustainability model
Menichetti, J., & Graffigna, G.	PHE in Action: Development and Modeling of an Intervention to Improve Patient Engagement among Older Adults	2016	English	Not a sustainability model
Michalowsky, B., Thyrian, J. R., Wucherer, D., et al.	Effect of dementiacare management on healthcare resource utilization and cost: One-year follow-up results of the delphi trial	2016	English	Not a sustainability model
Mir, G., Meer, S., Cottrell, D., et al.	Adapted behavioural activation for the treatment of depression in Muslims	2015	English	Not a sustainability model
Mitera, G.	National Quality Improvement in Radiation Therapy: A Look at the Past, Present, and Future	2015		Not a sustainability model
Mlotshwa, B. C., Mwesigwa, S., Mboowa, G., et al.	The collaborative African genomics network training program: A trainee perspective on training the next generation of African scientists	2017	English	Not a sustainability model

Moffat, T., & Thrasher, D.	School meal programs and their potential to operate as school-based obesity prevention and nutrition interventions: case studies from France and Japan	2016	English	Not a sustainability model
Mohamed, B., & Azizan, N. A.	Perceived service quality's effect on patient satisfaction and behavioural compliance	2015	English	Not a sustainability model
Molnar, B. E., Beatriz, E. D., & Beardslee, W. R.	Community-Level Approaches to Child Maltreatment Prevention	2016	English	Not a sustainability model
Moore, A. M., Gove, A., & Tietjen, K.	Great Expectations: A Framework for Assessing and Understanding Key Factors Affecting Student Learning of Foundational Reading Skills	2017	English	Not a sustainability model
Morbach, S., Kersken, J., Lobmann, R., et al.	The German and Belgian accreditation models for diabetic foot services	2016		Not a sustainability model
Morelli, M. S.	Using the Plan, Do, Study, Act Model to Implement a Quality Improvement Program in Your Practice	2016	English	Not a sustainability model
Morrel-Samuels, S., Rupp, L., Eisman, A., et al.	Measuring the Implementation of Youth Empowerment Solutions	2018		Not a sustainability model
Morris, R. L., Brand, C. A., Hill, K. D., et al.	RESPOND: a patient-centred programme to prevent secondary falls in older people presenting to the emergency department with a fall--protocol for a mixed methods programme evaluation	2016		Not a sustainability model
Mosavianpour, M., Sarmast, H. H., Kisson, N., et al.	Theoretical domains framework to assess barriers to change for planning health care quality interventions: A systematic literature review	2016	English	Not a sustainability model
Moshabela, M., Sene, M., Nanne, I., et al.	Early detection of maternal deaths in Senegal through household-based death notification integrating verbal and social autopsy: a community-level case study	2015	English	Not a sustainability model
Mosher, H., & Ogrinc, G.	Between the guidelines: SQUIRE 2.0 and advances in healthcare improvement practice and reporting	2016	English	Not a sustainability model
Moule, P., Armoogum, J., Dodd, E., et al.	Practical guidance on undertaking a service evaluation	2016	English	Not a sustainability model
Moureaux, C., Perelman, J., Mendes da Costa, E., et al.	Impact of the medical home model on the quality of primary care: the Belgian experience	2015		Not a sustainability model

Mukherjee, J. S., Barry, D., Weatherford, R. D., et al.	Community-Based ART Programs: Sustaining Adherence and Follow-up	2016	English	Not a sustainability model
Muleme, J., Kankya, C., Ssempebwa, J. C., et al.	A Framework for Integrating Qualitative and Quantitative Data in Knowledge, Attitude, and Practice Studies: A Case Study of Pesticide Usage in Eastern Uganda	2017		Not a sustainability model
Mumba, C., Skjerve, E., Rich, M., et al.	Application of system dynamics and participatory spatial group model building in animal health: A case study of East Coast Fever interventions in Lundazi and Monze districts of Zambia	2017		Not a sustainability model
Murphy, J., Nguyen, V., Hannaford, A., et al.	Near-peer teaching for sustainable capacity building of basic life support training in Haiti: Feasibility of a training the trainers model	2016	English	Not a sustainability model
Murray, K. E., Ermias, A., Lung, A., et al.	Culturally adapting a physical activity intervention for Somali women: the need for theory and innovation to promote equity	2017	English	Not a sustainability model
Myall, M., May, C. R., Grimmett, C., et al.	RESTORE: an exploratory trial of a web-based intervention to enhance self-management of cancer-related fatigue: findings from a qualitative process evaluation	2015	English	Not a sustainability model
Nabwera, H. M., Dickinson, F., Manu, A., et al.	Facilitators and barriers of continuous positive airway pressure use in newborn care in kenya (preliminary results)	2018		Not a sustainability model
Naika, A. D., Lawrence, B., Kiefer, L., et al.	Building a primary care/research partnership: Lessons learned from a telehealth intervention for diabetes and depression	2015	English	Not a sustainability model
Naslund, J. A., Aschbrenner, K. A., Kim, S. J., et al.	Health behavior models for informing digital technology interventions for individuals with mental illness	2017	English	Not a sustainability model
Nau, C., Kumanyika, S., Gittelsohn, J., et al.	Identifying Financially Sustainable Pricing Interventions to Promote Healthier Beverage Purchases in Small Neighborhood Stores	2018		Not a sustainability model
Needleman, J., Pearson, M. L., Upenieks, V. V., et al.	Engaging Frontline Staff in Performance Improvement: The American Organization of Nurse Executives Implementation of Transforming Care at the Bedside Collaborative	2016	English	Not a sustainability model

Nelson, M. L. A., Kelloway, L., Dawson, D., et al.	Stroke rehabilitation and patients with multimorbidity: a scoping review protocol	2015	English	Not a sustainability model
Neubauer, L. C., Doobay-Persaud, A., Galvin, S., et al.	Developing and refining the MSGH degree program: A theory and competency-driven, multi-phase curriculum development and alignment process	2017		Not a sustainability model
Nichols, M., Nemeth, L. S., Magwood, G., et al.	Exploring the Contextual Factors of Adolescent Obesity in an Underserved Population Through Photovoice	2016		Not a sustainability model
Nilmanat, K., Niyomthai, N. Udchumpisai, M., et al.	Models of palliative care from hospital to home in Southern Thailand	2018		Not a sustainability model
Noel, M. A., Kaluzynski, T. S., & Templeton, V. H.	Quality Dementia Care: Integrating Caregivers into a Chronic Disease Management Model	2017	English	Not a sustainability model
Novick et al.	Pediatric cardiac development assistance in Iraq; 2010-2016	2017		Not a sustainability model
Novick, G., Womack, J. A., Lewis, J., et al.	Perceptions of Barriers and Facilitators During Implementation of a Complex Model of Group Prenatal Care in Six Urban Sites	2015	English	Not a sustainability model
Ober, A. J., Watkins, K. E., Hunter, S. B., et al.	An organizational readiness intervention and randomized controlled trial to test strategies for implementing substance use disorder treatment into primary care: SUMMIT study protocol	2015	English	Not a sustainability model
O'Brien, O. A., Lindsay, K. L., McCarthy, M., et al.	Influences on the food choices and physical activity behaviours of overweight and obese pregnant women: A qualitative study	2017		Not a sustainability model
Obucina, M., Harris, N., Fitzgerald, J. A., et al.	The application of triple aim framework in the context of primary healthcare: A systematic literature review	2018		Not a sustainability model
O'Connor, D. P., Lee, R. E., Mehta, P., et al.	Childhood Obesity Research Demonstration project: cross-site evaluation methods	2015	English	Not a sustainability model
O'Connor, R., Mindlis, I., Hauser, D., et al.	Supporting asthma self-management behaviors in aging adults (SAMBA): A randomized clinical trial	2018		Not a sustainability model
O'Loughlin, M., Mills, J., McDermott, R., et al.	Review of patient-reported experience within Patient-Centered Medical Homes: Insights for Australian Health Care Homes	2017	English	Not a sustainability model

Olsen, H. M., Brown, W. J., Kolbe-Alexander, T., et al.	Physical activity and sedentary behaviour in a flexible office-based workplace: Employee perceptions and priorities for change	2018		Not a sustainability model
Olvera, D. J., Stuhlmiller, D. F. E., Wolfe, A., et al.	A Continuous Quality Improvement Airway Program Results in Sustained Increases in Intubation Success	2018		Not a sustainability model
O'Meara, P., Wingrove, G., & Nolan, M.	Clinical leadership in paramedic services: A narrative synthesis	2017	English	Not a sustainability model
onnely, C., Shulha, L., Klinger, D., et al.	Using program evaluation to support knowledge translation in an interprofessional primary care team: a case study	2016	English	Not a sustainability model
Ortiz, M., & Levins, R.	Self-feedbacks determine the sustainability of human interventions in eco-social complex systems: Impacts on biodiversity and ecosystem health	2017	English	Not a sustainability model
O'Sullivan, L., Wall, D., Creamer, R., et al.	Functional Land Management: Bridging the Think-Do-Gap using a multi-stakeholder science policy interface	2018		Not a sustainability model
O'Sullivan, P., Yuan, P., Satre, D., et al.	A Sequential Implementation Model for Workforce Development: A Case Study of Medical Residency Training for Substance Use Concerns	2018		Not a sustainability model
Paddock, S., Brum, L., Sorrow, K., et al.	PACE continuous innovation indicators-A novel tool to measure progress in cancer treatments	2015	English	Not a sustainability model
Paddock, S., Damberg, C., Yanagihara, D., et al.	What Role Does Efficiency Play in Understanding the Relationship Between Cost and Quality in Physician Organizations?	2017		Not a sustainability model
Palinkas, L. A., Campbell, M., & Saldana, L.	Agency Leaders' Assessments of Feasibility and Desirability of Implementation of Evidence-Based Practices in Youth-Serving Organizations Using the Stages of Implementation Completion	2018		Not a sustainability model
Paltiel, A. D., Zheng, A., Weinstein, M. C., et al.	Setting Performance Standards for a Cost-Effective Human Immunodeficiency Virus Cure Strategy in South Africa	2017	English	Not a sustainability model
Paquette-Warren, J., Harris, S. B., Naqshbandi Hayward, M., et al.	Case study of evaluations that go beyond clinical outcomes to assess quality improvement diabetes programmes using the Diabetes Evaluation Framework for Innovative National Evaluations (DEFINE)	2016	English	Not a sustainability model

Parham, G. P., Mwanahamuntu, M. H., Hicks, M. L., et al.	Population-level scale-up of surgery platforms for women's cancer care in low- and middle-income countries	2016	English	Not a sustainability model
Patel, M. M., Brown, J. D., Croake, S., et al.	The current state of behavioral health quality measures: Where are the gaps?	2015	English	Not a sustainability model
Patrick, K., & Wyckoff, L.	Providing Standards for Diabetes Care in the School Setting: A Review of the Colorado Model	2018		Not a sustainability model
Payne, B., Sharma, S., Dunsmuir, D., et al.	The piers on the move mobile health application	2017		Not a sustainability model
Peacock-Chambers, E., Del Canto, P., Ahlers, D., et al.	School-Based Disaster Recovery: Promotion of Children's Mental Health Over the Long Haul	2017	English	Not a sustainability model
Pelt, C. E., Anderson, M. B., Erickson, J. A., et al.	Adding Value to Total Joint Arthroplasty Care in an Academic Environment: The Utah Experience	2018		Not a sustainability model
Pennel, C. L., Tamayo, L., Wells, R., et al.	Emergency Medical Service-based Care Coordination for Three Rural Communities	2016	English	Not a sustainability model
Penson, D. F.	Re: Changing physician incentives for affordable, quality cancer care: Results of an episode payment model: Editorial comment	2015	English	Not a sustainability model
Pereira, S. K., Kumar, P., Dutt, V., et al.	Protocol for the evaluation of a social franchising model to improve maternal health in Uttar Pradesh, India	2015	English	Not a sustainability model
Phuksaritanon, R., Kijsanayotin, B., & Theeraroungchaisri, A.	A medicines terminology governance model for Thailand	2017	English	Not a sustainability model
Pinder, K. E., & Shabbits, J. A.	Educational leadership during a decade of medical curricular innovation and renewal	2018		Not a sustainability model
Pittman, P., & Salmon, M. E.	Advancing nursing enterprises: A cross-country comparison	2016	English	Not a sustainability model
Pizzo, J. J., Sullivan, L., & Ryan, D. L.	Building the right physician platform	2015	English	Not a sustainability model
Portela, M. C., Lima, S. M., Martins, M., et al.	Improvement Science: conceptual and theoretical foundations for its application to healthcare quality improvement	2016	English, Portuguese	Not a sustainability model
Proctor, E. K., & Chambers, D. A.	Training in dissemination and implementation research: a field-wide perspective	2017	English	Not a sustainability model
Puijk-Hekman, S., van Gaal, B. G., Bredie, S. J., et al.	Self-Management Support Program for Patients With Cardiovascular Diseases: User-Centered Development of the Tailored, Web-Based Program Vascular View	2017	English	Not a sustainability model

Radcliff, E., Hale, N., Browder, J., et al.	Building Community Partnerships: Using Social Network Analysis to Strengthen Service Networks Supporting a South Carolina Program for Pregnant and Parenting Teens	2017	English	Not a sustainability model
Raeburn, T., Hungerford, C., Sayers, J., et al.	Leading a Recovery-oriented Social Enterprise	2015	English	Not a sustainability model
Rai, A., & Jagadeesh Kannan, R.	Multi-scale modeling of territorial dynamics of geospatial anthropogenic energy consumption	2017	English	Not a sustainability model
Rao, K. D., Nagulapalli, S., Arora, R., et al.	An Implementation Research Approach to Evaluating Health Insurance Programs: Insights from India	2016	English	Not a sustainability model
Redman, R. M., Reinsvold, M. C., Reddy, A., et al.	A successful model for longitudinal community-engaged health research: The 2040 Partners for Health Student Program	2017	English	Not a sustainability model
Reich, L. J.	Collaborative Framework for Addressing Complex Issues: A Snapshot of San Bernardino County's Healthy Communities Program	2016	English	Not a sustainability model
Reich, R. R., Lengacher, C. A., Alinat, C. B., et al.	Mindfulness-Based Stress Reduction in Post-treatment Breast Cancer Patients: Immediate and Sustained Effects Across Multiple Symptom Clusters	2017	English	Not a sustainability model
Reininghaus, U., Depp, C. A., & Myin-Germeys, I.	Ecological Interventionist Causal Models in Psychosis: Targeting Psychological Mechanisms in Daily Life	2016	English	Not a sustainability model
Rejani, R., Rao, K. V., Osman, M., et al.	Spatial and temporal estimation of soil loss for the sustainable management of a wet semi-arid watershed cluster	2016	English	Not a sustainability model
Renfro, T., Johnson, E., Lambert, D. N., et al.	The MEDIA model: An innovative method for digitizing and training community members to facilitate an HIV prevention intervention	2018		Not a sustainability model
Renger, R., Foltysova, J., Becker, K. L., et al.	The power of the context map: Designing realistic outcome evaluation strategies and other unanticipated benefits	2015	English	Not a sustainability model
Ridgeway, J. L., LeBlanc, A., Branda, M., et al.	Implementation of a new prenatal care model to reduce office visits and increase connectivity and continuity of care: Protocol for a mixed-methods study	2015	English	Not a sustainability model
Rieger, M., & Wagner, N.	Child health, its dynamic interaction with nutrition and health memory - Evidence from Senegal	2015	English	Not a sustainability model

Riley, C. M., Merritt, A. D., Mize, J. M., et al.	Assuring Sustainable Gains in Interdisciplinary Performance Improvement: Creating a Shared Mental Model during Operating Room to Cardiac ICU Handoff	2017	English	Not a sustainability model
Rioth, M. J., Warner, J., Savani, B. N., et al.	Next-generation long-term transplant clinics: Improving resource utilization and the quality of care through health information technology	2016	English	Not a sustainability model
Rivera, Y. M., Moreno, L., Briant, K. J., et al.	Developing Sustainable Cancer Education Programs: Training Public Health Students to Deliver Cancer 101 in Puerto Rico	2016	English	Not a sustainability model
Rizzo, V. M., Burnes, D., & Chalfy, A.	A Systematic Evaluation of a Multidisciplinary Social Work–Lawyer Elder Mistreatment Intervention Model	2015		Not a sustainability model
Robbins, L. B., Ling, J., Toruner, E. K., et al.	Examining reach, dose, and fidelity of the "Girls on the Move" after-school physical activity club: a process evaluation	2016	English	Not a sustainability model
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Roche, D.	A realist evaluation of patient involvement in a safer surgery initiative	2016	English	Not a sustainability model
Roche, M. L., Sako, B., Osendarp, S. J., et al.	Community-based grain banks using local foods for improved infant and young child feeding in Ethiopia	2017	English	Not a sustainability model
Rodriguez, D. C., & Peterson, L. A.	A retrospective review of the Honduras AIN-C program guided by a community health worker performance logic model	2016	English	Not a sustainability model
Rodriguez, G. M., Huang, I., Truong, S., et al.	Depression care management: Results from the second year of a collaborative care model in an urban academic primary care clinic	2016	English	Not a sustainability model
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Rodriguez, M. A., Friedberg, J. P., Wang, B., et al.	Sustain ability of a tailored behavioral intervention to improve hypertension control: Outcomes of a randomized controlled trial	2015	English	Not a sustainability model
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Salbach, N. M., Howe, J. A., Baldry, D., et al.	Considerations for expanding community exercise programs incorporating a healthcare-recreation partnership for people with balance and mobility limitations: a mixed methods evaluation	2018		Not a sustainability model
Salvadori, M. R., Ando, R. A., Nascimento, C. A. O., et al.	Dead biomass of Amazon yeast: A new insight into bioremediation and recovery of silver by intracellular synthesis of nanoparticles	2017	English	Not a sustainability model
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Skillicorn, J. L.	Transitioning from Categorical Support for Clinical HIV Testing in the District of Columbia to a Stronger Reliance on Third Party Reimbursement: A Case Study	2015	English	Not a sustainability model

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Steele, M., Talley, B., & Frith, K.	Application of the SEIPS Model to Analyze Medication Safety in a Crisis Residential Center	2018		Not a sustainability model
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Westenbrink, S., Roe, M., Oseredczuk, M., et al.	EuroFIR quality approach for managing food composition data; Where are we in 2014?	2016	English	Not a sustainability model
Whedon, J. M., Punzo, M., Dehen, R., et al.	Relevance of Quality Measurement to Integrative Healthcare in the United States	2016	English	Not a sustainability model
Wiessing, L., Ferri, M., Belackova, V., et al.	Monitoring quality and coverage of harm reduction services for people who use drugs: A consensus study	2017	English	Not a sustainability model
Wilkinson, S. A., Hills, A. P., Street, S. J., et al.	Reassessment of Allied Health Professionals' Level of Self-Efficacy in, Outcome Expectancy in, and Use of Evidence-Based Practice	2016		Not a sustainability model
Willging, C. E., Aarons, G. A., Trott, E. M., et al.	Contracting and Procurement for Evidence-Based Interventions in Public-Sector Human Services: A Case Study	2016	English	Not a sustainability model
Williams, A., Sethi, B., Duggleby, W., et al.	A Canadian qualitative study exploring the diversity of the experience of family caregivers of older adults with multiple chronic conditions using a social location perspective	2016	English	Not a sustainability model
Williams, L. B., Tingen, M., McCall, A., et al.	Reducing lung cancer mortality in disparate populations through cancer-Community awareness access Research and Education (c-CARE)	2016	English	Not a sustainability model

Windsor, R., Clark, J., Davis, A., et al.	A Process Evaluation of the WV Smoking Cessation and Reduction in Pregnancy Treatment (SCRIPT) Dissemination Initiative: Assessing the Fidelity and Impact of Delivery for State-Wide, Home-Based Healthy Start Services	2017		Not a sustainability model
Witiw, C. D., Nathan, V., & Bernstein, M.	Economics, innovation, and quality improvement in neurosurgery	2015	English	Not a sustainability model
Wondimagegn, D., Cornelson, B., Rouleau, K., et al.	Toronto Addis Ababa Academic Collaboration in Family Medicine: An overview of the dawn of family medicine in Ethiopia through an inter-institutional model	2016	English	Not a sustainability model
Wong Shee, A., Robertson, C., McKenzie, A., et al.	Implementing an intervention to promote normal labour and birth: A study of clinicians' perceptions	2018		Not a sustainability model
Wong, J. Y. H., Chan, M. M. K., Lok, K. Y. W., et al.	Chinese women health ambassadors programme: A process evaluation	2017	English	Not a sustainability model
Wood, S. D., Candeland, J. L., Dinning, A., et al.	Our approach to changing the culture of caring for the acutely unwell patient at a large UK teaching hospital: A service improvement focus on Early Warning Scoring tools	2015		Not a sustainability model
Woon, K. S.	Sustainability Evaluation of Municipal Solid Waste Management Options in Hong Kong using Comparative Life Cycle Assessment and Life Cycle Costing	2015	English	Not a sustainability model
Wyer, P., & da Silva, S. A.	'All the King's horses . . .': the problematical fate of born-again evidence-based medicine: commentary on Greenhalgh, T., Snow, R., Ryan, S., Rees, S., and Salisbury, H. (2015) six 'biases' against patients and carers in evidence-based medicine. <i>BioMed Central Medicine</i> , 13:200	2015	English	Not a sustainability model
Wyer, P., Stojanovic, Z., Shaffer, J. A., et al.	Combining training in knowledge translation with quality improvement reduced 30-day heart failure readmissions in a community hospital: A case study	2016	English	Not a sustainability model
Yadlapati, R., Dakhou, L., Pandolfino, J. E., et al.	The Quality of Care for Gastroesophageal Reflux Disease	2017	English	Not a sustainability model
Yaegashi, Y., Yoshioka, H., Unami, K., et al.	A singular stochastic control model for sustainable population management of the fish-eating waterfowl <i>Phalacrocorax carbo</i>	2018		Not a sustainability model

Yakob, B., & Ncama, B. P.	A socio-ecological perspective of access to and acceptability of HIV/AIDS treatment and care services: a qualitative case study research	2016	English	Not a sustainability model
Yang, G., Gomez Tejada Zanudo, J., & Albert, R.	Target Control in Logical Models Using the Domain of Influence of Nodes	2018		Not a sustainability model
Yang, W., & Sharp, B.	Spatial Dependence and Determinants of Dairy Farmers' Adoption of Best Management Practices for Water Protection in New Zealand	2017	English	Not a sustainability model
Yashar, M. D., Ahn, J., Novack, J., et al.	Mastery learning of video laryngoscopy using the glidescope	2015	English	Not a sustainability model
Yasunaga, M., Murayama, Y., Takahashi, T., et al.	Multiple impacts of an intergenerational program in Japan: Evidence from the Research on Productivity through Intergenerational Sympathy Project	2016	English	Not a sustainability model
Yehualashet, Y. G., Mkanda, P., Gasasira, A., et al.	Strategic Engagement of Technical Surge Capacity for Intensified Polio Eradication Initiative in Nigeria, 2012-2015	2016	English	Not a sustainability model
Yeung, K.	Public Health Interventions as Regulatory Governance: The Place of Political Theory	2016	English	Not a sustainability model
Zhao, Z. G., Cheng, J. Q., Xu, S. L., et al.	A quality assessment index framework for public health services: A Delphi study	2015	English	Not a sustainability model
Zheng, H., He, J., Wang, L., et al.	Risk Factors and Spatial Clusters of Cryptosporidium Infection among School-Age Children in a Rural Region of Eastern China	2018		Not a sustainability model
Zimmerman, J. J., Anand, K. J. S., Meert, K. L., et al.	Research as a Standard of Care in the PICU	2016	English	Not a sustainability model
Zimmerman, M., Eisman, A., Reischl, T., et al.	Youth Empowerment Solutions: Evaluation of an After-School Program to Engage Middle School Students in Community Change	2018		Not a sustainability model
Zlotnik, S., Wilson, L., Scribano, P., et al.	Mandates for Collaboration: Health Care and Child Welfare Policy and Practice Reforms Create the Platform for Improved Health for Children in Foster Care	2015	English	Not a sustainability model
Zubkoff, L., Dionne-Odom, J. N., Pisu, M., et al.	Developing a "toolkit" to measure implementation of concurrent palliative care in rural community cancer centers	2017	English	Not a sustainability model

Zwijssen, S. A., Gerritsen, D. L., Eefsting, J. A., et al.	Coming to grips with challenging behaviour: A cluster randomised controlled trial on the effects of a new care programme for challenging behaviour on burnout, job satisfaction and job demands of care staff on dementia special care units	2015		Not a sustainability model
Blackstone, S., Iwelunmor, J., Plange-Rhule, J., et al.	Sustaining Nurse-Led Task-Shifting Strategies for Hypertension Control: A Concept Mapping Study to Inform Evidence-Based Practice	2017		Only sustainability factors, no model
Boggs, D., Urseau, I., Gallien, P., et al.	Analysing the sustainability of the physical rehabilitation sector in seven fragile countries through multi-stakeholder involvement using a participatory consensus tool	2015	English	Only sustainability factors, no model
Brookman-Fraze, L., Zhan, C., Stadnick, N., et al.	Using Survival Analysis to Understand Patterns of Sustainment within a System-Driven Implementation of Multiple Evidence-Based Practices for Children's Mental Health Services	2018		Only sustainability factors, no model
Buenemann, R. J.	Establishing Sustainable Community Garden Interventions with Aid from Health Promotion Organizations	2017	English	Only sustainability factors, no model
Chatio, S., & Akweongo, P.	Retention and sustainability of communitybased health volunteers' activities: A qualitative study in rural Northern Ghana	2017	English	Only sustainability factors, no model
Cheng, L., Feng, S., Hu, Y., et al.	Leadership practices of nurse managers for implementing evidence-based nursing in China	2018		Only sustainability factors, no model
Chu, E. S., Stollendorf, D. P., Mixon, A. S., et al.	Development of a sustainment program for the MAR-QUIS2 collaborative	2018		Only sustainability factors, no model
Colon-Emeric, C., Toles, M., Cary, M. P., Jr., et al.	Sustaining complex interventions in long-term care: a qualitative study of direct care staff and managers	2016	English	Only sustainability factors, no model
Cooper, B. R., Bumbarger, B. K., & Moore, J. E.	Sustaining evidence-based prevention programs: correlates in a large-scale dissemination initiative	2015	English	Only sustainability factors, no model
Dean, L., Njelesani, J., Smith, H., et al.	Promoting sustainable research partnerships: a mixed-method evaluation of a United Kingdom-Africa capacity strengthening award scheme	2015	English	Only sustainability factors, no model
Diaz del Castillo, A., Gonzalez, S. A., Rios, A. P., et al.	Start small, dream big: Experiences of physical activity in public spaces in Colombia	2016	English	Only sustainability factors, no model

Dombrowski, S. U., Campbell, P., Frost, H., et al.	Interventions for sustained healthcare professional behaviour change: a protocol for an overview of reviews	2016	English	Only sustainability factors, no model
Douglas, S., Button, S., & Casey, S. E.	Implementing for Sustainability: Promoting Use of a Measurement Feedback System for Innovation and Quality Improvement	2016	English	Only sustainability factors, no model
Engelgau, M. M., Peprah, E., Sampson, U. K., et al.	Perspectives from NHLBI Global Health Think Tank Meeting for Late Stage (T4) Translation Research	2016	English	Only sustainability factors, no model
Errington, G., Evans, C., & Watson, M. C.	Searching for sustainability within public health policy: insights from an injury prevention perspective	2017	English	Only sustainability factors, no model
Fleiszer, A. R., Semenic, S. E., Ritchie, J. A., et al. (a)	An organizational perspective on the long-term sustainability of a nursing best practice guidelines program: a case study	2015	English	Only sustainability factors, no model
Fleiszer, A. R., Semenic, S. E., Ritchie, J. A., et al. (c)	A unit-level perspective on the long-term sustainability of a nursing best practice guidelines program: An embedded multiple case study	2016	English	Only sustainability factors, no model
Fowler, P. J., Farrell, A. F., Marcal, K. E., et al.	Housing and Child Welfare: Emerging Evidence and Implications for Scaling up Services	2017	English	Only sustainability factors, no model
Gonzalez, M. B.	Exploring Community and Cultural Opportunities to Decrease Substance Abuse among American Indian Youth: A Photovoice Project	2017	English	Only sustainability factors, no model
Gray, S., Jones, M., Means, R., et al.	Inter-sectoral Transfer of the Food for Life Settings Framework in England	2017	English	Only sustainability factors, no model
Haby, M. M., Chapman, E., Clark, R., et al. (a)	Interventions that facilitate sustainable jobs and have a positive impact on workers' health: an overview of systematic reviews	2016	English	Only sustainability factors, no model
Haines, H. M., Baker, J., & Marshall, D.	Continuity of midwifery care for rural women through caseload group practice: Delivering for almost 20 years	2015	English	Only sustainability factors, no model
Hammond, J., Lorne, C., Coleman, A., et al.	The spatial politics of place and health policy: Exploring Sustainability and Transformation Plans in the English NHS	2017	English	Only sustainability factors, no model
Heinrich, M., Mechea, A., & Hoffmann, F.	Improving postoperative pain management in children by providing regular training and an updated pain therapy concept	2016	English	Only sustainability factors, no model

Hendriks, A. M., Jansen, M. W. J., Gubbels, J. S., et al.	Local government officials[U+05F3] views on intersectoral collaboration within their organization - A qualitative exploration	2015	English	Only sustainability factors, no model
Higuchi, K. S., Davies, B., & Ploeg, J.	Sustaining guideline implementation: A multisite perspective on activities, challenges and supports	2017	English	Only sustainability factors, no model
Hodge, L. M., & Turner, K. M.	Sustained Implementation of Evidence-based Programs in Disadvantaged Communities: A Conceptual Framework of Supporting Factors	2016	English	Only sustainability factors, no model
Hodge, L. M., Turner, K. M. T., Sanders, M. R., et al.	Factors that influence evidence-based program sustainment for family support providers in child protection services in disadvantaged communities	2017	English	Only sustainability factors, no model
Huang, W., Hunter, S. B., Ayer, L., et al.	Measuring sustainment of an evidence based treatment for adolescent substance use	2017	English	Only sustainability factors, no model
Hunter, S. B., Han, B., Slaughter, M. E., et al. (a)	Associations between implementation characteristics and evidence-based practice sustainment: a study of the Adolescent Community Reinforcement Approach	2015	English	Only sustainability factors, no model
Hunter, S. B., Han, B., Slaughter, M. E., et al. (b)	Predicting evidence-based treatment sustainment: results from a longitudinal study of the Adolescent-Community Reinforcement Approach	2017	English	Only sustainability factors, no model
Hysong, S. J., Kell, H. J., Petersen, L. A., et al.	Theory-based and evidence-based design of audit and feedback programmes: Examples from two clinical intervention studies	2017	English	Only sustainability factors, no model
Inauen, J., & Mosler, H. J.	Mechanisms of behavioural maintenance: Long-term effects of theory-based interventions to promote safe water consumption	2016	English	Only sustainability factors, no model
Iyer, S. P., Pancake, L. S., Dandino, E. S., et al.	Consumer-Involved Participatory Research to Address General Medical Health and Wellness in a Community Mental Health Setting	2015		Only sustainability factors, no model
Laba, T. L., Lehnbohm, E., Brien, J. A., et al.	Understanding if, how and why non-adherent decisions are made in an Australian community sample: a key to sustaining medication adherence in chronic disease?	2015	English	Only sustainability factors, no model

Linder, D.	A Mixed-Methods Evaluation of the Child-Dog Relationship in Healthy Weight and Overweight/Obese Children	2016	English	Only sustainability factors, no model
Mahomed, O. H., Asmall, S., & Voce, A.	Sustainability of the integrated chronic disease management model at primary care clinics in South Africa	2016	English	Only sustainability factors, no model
Markstrom, U., Svensson, B., Bergmark, M., et al.	What influences a sustainable implementation of evidence-based interventions in community mental health services? Development and pilot testing of a tool for mapping core components	2017		Only sustainability factors, no model
Mbalinda, S. N., Nabirye, R. C., Ombeva, E. A., et al.	Nursing Partnership Activities, Components, and Outcomes: Health Volunteers Overseas in Uganda 2001-2016	2017	English	Only sustainability factors, no model
Morden, A., Brooks, L., Jinks, C., et al.	Research "push", long term-change, and general practice	2015	English	Only sustainability factors, no model
Noel, V. A., Bond, G. R., Drake, R. E., et al.	Barriers and Facilitators to Sustainment of an Evidence-Based Supported Employment Program	2017	English	Only sustainability factors, no model
Ochtera, R. D., Siemer, C. J., & Levine, L. T.	Supporting Community-based Healthy Eating and Active Living Efforts in Sustaining Beyond the Funding Cycle	2018		Only sustainability factors, no model
Oliveira, S. R. A., Medina, M. G., Figueiro, A. C., et al.	Strategic factors for the sustainability of a health intervention at municipal level of Brazil	2017	English	Only sustainability factors, no model
Oliveira, S. R. A., Medina, M. G., Figueiro, A. C., et al.	Strategic factors for the sustainability of a health intervention at municipal level of Brazil	2017		Only sustainability factors, no model
Ory, M. G., Sanner, B., Vollmer Dahlke, D., et al.	Promoting public health through state cancer control plans: a review of capacity and sustainability	2015	English	Only sustainability factors, no model
Palinkas, L. A., Chavarin, C. V., Rafful, C. M., et al.	Sustainability of Evidence-Based Practices for HIV Prevention among Female Sex Workers in Mexico	2015	English	Only sustainability factors, no model
Patrick, R., & Kingsley, J.	Health promotion and sustainability programmes in Australia: barriers and enablers to evaluation	2017	English	Only sustainability factors, no model
Proctor, E., Luke, D., Calhoun, A., et al.	Sustainability of evidence-based healthcare: research agenda, methodological advances, and infrastructure support	2015	English	Only sustainability factors, no model
Rozema, A. D., Mathijssen, J. J. P., Jansen, M. W. J., et al.	Sustainability of outdoor school ground smoking bans at secondary schools: a mixed-method study	2017	English	Only sustainability factors, no model

Scheirer, M. A., Santos, S. L., Tagai, E. K., et al.	Dimensions of sustainability for a health communication intervention in African American churches: a multi-methods study	2017	English	Only sustainability factors, no model
Sumpradit, N., Fongthong, T., Puntong, S., et al.	Scaling up evidence-based interventions toward sustainability: A case study of antibiotics smart use program in Thailand	2015	English	Only sustainability factors, no model
Taylor, M. R. S.	IMPACT OF ADVOCACY INITIATIVES ON NURSES' MOTIVATION TO SUSTAIN MOMENTUM IN PUBLIC POLICY ADVOCACY	2016		Only sustainability factors, no model
Trasi, R., Biradavolu, M. R., & Deshpande, A.	Assistance, buy-in, and champions: The ABCS of sustaining leadership and management interventions	2016	English	Only sustainability factors, no model
Van Heerden, C., Maree, C., & Janse van Rensburg, E. S.	Strategies to sustain a quality improvement initiative in neonatal resuscitation	2016	English	Only sustainability factors, no model
Zakumumpa, H., Bennett, S., & Ssenooba, F.	Modifications to ART service delivery models by health facilities in Uganda in promotion of intervention sustainability: a mixed methods study	2017	English	Only sustainability factors, no model
Zakumumpa, H., Taiwo, M. O., Muganzi, A., et al.	Human resources for health strategies adopted by providers in resource-limited settings to sustain long-term delivery of ART: a mixed-methods study from Uganda	2016	English	Only sustainability factors, no model
Zheleva, B., Rajasekhar, V., Dobrzycka, A., et al.	Building capacity for pediatric cardiac care in low-resource settings: Sustainability through long-term partnerships	2016	English	Only sustainability factors, no model
Zida, A., Lavis, J. N., Sewankambo, N. K., et al.	The factors affecting the institutionalisation of two policy units in Burkina Faso's health system: a case study	2017	English	Only sustainability factors, no model

Additional file 5.4. Qualitative analysis of concepts and factors for sustainability frameworks/models/theories(F/M/Ts)

Core Factors identified by Authors related to CONCEPT	Subcategory - Specified for acute care			Subcategory - Unspecified or similar healthcare setting								
	Slaghuis et al (2011) 4	Sustainability of Healthcare Innovation Fwk 7 (Fleischer, 2015) SHIF	DCOM Fwk + with Realistic Eval Frykman (2017) 8	Buchanan (2005-07) 1	Racine (2006) 2	NHS Sustainability Model (Maher, 2010) (NHS SM) 3	Dynamic Sust Fwk (Chambers 2013) (DSF) 5	Sust of Innovation Theoretical Fwk (Fox 2015) SITF6				
	8	38	9	31	17	16	15	18				97
INNOVATION CONCEPT	changed practices/innov	Innovation	innovation - none noted			Process (Innovation)	Intervention	Innovation				
Relevance - consistent with competitive strategy		relevance to address need or problem,		Substantiality - perceived centrality - chg or innov is consistent with competitive strategy/need	Sociopolitical Legitimacy (relevance)			perceived need of innov in local context	4			
Innovation Characteristics (scale, shape & form, age, nature/type, integrity)		scale of innovation		Substantial - char / scale of innov	Structural Legitimacy (innov's shape and form)		<i>individual components/char</i> of the innov (chosen to effect beh chg)		7			
		age of innovation.										
		nature/type/form of innovation										
		integrity of innovation										
Perceived centrality to organization performance /platform /services		integration with existing services/program		Substantial- perceived centrality - chg or innov is central to the orgal performance	Procedural Legitimacy (acceptability of the methods and procedures it uses)		<i>delivery platform</i> (i.e., face to face, telephonic, web,) + others may be used to describe the intervention/innov		4			
Fit with org's vision/mission, procedures/ strategies		fit with orgal procedures/ strategies/ mission		Substantial- fit with organization		fit linked with strategic goals /vision and culture			3			

Adaptability of Innovation		adaptability of innov to the context				adaptability of the improved process		adaption of innov to local context	3			
Effectiveness of innovation for patient, staff, org (cost effective, efficiency & quality of care)		effectiveness of innovation			Consequential Legitimacy (of the +ve or -ve effects = effectiveness of innovation)	credibility of benefits to staff/pts/org and benefits beyond helping pts (i.e. ↓waste, avoid duplication)	offers benefits that are targeted, pt-centered (pt. pop) that receives the intervention or the system that delivers it (ie cost containment, efficiency of care, quality metrics)	Safety & quality of innovation to stakeholders (i.e., using measures relevant to stakeholders to evaluate the quality of an innovation)	6			
						benefits beyond helping pts (i.e. ↓waste, avoid duplication)						
Barrier Identification								Barriers to the innovation	1		28	28
ADOPTOR CONCEPT	Actors are implied to be part of the adopter concept via institutionalization (team reflection)	Adopters under contextual factors whereas Leadership is a separate factor	No discrete adopter section but rather a mechanisms of change beh which is embodied in the adopters	individual, leadership managerial = all separate factors	local adopter = separate factor/concept	staff = separate factor/concept	Adopters - Not explicitly stated as a separate concept it is in practice setting as a separate factor = staffing.	Workforce = adopters -separate factor/concept				
Human resources - recruitment processes, succession and leave planning (staffing)							Human resources & capital resources (staffing) exist within the practice setting	Staff recruitment processes, succession and leave planning in place	2			
Individual commitment to innovation		commitment of stakeholders to innovation/ownership of innovation,		Indiv commitment ie commitment to chg/ innov and success	<i>Intermediary Functions factors - Balancing the Authority of the intermediary(mgmt.) and the relative autonomy of adopters (at sites) =</i>			Support for the innovation	4			

					mutual commitment to innov							
Individual competency (skill knowledge, absorptive capacity) to perform innovation		competencies of indiv to perform innovation	Competence - is having the skills needed to perform work tasks.	Indiv competence = skills and knowledge	Intermediary Functions Factor - Technical competence		<i>innov practitioners</i> (set of chars defining who should deliver the Intervention)		8			
		char of the workforce (e.g. stability)	individual (e.g. individual capacities)		Absorptive capacity (for new knowledge rt to the innov)							
Internal cohesion btwn indiv & commitment within the org /stakeholder engagement leads to increased performance		commitment of individuals to the org/stakeholder engagement			Internal cohesion (within the org) =degree to wh members are attracted to the org leads to increased performance				4			
		nature of relships among innov stakeholders	interpersonal relships (e.g., relationships between individuals)									
Stakeholder Commitment to innovation	Institutionalization of Team Reflection (i.e., formal purposeful reflection & monitoring of quality performance btwn professionals)		Direction - entails knowing what work tasks to perform and how these tasks are related to individual & orgal goals (i.e. why the work tasks are important).			Staff behavior towards sustaining the chg;			3			
Stakeholder beliefs, attitude, perceptions, emotions, expectations towards innovation				indivs emotions - innov is welcomed		staff attitude towards sustaining change/innov	Staff perceptions of innovations need		5			

INNER CONTEXT CONCEPT	context	Indiv & stakeholders contained in inner and outer Context				Context	Practice Setting	Organization				
Infrastructure support- Policies & Procedures based on Innovation		P & P based on innovation	institutional setting (e.g., orgal structures & policies)	Organizational - Policies favour innov & long term goals, encourage team work		infrastructure support (ie new innovation-process in policy)			6			
				Organizational - procedures to monitor		infrastructure support (ie new innovation-process in procedures)						
Infrastructure support for innovation in job description with mechanism for recognizing achievement	Institutionalization of new skills (i.e. involves setting demands in job postings,			Organizational - mechanisms for recognizing achievement		infrastructure support (ie new innovation-process in job descriptions)			4			
				Organizational - reward and appraisal systems are consistent and transparent								
Infrastructure support-equipment & supplies for innovation	Institutionalization of Practical materials (i.e.) medical instruments, pt records into processes/routines		Opportunity - includes the tools, resources, and processes that enable the performance of work tasks			infrastructure support (ie facilities and equipment for new innovation-process)			3			
Organization - Absorptive capacity for innovation		Absorptive capacity /strength/ effectiveness of institution	wider infrastructural system (e.g., other units in the hospital system).						2			
Cultural - Beliefs, values & perceptions to innov		Predominant orgal culture (shared beliefs, values, norms)		Cultural - Shared beliefs, values, perceptions are receptive to chg and see it as effective					2			

PROCESSES/SYSTEM CONCEPT												
Education & training processes		availability of expertise related to the innov as resource				infrastructure support (i.e., training staff for new innovation-process)			7			
	Institutionalization of new skills (i.e. involves offering training & feedbk on new skills, monitoring performance)	training and education about the innov				staff education & training involvement	processes for training	Education & training provisions & processes in place				
Processual - Planning, method, & timing of embedding innovation	Routinization of practices(innov) - How principles form practices (i.e. used to guide practice, account for and are referred to)	planning & implementation of innov		Processual - Implementation methods changed to incorporate innov					5			
		timing, pacing, flow of events		Timing, pacing or sequencing or flow of the innov to become part of the culture								
Processual- project structure & system to monitor/manage innovation	Routinization of practices(innov) - How practices form principles (i.e. the ways the practices serve to create, maintain & modify the principles)	· Project mgmt. structures & systems rt innovation,		Processual - project management structures		effectiveness of system to monitor new innovation - process	business structure/model		5			

Organization - communication capacity for monitoring (exchange & feedback)	Routinization of practices - The collective monitoring btwn actors (i.e. exchg of feedback on performance in practice)	use of performance monitoring systems (ie evaluation & feedback), +++ communication about the innovation,		Organizational - structures promoting of cross functional collaboration	<i>Intermediary Functions Factor - Capacity</i> (mgmt. info system or regular scheduled mtgs, freq. of mtgs, face to face comm btwn sites) for Communication (make connection & transmit info) with adopters	infrastructure support (ie communication system)	information systems within the practice setting	Intra & Inter departmental communications	7			
Behavioural change strategies			Behavior change interventions or strategies aimed at influencing the outcome						1			
											25	25
OUTER CONTEXT (SYSTEM) CONCEPT												
Soci-economic political threats, stability		socioeconomic political conditions i.e. threats/stability;		Contextual - External threats/ stability			market forces		3			
External conditions, compatibility for innovation		socioeconomic political conditions i.e. /norms;		Contextual - External conditions = chg is seen as approp response to environment	Compatibility with other institutional Interests		External -other practice settings		6			
				Contextual - wider social norms - new innov remains relevant			External - population characteristics					
Connection to broader external context		connection of org to networks in broader community/system			local Host org centrality (within the envirt) = is centrally placed within comm &committed to innov			Links with regional health plans/goals /visions	5			

					Nature of networks			existence of networking opportunities with external orgs				
External Support for innovation from Stakeholders		support /participation of external community,		Political -External Stakeholder and coalition power and influence = has support of external network	Planning cultivation of support (efforts made to plan implement and cultivate stakeholder support)				3			
Political - Policy, legislation & Interests		policy & legislation governing innovation,			Compatibility with relevant political Interests		legislative environment /regulation	Gov't & local policy alignment	5			
							policy					
Financial -funds (initial and ongoing) & non-financial resources of innovation		Outer - financing (initial & ongoing) of the innov							2			
		Outer - non--financial resources for the innov									24	24
OUTCOME CONCEPT	Refers to 'results of quality improvements' (undefined). Not a concept in fwk	Refers to 'outcomes on a spectrum from high to nil' (undefined). Based on the effects of factors (preconditions) on characteristics of sustainability – i.e., routinization, benefits, development-	Refers to 'sustained teamwork behaviours' specific to context (undefined)	Refers to Consequences = decay, sustainability or development" ... which are the result of combined influence of 11 factors	refers to - achieving reliable effectiveness (undefined). Not a concept in fwk	Refers to "improvement outcomes' (undefined). Not a concept in fwk	Outcomes in the Innovation part of fwk- refers to 'continuation of intended benefits'	Not a concept in fwk				
specific outcome factors defined									0			

CHAPTER 6

Integrated Discussion

The overall purpose of this dissertation was to identify the constructs, factors and knowledge translation interventions (KTIs) influencing the sustainability of an evidence-based practice (EBP) within an acute care context over time and at a ten-year timeframe. To achieve this, my dissertation consisted of two main components. First, a case study of an organizational-wide nursing best practice guideline (BPG) using mixed methods was conducted ten years post initial implementation. This component included three articles (Articles #1-3). A brief overview of the total factors and KTIs identified, either from a corporate (Article #1) or unit level (Articles #2-3) perspective, a summary of the main findings, and how each article informed the subsequent is presented. Second, a systematic review and theory analysis of known sustainability frameworks/models/theories (F/M/Ts) (Article #4) was concurrently conducted. I then compared results from the case study (Articles #1-3) to those from the systematic review of sustainability F/M/Ts (Article #4) to provide a comprehensive meta-synthesis of 7 concepts, 49 factors and 29 KTIs influencing sustainability in acute care settings. I present main observations related to the factors and for the related KTIs. I discuss how the integrated findings contribute to current knowledge, practice implications and propose future directions.

6.1 Summary of Article Findings

An Introduction to the Case Study

In response to the growing recognition among healthcare professionals that the sustainability of EBPs in clinical practice does not result in sustained change, nor continued adherence over time, I examined the long-term sustained use of a nursing best practice guideline (BPG) within a multi-site acute care center. The perspective and timeframe studied

was at the corporate level over a ten-year timeframe (Article #1), and at the unit level ten years post initial implementation (Article # 2-3). I used the Dynamic Sustainability Framework (DSF)(Chambers, 2013) as the conceptual framework for this component of the dissertation, and set out to uncover the factors and KTIs influencing sustainment of a BPG in a real-world setting. Using mixed methods, the case study component had two phases. In the first phase, I examined the factors and what was done to sustain a nursing BPG across all inpatient units at the corporate level over a ten-year timeframe (Article #1). This phase uniquely provided insight into the impact of ongoing efforts on sustainability of a nursing BPG over time. In the second phase, I focused on determining unit nurses' (two selected subcases) level of adherence to five selected BPG recommendations within the same acute care center (Article #2), and identifying the factors and KTIs influencing their use of the recommendations ten years post initial implementation (Article #3). Both phases provided a different perspective on the factors and KTIs influencing the sustainability of an EBP within a multi-site acute care center over time.

Descriptive Case Study Findings (Article #1)

From a corporate level perspective, I examined the factors and KTIs reported to influence nurses ongoing use of a Pain BPG over a ten-year period (e.g., 2007-2017). The Pain BPG was among nine BPGs initiated in 2007 and derived from the Registered Nurses of Ontario Association's *Pain Assessment and Management BPG* ((RNAO., 2007, 2013). Unlike most of the BPGs, the Pain BPG was deemed an organizational-wide priority and a Pain Policy/Protocol (Pain P/P) was developed to promote its implementation across all 60 inpatient units. Using the DSF constructs (broader system, innovation, practice setting) to guide the investigation, I interviewed three nurses with corporate level responsibility for implementing the Pain P/P. Participants reported a total of three implementation (0-2yrs.) and twelve sustainability (>2-

10yrs.) factors and twelve implementation and twenty-one sustainability KTIs that influenced use of the Pain BPG across all inpatient units within the acute care center over time (see Table 6.1). Three factors and seven KTIs were reported to have influenced use of the Pain P/P during both implementation (0-2yrs.) and sustained (2-10 yrs.) use phases. The factors are noted with *, the KTIs are noted with **, and both are highlighted in green on Table 6.1. The three factors included (i) a *need to improve*, (ii) *external pressure/demand* for the pain care, and (iii) *leadership commitment*. The seven KTIs included (i) *embedding of refinements* into existing processes, (ii) *formalizing supervision* of BPGs, (iii) establishing *interprofessional committee(s)*, (iv) support for *ongoing training*, (v) establishing *infrastructure (taskforces)* to lead policy development and refinements and educations strategies, (vi) formalizing *leaders on steering committees*, (vi) *educating champions*, and (vii) developing a *system to monitor adherence* to recommendations. Although not the original aim of this dissertation, these three factors and seven KTIs provided novel insight into the relationship among implementation and sustainability factors and related KTIs across both phases at the nursing corporate-wide level. Findings also provided a historical perspective of the corporate level factors and KTIs used to sustain the Pain P/P across all inpatient units over ten years (e.g., 2007-2017) and revealed the need to further examine unit nurses use (or not) of guideline recommendations at the clinical level.

Retrospective Chart Audit Findings (Article #2)

In a meeting with the Nursing leaders in 2016, they suggested there was variable use of the Pain P/P recommendations, especially on the Medicine care units (e.g., a practice-gap). Thus, to confirm adherence rates, I undertook a retrospective audit of nurses' use of five selected Pain P/P recommendations on two Medicine care units (subcases) within the same multi-site acute care center (Article #2). The two units were purposefully selected by corporate nursing

representatives having potentially different patterns of findings, different Managers, nursing staff, interprofessional team members, and located at different hospital campus sites. Data included 100 inpatient charts per subcase for the selected timeframes between August 2016 and October 2017, ten years post-implementation. The audit revealed high adherence rates on both units (subcases) for three out of five recommendations: Recommendation 1 (R1) - *assessing pain on admission to the unit*; Recommendation 2 (R2) – *assessing pain once per shift and ongoing hourly assessments*; and Recommendation 4 (R4) - *establishing interventions to manage pain*. Corporate level KTIs designed to standardize and monitor nursing documentation practices implemented over time, identified in the descriptive case study (i.e., Article #1), were effective at promoting ongoing use of recommendations R1, R2, and R4. However, a significant difference in the adherence rate to Recommendation 3 (R3) - *establishing a Pain Goal* for patients who had pain during their hospital stay (over 5 shifts) was identified among subcases: a low adherence rate to R3 on subcase 1 and moderate adherence rate to R3 on subcase 2. Additionally, I identified low adherence rates to Recommendation 7 (R7) - *providing patient education* related to pain management on both subcases. Findings revealed the need to further examine the point of care factors and processes/practices influencing unit nurses' related R3 and R7 documentation.

Comparative Embedded Case Study Findings (Article #3)

Using the DSF constructs (broader system, innovation, practice setting) to guide the investigation, I interviewed subcase nurses from the same two selected units (Article #2). Subcase nurses identified a total of thirty-one sustainability factors and nine related KTIs influencing their use of the Pain P/P, ten years post-implementation (i.e., 2017) (see Table 6.1). Notably, there was consistency in perceptions of participants from both units (subcases) regarding 67% (21 out of 31) of identified factors and 89% (8 out of 9) of KTIs being used to

promote Pain P/P use. Practice Setting factors and KTIs identified by subcase nurses reflected unique unit level influences impacting sustainability.

Similarities and Differences among Factors and KTIs Across Subcases

Similarities among factors existed across subcases related to the Innovation (e.g., *nurses' motivation*) and Broader System (e.g., *population characteristics*) constructs. Two ongoing KTIs that subcase nurses reported continued to promote their use of the Pain BPG recommendations included (i) providing *ongoing education and training for staff*, and (ii) conducting *prevalence monitoring and evaluation*. Differences identified across subcases were identified within the Practice Setting construct. Specifically, subcase 1 nurses identified *managements approach & engagement* (e.g., clinical managers), while subcase 2 nurses identified *internal cohesion between mentors* (e.g., senior nurses and interprofessional (IP) team members) uniquely facilitated increased use of the Pain P/P. Despite these differences, both factors are important considerations for sustainability. These unique differences also provide insight into understanding why the use of BPGs may vary among nurses on different units, with similar patient populations, within the same setting.

Factors and KTIs Influencing High Adherence Rates Across Subcases

Practice Setting factors and KTIs related to the Innovation construct contributed to high adherence rates to 3 out of 5 Pain P/P recommendations (e.g., R1, R2, R4). Specifically, Practice Setting factors included *supportive multiple stakeholders, senior nurse mentors*, and *collaborative expert services*. Innovation KTIs included *embedding of prompts into nursing forms and practices/processes*, and *digitalizing same*. Additionally, the combination of two Inner Processes KTIs, namely the *ongoing education and training, monitoring and evaluation* across subcases reportedly promoted nurses use and adherence to the Pain P/P. Factors and KTIs that

influenced high adherence rates across subcases are important for the sustainment of BPGs among unit level nurses in changing acute care contexts.

Factors and KTIs Influencing Low to Moderate Adherence Rates Across Subcases

Established practices (KTIs) not documented in the health record, such as the use of *care boards* and *verbal bedside shift reports*, reportedly contributed to low adherence rates for R3- setting pain goals. Unit nurses reported factors such as increasing *workloads*, *lack of time* and *unrealistic charting expectations*, contributed to the low adherence rates for R7- providing pain education to patients/families. Thus, the assumption nurses were not setting pain goals or providing pain education could not be drawn solely based on low adherence rates observed in the audit. Instead, the results indicated direction for future KTI design and the need for further investigation at point of care.

Systematic Review and Theory Analysis (Article #4)

This study was concurrently conducted with the case study. The aim was to develop a comprehensive listing of key constructs and factors among existing F/M/Ts that focus solely on the sustainability of EBPs in acute care settings. I conducted a systematic review and theory analysis using the Walker and Avant (2005) approach. Two different data sources and related search strategies were used to identify existing healthcare sustainability F/M/Ts. I conducted a review, abstraction and appraisal of two published syntheses, followed by a search of databases between January 1, 2015 to July 3, 2018 based on end dates of the two syntheses. Eight F/M/Ts were identified and the theory analysis revealed seven main sustainability constructs: *innovation*, *adopters*, *leadership and management*, *inner context*, *outer context*, and *outcomes*. A total of thirty-seven core sustainability factors were identified, of which sixteen were recorded as common factors (i.e., occurring within 4 or more of the 8 included F/M/Ts) (see Table 6.1). The theory analysis also provided insight into sustainability as ‘*a process*’ or ‘*stage of ongoing use*’

of EBPs post the implementation phase, congruent with researchers who argue sustainability is not an endgame (Chambers, 2013), nor an outcome (Goodman & Steckler, 1989). This finding is an important consideration for the current definition (Moore, 2017). The observation that the interactions and influence between constructs and factors is dynamic created a shift in perspective (Nadalin Penno et al., 2019). This finding highlighted the importance of examining how the factors and KTIs for sustainment may differ from initial implementation phase and or potentially overlap for future research. Overall, results from the systematic review provided a comprehensive listing to compare case study findings in the integrated analysis which ultimately produced a novel synthesis sustainability constructs and factors for acute care contexts.

6.2 Integrated Findings

The summary discussion for the integrated findings is presented in two parts. First, I presents BPG sustainability factors for acute care settings, and then I present related KTIs influencing BPG sustainability in acute care. In part one, I initially discuss the thirty-two unique factors identified by combining case study findings identified in the three articles (Articles #1-3). Case study findings are presented for the following three timeframes: the implementation phase (0-2yrs.), the sustained use phase (>2 up to 10 yrs.), and ten years post initial implementation (see Table 6.2). I then summarize the integrated findings derived by comparing the thirty-two case study factors (Articles #1-3) with the thirty-seven factors synthesized from the theoretical conceptualizations of the eight sustainability F/M/Ts in Article #4 (Nadalin Penno et al., 2019). A final total of forty-nine unique sustainability factors for acute care are presented. I then compare integrated factors with current literature (see Table 6.3). I reveal similarities and differences and highlight main observations based on the totality of the dissertation findings.

In part two, I then present the combined case study KTI for the same three timeframes. Combined case study findings revealed a total of twenty-nine KTI (see Table 6.4) related to sustainability for acute care. I discuss integrated KTI findings with current literature (see Table 6.5). I reveal similarities and differences, and highlight main observations based on the totality of the findings.

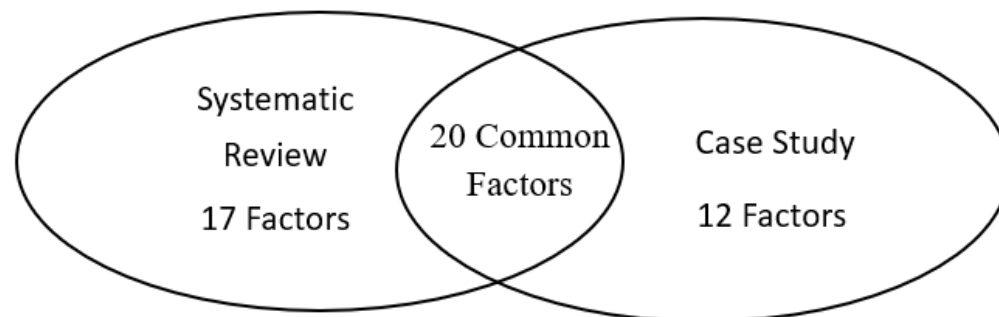
Finally, I discuss implications for nursing leadership and practice, how the integrated findings contribute to the broader literature and propose future research directions.

6.3 BPG Sustainability Factors for Acute Care Settings

The case study revealed a total of thirty-two unique factors related to sustainability of a BPG for acute care. These factors are presented on Table 6.2. Three factors were uniquely identified by corporate level nurses as having influenced nurses' use of the Pain P/P during the implementation phase (0-2yrs.) and the sustained use phase (2-10 yrs.), and by unit nurses at the ten-year timeframe. Corporate level nurses also identified another ten factors that influenced the use of the Pain P/P across all inpatient units over time (>2-10 yrs.). Unit nurses further identified nineteen unique factors that influenced their use of the Pain P/P ten years post-implementation.

I then compared the thirty-two case study factors with the thirty-seven sustainability factors identified in the systematic review (Article #4) (see Figure 6.1). Twenty factors were

Figure 6.1 Diagram of the 49 unique sustainability factors for acute care



common with those identified in the systematic review. The remaining seventeen sustainability factors previously identified in the systematic review did not align with those in the case study. Given the systematic review was not completed prior to conducting the case study, I was not able to ask specific questions related to the thirty-seven factors identified in the systematic review. Therefore, I cannot say with any definitiveness whether the remaining seventeen sustainability factors were present (or not) in the case study site. This finding does however demonstrate that not all factors apply every time in a real-world setting.

Using the constructs identified in the systematic review (Article #4), I then compare the remaining twelve sustainability factors identified by case study nurses with those identified in two recent reviews (Shelton et al., 2018; Squires et al., 2019) (see Table 6.3). Since the time I published the systematic review (Nadalin Penno et al., 2019), all twelve case study factors subsequently have been reported in the current literature (Shelton et al., 2018; Squires et al., 2019). This finding highlights the importance of empirical research to explicate the specific contextual determinants influencing sustainability in acute care. Adding these twelve unique factors to the thirty-seven previously identified in the systematic review resulted in a final total of ‘49 unique sustainability factors’ identified in this dissertation. All 49 unique sustainability factors aligned with six of the seven constructs previously identified in Article #4 (Nadalin Penno et al., 2019).

No factors were explicitly reported in the case study for the ‘Outcomes’ construct previously identified in Article #4. Outcome factors were not examined in the case study given the DSF does not explicitly contain this construct but rather only defines it as “the continuation of intended benefits”(Chambers, 2013, p. 118). Despite this acknowledgement, overlooking the

impact on patient outcomes in the DSF has been previously identified by researchers (Doyle, 2013; Nadalin Penno et al., 2019).

Main Observations on the 49 Unique Sustainability Factors

Four main observations related to the forty-nine sustainability factors identified in this dissertation that influenced nurses use of the Pain BPG over time and at the ten-year timeframe in an acute care context include:

- (i) three factors had a continuous influence over the ten years;
- (ii) the majority of factors identified lie within the internal context constructs;
- (iii) factor similarities and differences exist among the multiple levels within the setting (e.g., corporate and unit level nurses);
- (iv) twelve sustainability factors identified among nurses, not previously identified within the synthesis of the eight F/M/Ts are congruent with those identified in the evolving literature.

Three Factors Having Continuous Influence Over time

Three implementation factors identified in the empirical studies as having a continuous influence during the implementation (0-2yrs), the sustained use (>2-10yrs.) phases and at ten years post-implementation include: *a need* for the innovation; *leadership commitment*, and *external pressure/demand* for the innovation. These three factors align with sustainability factors identified in the systematic review within three different constructs; namely the Innovation, Leadership and Management (a part of the inner context construct), and the Outer Context respectively. This finding illustrates the simultaneous influence that three different constructs and related factors had ‘between the two phases’, and the potential ‘impact of implementation on sustainability’ of innovation in acute care contexts, suggested in the literature (Nadalin Penno et al., 2019; Proctor et al., 2009). Thus, it is important to understand

the construct influences underlying these three factors that changed or evolved over time for sustainment.

A Need for the Innovation. During the implementation phase (0-2 yrs.) a *need* identified among internal stakeholders to ensure a consistent approach to pain care across all inpatient units (corporate level influence) by all disciplines was identified. This need impacted the development of an interdisciplinary Pain P/P (i.e., innovation) designed for all disciplines to follow, especially nursing. Whereas during the sustain use phase (>2-10 yrs.) *demand/need* for the innovation by internal stakeholders such as health consumers (e.g., inpatients), contributed to the ongoing use of the Pain P/P at the clinical or unit level. Corporate and unit nurses' ongoing perception of the innovation's need, its' safety and quality, and over time its' relevance to addressing a need (perceived benefit to patients) reportedly influenced their ongoing use of the Pain P/P over time and still at the ten-year timeframe. This finding is congruent with the evidence in the literature (Brewster et al., 2015; Fleiszer et al., 2015; Fox et al., 2015). Thus, ongoing need was an important determinant for the sustainment of BPGs in acute care contexts.

Leadership Commitment. Similarly, over time leadership commitment initiated at the corporate level, eventually required the engagement of unit level leaders to sustain its use post-implementation on their units. Senior and clinical leadership's commitment, which trickled down to all levels of the organization, including champions who advocated for the use of the Pain P/P and provided unit level expertise, was reported to be a key facilitator for sustainment among corporate and unit level nurses in clinical practice. Leadership engagement at all levels is identified in previous studies as a key factor influencing sustainment (Chambers, 2015; Cowie et al., 2020; Fleiszer et al., 2016b; Gifford, 2004; Shelton et al., 2018; Shuman et al.,

2018; Shuman et al., 2019). Thus, ongoing leadership commitment or engagement is an important determinant for the sustainment of BPGs in acute care contexts.

External Pressure/Demand. Expectations from healthcare regulatory bodies on hospital leaders to embrace evidence-based care in the implementation phase, over time shifted to a requirement by the Ministry and accrediting bodies to report related quality and standards of care data. Ongoing pressure/demand to report the impact of the use of the Pain P/P on patient outcomes thus became part of the organization's quality reporting system. Brewster et al (2015) purports efforts such as these “transform innovations from a practice imposed on a hospital organizational system, to habits that are reinforced by the system” (2015, p. 175). Thus, external pressure/demand eventually took on the role of holding the EBP in place, promoting sustainment of the Pain P/P over time and at the ten-year timeframe. Thus, external pressure/demand is an important determinant for the sustainment of BPGs in acute care.

Overall, attention to these three factors influencing the fit or alignment of the BPG, at multiple levels within the local setting (e.g., corporate and unit level), during both phases, was necessary for sustainment. This finding provides evidence that factor changes that influence the way the innovation is delivered (e.g., level of application) do impact the fit between the innovation and the context, and ongoing use of the innovation over time, supported by other researchers (Chambers, 2013; Estabrooks et al., 2011; Hailemariam et al., 2019; Rogers, 2003). The fact that these factors did change or evolve over time, further supports the conceptualization of sustainability as an ‘*ongoing dynamic process*’, identified in Article #4 (Nadalin Penno et al., 2019), supporting the recommendation to add this to Moore's definition of sustainability (Moore, 2017). Moreover, given the current evidence and the influence of these factors during all three timeframes on sustained outcomes (benefits), I recommend these three

sustainability factors be considered early in the planning and development of sustainability action plans as indicated by other researchers (Davies, 2013; Hoben et al., 2021; Proctor et al., 2009; Shelton et al., 2018; Straus, 2013) .

Contextual Factors Influence Sustainability

Another observation related to the integrated findings is 78 % (25/ 32) of factors influencing sustainability in this acute care setting were within the four constructs related to context identified in the systematic review (Article #4). These four constructs include Adopters, Leadership and Management, Inner Context, and Inner Processes. Factors within these constructs varied among the two subcases studied. Internal context factors influencing sustainability provided insight into ‘why’ the sustained use of EBPs varied among units and departments within the same organization. This finding also highlights the need to focus on the specific unit-level context factors influencing practice use (or not) before developing or choosing KTIs meant to integrate the EBP recommendations into routine practice, suggested in the literature by Lennox et al (2018), and most recently by Birken et al (2020), and Chapman et al (2020).

Similarities and Differences Between Sustainability Factors

Factor Similarities. Among the thirty-two sustainability factors identified, two factors had an influence on both the corporate and unit level nurses use of the Pain BPG. The two similar factors include: (i) *stakeholder beliefs/attitude/expectations* towards the innovation; and (ii) *management approach/engagement (commitment)*. These empirical findings align with those identified in the systematic review, wherein the majority of F/M/Ts (5 or more) identified Adopters’ (or individuals, stakeholders) *belief in* and *commitment towards* the innovation, and *leadership and management commitment at all levels* (e.g., Board, department, and unit level)

as key factors influencing sustainment in acute care. Factor similarities reported among corporate and unit level nurses highlight the importance of ‘building capacity for an innovation through stakeholder motivation and commitment to the innovation’, and ‘leadership engagement at all levels’ within the organization to promote sustainability over time. The literature reports facilitating factors such as the positional influence of leaders who impart the value of the change to decision makers, and the network of support/commitment provided by a range of stakeholders, influences whether an innovation is sustained in practice (Fleischer et al., 2016b; Martin et al., 2012). Findings also reinforce that the ‘shared commitment of all stakeholders’, including leaders’, across the organization to prioritize the innovation (e.g., EB care) contributed to a sustainability-promoting culture of shared accountability. This finding is also reported in previous studies (Buchanan et al., 2007; Chambers, 2013; Fleischer et al., 2016b; Frykman et al., 2017; Gifford, 2004; Higuchi, 2013; Maher, 2010).

Factor Differences. Differences or unique factors identified by the corporate and unit nurses reflect a viewpoint based on their respective roles and responsibilities related to the innovation. For example, unique corporate level factors identified by corporate level nurses focused mainly on *organizational-wide* and *Outer Context* influences, while unique unit level factors identified by unit nurses revealed their focus on the use of the *Innovation* at the clinical practice level with ‘*Adopters*, within the *Inner Context*, and related *Inner Process* influences.

Sustainability Factors Identified by Corporate Nurses. Corporate level nurses reported the following organizational-wide influences impacting sustainability of the Pain P/P over time: *internal competing priorities* such as infection control rates, higher-level *human resource* concerns related to the complement of nursing staff on units, and the *frequent turnover of medical trainees* (e.g., clinical placement rotation changes). The following Outer Context factors

affected sustainability over time: *goal alignment* for the innovation with external agencies (e.g., educational institutes), maintaining links or *connections with broader external networks*, *external pressure/demand* set by accrediting, government and regulatory bodies, *external support or recognition* for their efforts from external stakeholders (e.g., RNAO), and *compatibility of the innovation to meet consumer demand* for pain care. These departmental factors revealed an ‘outward focus’ held by corporately positioned nurses prompting/supporting ongoing use of the innovation across the inpatient units over time. It also offered insight into their corporate roles and responsibilities that positions them ‘to act as conduits, linking outer and inner contextual influences’ to ensure sustainment of the innovation over time in an ever-changing healthcare environment. Similar bi-directional linkages between inner and outer context are identified as key factors influencing sustainment in a recent study by Lengnick et al (2020). This finding also adds to the nurse leadership roles identified in a previous study wherein the mid-level management role is described as being critical to enacting a tie between the unit level leaders and frontline (Fleischer et al., 2016b).

Sustainability Factors Identified by Unit Nurses. The nineteen unique unit level factors identified by unit nurses, instead, reflected an individual and internal perspective, focused mainly on the ‘innovation’ and nurses’ use of it within their unit. In essence, these factors illuminate nurses’ daily clinical practice’ viewpoint. These nineteen factors aligned with the Innovation, Adopter, Inner Context, Inner Process constructs identified in Article #4.

Innovation Factors influencing unit nurses. First and foremost, unit nurses reported *perceived innovation benefit* to patients/family and or staff was important for sustainability of the Pain P/P. This Innovation factor was identified in 5 F/M/Ts in Article #4, and aligns with a

recent study where unit level hospital-based nurses previously reported continued benefits as an essential innovation characteristic for sustainability of BPGs (Fleischer et al., 2016a).

Adopter Factors influencing unit nurses. Four out of the seven Adopter factors identified by unit nurses, were aligned with sustainability factors previously identified in Article #4. They include (i) *stakeholder commitment* towards the innovation, (ii) *individual commitment to the innovation*, (iii) *individual competency* to perform the innovation, and (iv) the *internal cohesion* between individuals leads to increased performance. The following three out of the seven Adopter factors add to those previously identified in the systematic review (Article #4): (v) *population characteristics* related to the use of the innovation, (vi) *user awareness/familiarity* with the innovation, and (vii) the presence of *expert consultants/resources*.

Unit nurses reported *patient (population) characteristics*, such as their preferences or acuity level, as a factor influencing their use of the Pain BPG. Patient involvement was identified in a recent review by Lennox et al (2018) in 16% (10/62) of studies to influence sustainment of EBPs in clinical practice. A recent concept analysis on context related to research utilization in practice identified *expertise of providers* within the context as a key feature (Squires et al., 2019). Having the appropriate expertise and knowledge in order to deliver the innovation was identified in 44 % (14/32) of studies in a recent review that identified barriers and facilitators influencing sustainability of hospital based interventions (Cowie et al., 2020). Furthermore, engaging all persons with innovation expertise was identified as a major facilitating factor underpinning sustainment in 47% (15/32) of studies by Cowie et al (2020). Unit nurses reported that both departmental and unit level education initiatives (e.g., mandatory eLearn modules, general hospital orientation, annual pain education days) offered to them supported the training of new nurses and updated *nurses' awareness* of policy refinements. These findings substantiate

the importance of having an infrastructure that supports *user awareness/familiarity and competency* to perform the innovation evident in the literature (Cowie et al., 2020; Rogers, 2003; Straus, 2013).

Additionally, unit nurses either reported the *internal cohesion between individuals* (e.g., senior nurse mentors, interprofessional team (IP) members), or *stakeholders' commitment* (e.g., formal clinical leader) facilitated their daily use of the Pain P/P recommendations. This finding reflects the unique difference observed regarding leadership support between the units. However, whether there is formal (managers) or informal (mentors and IP team members) leadership support at the unit level, it is important to recognize the linkages and interactions between and attributes of these key individuals (e.g., managers, mentors) are important for sustainability among unit level nurses in acute care. In a previous study, researchers demonstrate sustainability of BPGs in nursing practice is often dependent on linkages between the persons and clinical processes/practices within the network of care it is located in (Fleischer et al., 2016a). Most recently, a significant association was identified between the leadership behaviors of middle managers on medical-surgical units and their ability to create climates supportive of EBP implementation for sustainment (Shuman et al., 2018).

Inner Context Factors influencing unit nurses. Unit nurses indicated seven Inner Context factors that influenced their use of the Pain BPG. Five out of seven Inner Context factors align with factors previously identified in Article #4. They included: having infrastructure supports for the innovations such as (i) *policies* and (ii) *equipment and supplies* (e.g., pumps), (iii) *shared cultural beliefs/perceptions* towards the innovations (e.g., shared vision of evidence-based care), (iv) a *climate* that facilitated the pain BPG, and (v) a *culture that integrates the innovation into context norms* (documents, protocols, manuals). The remaining two Inner

Context factors add to Article #4: (vi) *the physical layout* of having units spread between two floors too, and (vii) having *a team culture* that embraced the innovation. These Inner Context factors further support findings reported by Lennox (2018), Shelton (2018), Squires (2019) and Hailemariam et al (2019) that infrastructure supports and promoting a culture that embraces the innovation are needed to for successful sustainment of EBPs in clinical practice.

Inner Process Factors influencing unit nurses. Lastly, unit nurses indicated four Inner Processes factors influenced their use of the Pain BPG. Two factors align with factors previously identified in Article #4. They include: (i) having a *plan, method and schedule* to integrate the innovation and any updates/revisions into routine practices, and (ii) having *established communication system* to provide feedback and exchange on adherence rates to BPGs, and reporting processes for remedial plans. The remaining two Inner Process factors identified by case study nurses add to those in Article #4: (iii) establishing *formal communication/reporting systems* to share innovation related patient information between practitioners (e.g., verbal shift reports) and between patients (e.g., in room care boards), and (iv) *workload/staffing patterns* (e.g., shortages). Inner Process factors uniquely identified by unit level nurses that promoted Pain BPG use over time consisted of both formal (e.g., adherence rates from prevalence survey) and informal (e.g., verbal reports, care boards) systems. Establishing a means to monitor the long-term progress of the hospital-based innovations is identified in the literature in 59%(19 /32) of studies as one of the most frequently reported facilitating factor for the sustainability of hospital-based innovations over time (Cowie et al., 2020). Similar consistent reinforcement and feedback on maintaining BPGs, provided to unit nurses by clinical leaders evidently contributed to a sustainability-promoting culture of hospital-based innovations in other studies (Fleischer et al., 2016a, 2016b).

Twelve Sustainability Factors that add to Current Knowledge (Article#4)

Twelve sustainability factors identified in the case study by nurses, add to the thirty-seven factors previously identified in the synthesis of the sustainability F/M/Ts (Article #4). These twelve factors lie within the five *context* constructs identified in Article #4 (e.g., Adopters, Leadership and Management, Inner Context, Inner Processes, Outer Context). I compared these twelve sustainability factors with the current literature related to sustainability of EBPs in healthcare settings. The details are presented in Table 6.3. Notably, these twelve factors align with the ‘domains, attributes and related features of context’ influencing the use of EBPs in research and clinical practice identified in a recent review and concept analysis of context (Squires et al., 2019) and the ‘emerging contextual influences’ impacting sustainability identified in another review (Shelton et al., 2018).

The following five observations are based on comparing the twelve sustainability factors identified in the case study with the literature and informed the decision to add them to the previously identified thirty-seven sustainability factors in the systematic review (Article #4). The observations include: (i) similarities exist between themes/constructs or domains used to categorize factors, (ii) a potential utility of the twelve factors in settings outside acute care, innovations, and level of application (i.e., department versus unit level use), (iii) the impact of context factors on sustainment, (iv) the influence of academic institutions on BPG use, and (v) the level of collaboration with experts affects sustainability of EBPs. The first three observations are reflections based on comparing the twelve factors to those identified in two recent reviews related to the ‘concept of context’ and research utilization in clinical practice. The latter two observations stem from two unique factors that often exist within real-world academic acute care settings; the presence of medical trainees and clinical experts.

Construct/Theme Similarities in the Literature Categorizing the Twelve Factors.

First, by comparison, the current literature uses similar definitions and or categorization for the twelve context factors as those previously identified in the synthesis of eight F/M/Ts in the systematic review (Nadalin Penno et al., 2019). Specifically, Squires et al (2019) uses the term Domains and Shelton et al (2018) uses the term Factors (themes), identifying similar factors within the same categories/groupings, having similar definitions. This confirms the addition of the twelve factors to similar constructs identified in the systematic review in this dissertation (Nadalin Penno et al., 2019). Specifically, the ‘*Adopters*’ construct identified in the systematic review (Nadalin Penno et al., 2019) continues to be uniquely categorized and defined as users of the innovation, which includes both providers and the consumers in the context in both reviews. Adopter constructs comparisons in the two reviews include: the Domain ‘Providers or Users within the Context’ (Squires et al., 2019) or the ‘Implementors and Population Characteristics Factors’ (Shelton et al., 2018). ‘*Leadership*’ commitment or support for the innovation is also grouped separately by both reviews, either as an attribute within the *Inner Context* (Shelton et al., 2018) or within the *Domain :Internal Arrangement of Context* (Squires et al., 2019). This finding further supports its previous distinction as a separate context construct in the systematic review (Nadalin Penno et al., 2019), that was not evident in a previous concept analysis on healthcare innovation sustainability (Fleischer et al., 2015). In the systematic review in this dissertation, the ‘*Inner Context*’ construct includes internal structural factors, separate from the ‘*Inner Processes*’ construct which includes established system/network factors that exist to support the innovation. Similar factor groupings for these two constructs are evident in both reviews (Shelton et al., 2018; Squires et al., 2019). Similar ‘*Outer Context*’ construct are evident across all three reviews as well. Alignment of these twelve factors with the previous identified factors, definitions, and

their categorizations in the current reviews (Shelton et al., 2018; Squires et al., 2019) reinforces their importance for sustainability. It further supports their addition to the thirty-seven factors identified in the systematic review (Article #4) presented on Table 6.1.

The Potential Utility of the Twelve Factors Beyond Acute Care. In the Squires et al (2019) review and concept analysis of context, they set out to examine the domains, attributes and features of context influencing research use (i.e., EBPs) among healthcare professionals. Seventy publications were included in the review and sources included several theories, models, tools, and studies from a variety of healthcare settings and countries, including a variety of EBPs, and different levels of application. A 'Framework for Context' was developed comprised of 6 domains, 21 attributes and 89 unique features of the attributes, irrespective of setting, type of clinical EBPs, or professional roles (e.g., nurse, other healthcare team members) supporting a broader utility (Squires et al., 2019). Similarly, factors identified in the Shelton et al (2018) review included those from multiple settings and contexts, informed by the current evidence base (Shelton et al., 2018). The twelve factors reported by nurses in the case study are similar to those identified in the two current reviews, potentially extending the utility of the twelve sustainability factors in this dissertation to other settings (Shelton et al., 2018; Squires et al., 2019), units and EBPs (Squires et al., 2019).

Impact of the Twelve Context Factors on Sustainment. Adding the twelve factors identified in the case study to those previously derived by the synthesis of factors from eight F/M/Ts related to sustainability of EBPs within acute care context, provides further conceptual clarity to the concept and the factors influencing the sustainability of healthcare innovations in acute care, suggested in other reviews (Cowie et al., 2020; Shelton et al., 2018). These results also highlight the importance of considering aspects of local context that promote or inhibit the

sustainability of EBPs in healthcare contexts to achieve desired program goals and population outcomes over time, suggested in the literature (Cowie et al., 2020; Shelton et al., 2018). For example, the findings further demonstrate what and how internal and external contextual factors influence the sustainability of healthcare EBPs in a real-world setting. In short, understanding context for sustainability does matter!

Influence of Academic Institutions on BPG Use. The following observation is based on two (out of the twelve) factors reported by nurses in the case study that influenced their use of the Pain P/P in clinical practice: (i) *student turnover- medical*, and (ii) *shared vision/goal alignment*. Partnerships are established between healthcare agencies and educational institutions based on shared goals (e.g., to provide evidence-based care) and to facilitate medical student clinical placements, internships or residencies. It is not uncommon to expect medical trainees to engage in EBPs use related protocol/policy, such as prescribing pain management therapies. Case study nurses reported frequent medical resident rotation changes inhibited the sustained use of the Pain P/P on their units. As a result, medical trainees and student nurses are currently offered training on the Pain BPG during hospital orientation and are required to complete the mandatory eLearn modules related to Pain care offered by the study site to ensure congruence with the established protocol/policy. These two context factors are identified in a current review (Squires et al., 2019) to influence the use of EBPs in clinical practice, reinforcing their importance for sustainment of EBPs especially in complex ever-changing in acute care environments.

Collaboration with Experts Affects Sustainability. Unit nurses reported having access to available '*expert consultants/resources*' on their unit supported their ongoing use of the Pain P/P, ten years post-implementation. With increasing complexity and acuity of acute inpatients

care, achieving pain management outcomes often requires collaboration and interdependence of various disciplines, such as *nurse champions*, *physicians*, and the *acute pain service (APS)* team. Remarkably, over ten years, the study site educated 170 BPG nurse champions to provide unit level expertise on guideline use, including the Pain P/P, to unit team members. They also formalized two advanced pain management teams: an acute pain service and palliative care service, which physicians and nurses' access when needed, to support advanced pain management needs. Expert consultants/resources is identified as an attribute in the two recent reviews either as 'staff expertise'(Squires et al., 2019) or 'implementor expertise'(Shelton et al., 2018) and is evident in previous studies (Davies et al., 2006; Davies et al., 2008; Fleiszer et al., 2016a; Wiltsey Stirman et al., 2012). Others have also observed that engaging *supportive multiple stakeholders* in clinical processes with 'identified roles' such as *experts*, promotes ongoing use of healthcare innovations in clinical practice (Lennox et al., 2018). Having expert consultants/resources at the unit level reinforces the conclusion noted in previous studies, that nurses work is part of a larger network of interprofessional collaborative care, including experts, that ultimately can affect sustainability of EBPs (Fleiszer et al., 2016a; May et al., 2014). Thus, this factor provides further evidence that collaboration among other experts and or practitioners is often necessary to promote sustainment of BPGs in clinical practice.

Alignment of these twelve factors with those previously identified in the literature reinforces their importance for sustainability in acute care and their addition to those previously identified in the systematic review (Article #4). Adding these twelve factors to the thirty-seven results in a total of forty-nine (49) sustainability factors for the sustainability of healthcare innovations in acute care.

6.4 KTIs Influencing Sustainability in Acute Care Settings

The case study revealed a total of twenty-nine unique KTIs that facilitated the sustainability of the Pain P/P in the acute care center (see Table 6.4). A total of twelve KTIs were identified by corporate nurses that facilitate use of the Pain P/P during the implementation phase (0-2yrs.). Four KTIs were unique only to the implementation phase, the remaining eight KTIs were identified by both corporate and unit nurses to have promoted use of the Pain P/P during the implementation (0-2yrs.), the sustained use phase (>2-10 yrs.), and ten years post initial implementation. These eight KTIs evolved over time with the level of application (i.e., corporate level verses unit level use) to fit within the context. The continued use and involvement over time of the eight KTIs is a novel finding revealed in this dissertation. Table 6.4 presents the eight KTIs with ** and green shading. Additionally, corporate nurses identified another fourteen unique KTIs that facilitated ongoing use of the Pain P/P across all nursing inpatient units over time (>2-10yrs.). Unit nurses further identified three unique KTIs that promoted use of the Pain P/P at the ten-year timeframe.

Eight Sustainability KTIs Used Over Ten Years

Corporate and unit nurses described eight KTIs that continuously promoted the use of the Pain BPG over time and continue to be used at the ten-year timeframe. These eight KTIs provided insight into how the focus of the KTIs evolved over time with the change in level of application (e.g., across units/departmental verses unit specific application). The first KTI includes *embedding of recommendations* and *ongoing refinements* into existing forms and processes. In Article #2, high adherence rates were evident in the results for those recommendations where *prompts* had been integrated into formal documentation processes and routine practices. Second KTI: engaging *stakeholder joint collaboration* from the start, on all

levels (e.g., on committees, consulting with IP team members on pain care) promoted evidence-based care among all disciplines. Third KTI: *formalizing the supervision of BPGs* within the Nursing Professional Practice (NPP) center and in related job descriptions for NPP leaders (e.g., BPG Coordinator and NPP representatives), provided an enduring centralized infrastructure to support ongoing BPG implementation, monitoring and reporting efforts over time. Fourth KTI: *obtaining buy-in and formalizing nursing leaders' involvement on committees* to support clinical tactics to sustain use of the innovation fostered leadership's commitment to evidence-based care and culture among team members. Fifth KTI: *securing financial funds* externally and internally supported the development of a software system to monitor BPG nursing sensitive indicators at point of care, and training and development of resources which served to build capacity for evidence-based care. Both funded KTIs served to facilitate sustainment beyond implementation. Sixth KTI: *providing ongoing education and training* support through formal and informal initiatives, on all levels, promoted evidence-based care among new recruits and senior staff nurses. Seventh KTI: *educating and training champions*, over ten years, ensured nurses access to unit level BPG expertise promoting nurses use of BPG recommendations. Eight KTI: *establishing a central reporting and monitoring structure* within the Nursing Professional Practice (NPP) department facilitated timely feedback of prevalence survey results to units and promoted formal reporting of unit level remedial plans designed to address low adherence rates.

KTIs Used Only During the Implementation Phase

As describe by the corporate nurses, four KTIs facilitated uptake of the Pain BPG during the first 2 years (2007-2009):

1. *establishing a Pain policy/protocol that was interdisciplinary* for all practitioners to use to assess and manage pain;

2. *use of a theoretical framework* (e.g., the Ottawa Model for Research Use (OMRU) (Logan & Graham, 1998)) to guide their implementation processes and identify barriers to implementation;
3. the use of a *multi-modal approach to disseminate the BPGs* across all units, at the same time, over the first two years. This was completed with the assistance of corporate level nurses (e.g., APNs, Educators, NPP representatives) and unit level trained BPG champions; and lastly
4. intentionally *securing internal funding* to support the time and participation of interprofessional (IPs) and nurses on related BPG committees to develop and implement KTIs to facilitate uptake BPGs.

These four KTIs were instrumental in providing an evidence-based approach to support implementation and dissemination of the Pain P/P during the first two years, and they also ensured the necessary human and financial resources were in place to support the ongoing use of the eight KTIs that promoted the sustained use of the Pain BPG over the next ten years.

KTIs Uniquely Used During the Sustained Use Phase (<2-10yrs.)

In addition to the eight KTIs used over time, fourteen KTIs were used by corporate nurses to promote the sustained use of the Pain BPG across all inpatient units over time (>2-10 yrs.). They included:

1. *integrating performance evaluation indicators* for the innovation into Management's performance reviews;
2. creating the expectation that *departments determine EBP priorities* for their units;
3. *management lead department and unit level patient-centered initiatives* to support the EBP priorities;
4. *providing corporate-wide ongoing education* such as general hospital orientation including BPGs, pain care education days;
5. *implementing mandatory eLearn training modules* for Pain BPG for all disciplines,
6. developing unit specific tools/resources to be shared among units within department (e.g., surgery pain care booklets);
7. providing unit specific *training for staff based on remedial action plans* to improve on related BPG survey results;
8. sharing or *spreading the inpatient Pain BPG* to outpatient departments in hospital;
9. *establishing a regular BPG performance monitoring* process which included results from the biannual prevalence audit and internal incident reporting;
10. providing ongoing *training of staff to conduct biannual prevalence audit* on units not their own;
11. providing *timely exchange of prevalence survey results* to units triggering course correcting changes to be implemented at the unit level (e.g., remedial action plans);

12. *integrating new evidence into BPGs* and providing related ongoing educations for staff;
13. *encouraging staff participation on regional networks* to ensure access to new research and related outcomes for pain management; and lastly
14. *benchmarking best practices* (e.g., Pain BPG) to external sources.

Nurses reported these corporate efforts promoted ongoing use of PBGs across all units over time (2007-2017).

KTIs Uniquely in Use by Unit Nurses at the Ten-Year Timeframe (At 10 Yrs.)

In addition to the eight KTIs used over time by all nurses, three KTIs identified by unit nurses that influenced the use of the Pain BPG included:

1. *digitalizing the Pain P/P recommendations and related forms* into the new eHealth record reportedly facilitate their documentation of Pain BPG implementation efforts;
2. *mentorship provided by senior nurses* to junior nurses supported Pain BPG use;
3. *establishing effective communications between providers/practitioners* (e.g., verbal bedside shift reports, in room care boards, clipboard documentation of patient pain status for team leads) promoted pain BPG use.

These three KTIs reflect strategies the unit nurses indicated directly influenced daily use of the Pain BPG on their unit. However, results in Article #2 revealed most are not documented in the health record. Future digitalization or use of technology provides an opportunity to formalize some of these efforts into the eHealth documentation system to improve the accuracy of monitoring and evaluation of BPG ongoing use. These results indicated direction for future KTI design.

Comparing the 29 Unique KTIs with the Current Literature

I compared the twenty-nine unique KTIs findings identified in this dissertation to the themes and approaches (constructs) identified in a recent review on the sustainability of approaches in healthcare by Lennox et al (2018). The aim of the Lennox review was to identify studies that described approaches or strategies used related to sustainability in healthcare, and to

describe the different perspective, applications and constructs within the approaches to guide future use by healthcare teams and researchers. The review included a total sixty-two publications each identifying a sustainability approach (e.g., 32 frameworks, 16 models, 8 tools, 4 strategies, 1 checklist and 1 process). The search included publications between 1989 and Sept 2017, having similar end dates in Article #4 (e.g., July 2018). The majority of approaches (i.e., 37% or 23/62) were designed for use in general healthcare and did not specify a specific healthcare setting for use. Public health settings were specified in 31% (19/62) of the approaches, followed by community healthcare in 26 % (16/62) of approaches. Only 3% (2/62) of the approaches were designed for use in acute care. Constructs across approaches were compared and 40 unique constructs for sustainability were identified. Comparisons across approaches (62) revealed 6 constructs that were included in over 75 % (47/62) of the approaches regardless of the proposed interventions, setting or level of application. From their findings, Lennox et al(2018) developed a framework entitled, the ‘Consolidated Framework for Sustainability Constructs in Healthcare’ (hereafter CFSCH), which includes 6 themes and 40 constructs for sustainability. Thus, I set out to compare my KTIs findings to the 6 themes and 40 constructs identified in this review. However, before proceeding, given this is the first review reported in the current literature identifying approaches for the sustainability of innovations in healthcare, I conducted a critical appraisal of the review using the AMSTAR 2 rating tool (Shea et al., 2017). I determined a moderate to high confidence rating for the results (see Appendix G).

The comparison of the twenty-nine KTIs with the forty constructs reported in the Lennox review (2018) is presented on Table 6.5. In summary, first, the six themes identified in the Lennox CFSCH (2018) aligned with six constructs identified in Article #4, with minimal

regrouping of the CFSCH themes. This alignment confirms the applicability and relevance of the six constructs identified in the systematic review in this dissertation (Article #4) to map these twenty-nine KTIs to. Second, all twenty-nine KTIs mapped to 17 (out of 40 constructs) constructs identified in the CFSCH, that were evident in no less than 52% (32/62) and as high as 90% (56/62) of approaches included in the Lennox et al (2018) review. Given the studies included in the Lennox review involved a range of settings, a variety of EBPs, and different levels of application, this alignment suggests potential relevance for the 29 KTIs beyond acute care in other settings, with other innovations and level of application. Third, the twenty-nine KTIs designed for use by acute care nurses in the study site were not exact matches but rather considered similar in nature and several were grouped under the same construct. For example, seven of the twenty-nine KTIs that included some form of ongoing training (e.g., eLearn modules, 1 on 1 training etc.) aligned with the CFSCH construct entitled *Training and capacity building*. Given only a small number of approaches designed for acute care were included in the Lennox review (e.g., 3 % or 2/62 studies), the twenty-nine KTIs identified in this dissertation provide further specificity of KTIs designed for use in acute care context, not evident in the Lennox et al (2018) review. This finding also highlights the need and importance of empirical research to further explicate the specific KTIs for sustainability in acute care. Overall, the twenty-nine KTIs identified provide further evidence to guide or inform future sustainability approaches and research for acute care.

Main Observations related to the 29 KTIs

Six main observations underscoring the twenty-nine KTIs identified in this dissertation that effectively fostered change behaviors and facilitated sustainment of the Pain BPG in the acute care center over time are presented in this section. They include:

- (i) providing *timely feedback* spurred competition between users that promoted sustainment,
- (ii) use of *an incremental approach to address adherence* to selected recommendations shifted the focus and design of KTIs over time,
- (iii) use of *a participatory approach* that engaged leaders and users influenced adherence,
- (iv) *training users to conduct prevalence surveys* (monitoring) promoted accountability for EB care and built capacity,
- (v) creating an institutional system that held leadership accountable for EBP outcomes, and
- (vi) establishing practices/processes that unknowingly influence low to moderate adherence rates.

Providing Timely Feedback

Timely exchange and feedback of performance data (e.g., prevalence survey and patient satisfaction results) by NPP representatives with clinical leaders and unit nurses and comparing of results among units created ‘a sense of competition’ among unit leaders and staff that spurred a chain of activities to improve. Specifically, ongoing changes in measurement activities (e.g., the questions within the prevalence survey) became more focused and sophisticated to target selected BPG behaviours. Unit clinical leaders and teams set increasingly specific benchmarks that were incrementally obtainable and modified survey questions to reflect benchmarks. Efforts to establish a point of care *monitoring system* that provided *regular reports* on nurses’ adherence rates to BPG recommendations produced the necessary data critical to determine remedial action plans (e.g., a feedback mechanism) for sustainment of the Pain BPG at the unit level (i.e., local context). This finding corroborates the evidence in the literature for both phases. Specifically, studies have previously identified audit and feedback strategies effectively contribute to the uptake of EBPs in clinical practice during the implementation phase (Powell et al., 2015) and the sustained use phase (Lennox et al., 2018). Fleischer et al (2016a) also reports regular feedback on BPG audit results reinforced expectations and promoted sustainment among nurses in acute care.

Use of An Incremental Approach

The *use of an incremental approach* to influence adherence to recommendations shifted the focus and design of KTIs over time. Specifically, during implementation (0-2 yrs.), KTIs were focused on integrating recommendations into existing organizational-wide documentation and orientation processes/practices. During the sustained use phase, the focus and design of KTIs continued to change to address unit specific low adherence rates. For example, the linking of KTIs to target behaviors (e.g., guideline recommendations) while focusing efforts on one recommendation at a time at the corporate level over time (e.g., an incremental approach) and subsequently designing KTIs to address unit specific level low adherence rates promoted sustainability. This change likely stemmed from the realization that they could not obtain high adherence to all BPG recommendations on all units, at the same time. The added value or effectiveness of tailoring KTIs over time to support the integration of the innovation into routine practices/processes (context), previously identified as an implementation strategy to overcome barriers to change (Baker et al., 2010; Wensing et al., 2013), now adds to sustainability knowledge. Findings also add credence to the conceptualization that sustainability of healthcare innovations in clinical practice is an ‘*ongoing dynamic process*’ recommended in Article #4 (Nadalin Penno et al., 2019), evident in existing sustainability frameworks (Buchanan et al., 2006; Chambers, 2013; Fleischer et al., 2015; Fox, 2015; Maher, 2010), and the literature (Cowie et al., 2020; Stirman, 2010).

Use of a Participatory Approach

The third main observation involves the *use of a participatory approach* to engage leaders and users in the development of KTIs to enhance adherence: a user up approach. At the corporate level, engaging users on EBP committees/taskforces initially mandated to develop a

multi-modal approach to disseminate BPGs, and later to monitor guideline adherence rates and patient outcomes, reportedly promoted commitment to pain care and its sustainment over time. Additionally, based on departmental (e.g., Medicine care unit) EBP priorities, the incremental approach used by unit clinical leaders to engage Medicine care nurses and other IP team members to collectively develop and or tailor KTIs to address low adherence rates promoted adherence to select targeted behaviors. Promoting a ‘*user participatory approach*’ as a means to promote guideline use, evident in the literature (Geerligs et al., 2018; Jagosh et al., 2012), seems to be a proven means for BPG sustainment beyond the implementation phase. These findings confirm the notion that to produce real-world change over time there is a “need to consider staff and system domains as active components in the change process rather than imposing change”(Geerligs et al., 2018, p. 51) for sustainment as well.

Promoting Accountability for Evidence-Based Care and Building Capacity

The fourth main observation involves a combination of two KTIs designed to promote user accountability while building capacity for evidence-based care over time. Specifically, the combined training of nurses to be surveyors to conduct the biannual audits (e.g., monitoring) reportedly served to increase nurses’ accountability towards sustaining BPGs in clinical practice while building their capacity for EBP use within the setting. Training is identified as a key KTI in sustainability of innovations in healthcare by several researchers (Chambers, 2013; Cowie et al., 2018; Cowie et al., 2020; Lennox et al., 2018; Waltz et al., 2015). In a previous review, monitoring progress using a standardized mechanism over time (e.g., such as conducting a prevalence survey) was identified in 84% (52/62) of approaches as a key strategy for the sustainability of innovations in healthcare (Lennox et al., 2018). Fleischer et al (2016a) also reports using nurses as auditors served to strengthen accountability. This combination of KTIs

(e.g., training and monitoring) should be an important consideration for sustainment of BPGs among unit level nurses in changing acute care contexts.

Creating Leadership Accountability

The fifth main observation relates to the impact of a KTI that contributed to an *institutional culture of shared accountability for evidence-based care* among nursing stakeholders. Once real-time prevalence data were made available to users, a BPG-related performance criterion was integrated into the performance evaluation system of leaders. Soon after, this KTI had a trickled down impact on frontline staff performance expectations, critical to the process of change, creating an institutional system that held leadership and users (e.g., nurses and IP team members) accountable for the sustained use of EBPs. This KTI was focused on obtaining shared accountability (e.g., getting buy-in) to deliver the innovation (e.g., Pain P/P) in support of the corporations' vision for evidence-based care. The use of a BPG criterion for individual performance evaluation is not explicitly identified as a KTI in a recent review of sustainability approaches, rather the literature suggests 'incentives' and or 'job requirements' are necessary for sustainment of EBPs (Lennox et al., 2018). Thus, the BPG performance criterion exemplifies how to design a KTI for use in acute care context to promote use of BPGs in clinical practice. This KTI is congruent with other studies wherein front-line nursing leaders promoted shared accountability by reinforcing the expectation of BPG as the practice standard on their units using multiple strategies, one of which included evaluating performance (Fleischer et al., 2016a, 2016b).

Examining Processes Unknowingly Influence Adherence

Lastly, the sixth main observation relates to existing practices/processes that unknowingly may be influencing low adherence rates. The assumption nurses are not carrying

out BPG recommendations cannot be drawn solely based on low adherence rates derived from the electronic health record (EHR). In fact, the accuracy of nursing documentation among acute care nurses has been studied in similar acute care settings (Doran et al., 2014; Paans et al., 2011; Paans et al., 2010). Doran (2014) and Paans (2011; 2010) have reported low rates or scores related to the accuracy of nursing intervention documentation. Doran et al (2014) further indicated that nurses' documented 'assessments of patient status' more frequently than the 'nursing interventions they were performing'. Examination at point of care is needed to determine whether low adherence rates are due in part to a lack of accurate documentation. If so, effective KTIs to enhance or formalize documentation are required. Additionally, attention to unit level practices/processes related to BPG recommendations not recorded in the health record (e.g., use of clipboards, whiteboards, and verbal reports) may also provide insight into low adherence rates. A recent review, suggests it is important to routinely monitor the factors and KTIs such as these that facilitate or inhibit BPG use for sustainment in ever-changing acute care contexts (Cowie et al., 2020). This is an important consideration for sustainment given similar processes/practices are likely common in many healthcare settings.

6.5 Dissertation Implications

Nursing Leadership and Practice Implications

In this section I provide an overview of corporate wide considerations that support the sustainability of BPGs across inpatient units in an acute care context followed by implications to achieve sustained use of BPGs at the unit level for leadership and unit nurses.

Corporate Level Considerations for Sustainment

The implementation and sustainability of BPGs is a complex process that requires the continued commitment and efforts of multiple supportive stakeholders across the organization

from the Board to the unit level. Establishing and supporting structural processes (e.g., systems to monitor/manage the innovation) and infrastructure supports (e.g., policies/procedures, human resource commitments to supervise BPGs) is necessary to build capacity and a culture of shared accountability for evidence-based care across the organization. Using a participatory approach to engage users of the BPGs to participate on related committees/taskforces to support ongoing review of clinical tactics, also facilitates buy-in promoting sustainment at all levels over time. Providing ongoing education and training at the corporate (e.g., orientation sessions, education days) and unit level (e.g., one on one training, in-services) are needed to build capacity for evidence-based care at the all levels. Establishing an audit and feedback system that uses an incremental approach to guide ongoing efforts to address low adherence over time should also be considered. Finally, establishing an institutional system that reinforces leadership's commitment to evidence-based care, such as the use of a performance criterion or a requirement to report the impact of the use of the BPGs on patient outcomes as part of the organization's quality reporting system, promotes sustainment.

Clinical Practice Level Considerations for Sustainment

Leadership Considerations. To achieve sustainment of BPGs at the point of care it is important to realize sustainability is dependant on the unit's team-wide efforts, not just the nurses' adherence to guidelines. Sustaining BPGs can be maximized if unit leaders maintain a unit-wide perspective on how recommendations are being integrated into daily routines, processes and practices. Unit leadership teams (e.g., leaders, managers, champions, educators) should adopt strategies that promote use of BPG recommendations in regular and responsive ways to support ongoing sustained use. For example, utilizing daily interprofessional patient rounds to discuss BPG related clinical management issues. Additionally, given conditions

underlying sustainability factors change over time, leaders also need to focus on establishing strategies that build unit capacity among IP team members to ensure BPG sustainment. For example, establishing unit specific BPG priorities for monitoring and evaluation and collaborating with unit teams on developing remedial KTIs to address low adherence and or to set benchmarks builds capacity. Encouraging unit nurses to participate in regular monitoring and evaluative processes (e.g., audits), on units not their own builds capacity and fosters accountability for evidence-based care, promoting sustainability. Ultimately leadership's efforts should focus on promoting a culture of shared accountability for the ongoing use of BPGs among all team members to enhance sustainability at the practice level.

Unit Nurse Considerations. Unit nurses should be encouraged to participate in the establishment and ongoing revisions of BPG policies/protocols and determining the measurable indicators for each recommendation to be surveyed. Unit nurses reported the embedding of prompts for BPG recommendations in routine processes and documentation practices (forms) positively influenced high adherence rates to BPG recommendations over time. Engaging unit nurses to identify established processes/practices related to BPG recommendations on their units and how to best to integrate such prompts will promote sustainment. Attention to established practices/processes related to BPG recommendations that are not documented in the health record provided insight into low adherence rates in the study site. It also provided a focus for how best to design KTIs that would promote formal documentation of nurses' ongoing point of care implementation efforts. Given increase complexity, acuity levels and potential workload and time barriers in acute care settings, KTIs need to identify benefits related to documenting recommendation efforts that are flexible and motivational for nurses to carry out. Collaboration among team members to devise unit specific remedial plans facilitated sustained use of BPGs at

the unit level over time. Encouraging team members to use frameworks to identify barriers, initially to guide implementation efforts, and over time to develop course correcting KTIs designed to incrementally address low adherence rates (tailoring of KTIs) facilitates sustainment. Encouraging unit nurses' participation in ongoing education related to BPGs and or engaging them in training to become champions to provide expertise at the unit level is necessary to promote BPG use and maintain awareness of refinements/new evidence at the unit level. Lastly, training nurses and IP team members to be surveyors to conduct the BPG prevalence audits promotes increased accountability towards sustaining BPGs in clinical practice while building their capacity for evidence-based care within the setting.

Moreover, these ongoing internal efforts to improve patient outcomes that target collaboration among leaders, unit nurses and team members for evidence-based care promotes sustained use of BPGs in acute care. In short, sustainability depends on the linkages and shared actions among unit leaders at the department and unit level, along with the nurses and IP team members at the point of care.

Implications and Future Directions for Sustainability Research

Sustainability is an evolving field of research within implementation science. Monitoring and measuring sustainment when an innovation is adapting to the context while it evolves (i.e., refinements occur) over time should focus on whether the intended benefits or outcomes are being maintained. The main purpose of adapting and refining the innovation to fit within the local context is to ensure the routine practices/processes support the intended outcomes of the BPG recommendations. Setting outcome measures is a key step in measuring sustainability over time. Establishing regular measurement of adherence to guideline

recommendations and monitoring outcomes through timely audit and feedback is needed to compare impact of KTIs/strategies and ultimately determine sustainment over time.

Implications for Sustainability Research

In recent years, the growing emphasis on understanding what frameworks are available to guide sustainability research in specific contexts, such as acute care (Nadalin Penno et al., 2019; Shelton et al., 2018), the related determinants (Cowie et al., 2020; Nadalin Penno et al., 2019), and strategies used (Lennox et al., 2018) to support sustainability of EBPs in clinical practice, is evident in the literature. Furthermore, recent efforts to define sustainability have improved conceptual clarity (Moore, 2017). However, despite these efforts there still is a need to increase the empirical base for sustaining healthcare improvements in a variety of clinical contexts (Proctor et al., 2015; Shelton et al., 2018), including acute care (Ament et al., 2014; Cowie et al., 2020; Fleiszer et al., 2015). Contributions from this dissertation that advance the knowledge base for the sustainability of healthcare innovations in practice include:

- (i) Article #4 findings defined seven sustainability constructs (Nadalin Penno et al., 2019),
- (ii) Combining cases study factor results (Article #1-3) with those from the systematic review (Article #4) produced a total of forty-nine sustainability factors for the sustained use of EBPs in acute care.
- (iii) The twelve contextual factors identified in the case study, aligned with findings of two current reviews (Shelton et al., 2018; Squires et al., 2019), suggesting their potential relevance beyond acute care.
- (iv) Alignment of the twenty-nine KTIs identified in the case study with approaches identified in the recent Lennox (2018) review, not only suggests their potential relevance beyond

acute care, but provides further specificity, not evident by the lack of acute care studies included in the Lennox review (Lennox et al., 2018).

- (v) Theory analysis and empirical findings both demonstrated sustainability is a ‘process’ or ‘ongoing stage’, supporting the expansion of the most current definition for the concept of sustainability (Moore, 2017).

Future Directions for Sustainability Research

To advance sustainability knowledge future research in this field should focus on the following four directions. First, further investigation is required to provide additional evidence and refinement for the seven constructs, the forty-nine factors in this dissertation in other healthcare settings to confirm generalization and to inform the design of future sustainability approaches and research. Second, one of the eight KTIs identified as having an impact on nurses sustained use of a BPG over time on all inpatient units (e.g., embedding prompts in documentation processes/practices) should be selected to inform the design of an intervention study. The intervention study should be conducted in a variety of healthcare contexts over time, with the same or a different healthcare innovation, to explore applicability and further development. Third, to further understand the impact of implementation on sustainability of healthcare innovations, an examination of F/M/Ts containing both implementation and sustainability constructs and factors for acute care contexts should be undertaken using a similar theory analysis approach (Walker, 2005). Results could then be compared to those from this dissertation and interpretations made regarding potential overlap and or impact of implementation of sustainability, and further substantiate insights revealed in this dissertation. Fourth, further examination of the *Outcome* construct is recommended to explicitly identify related factors or indicators. This recommendation is supported in the literature by framework

authors (Buchanan et al., 2006; Chambers, 2013; Fleiszer et al., 2015; Frykman et al., 2017) and researchers (Nadalin Penno et al., 2019; Shelton et al., 2018). To achieve this, using Proctor's Framework (Proctor et al., 2009), future inquiry should focus on determining the level of influence or impact of an BPG on specified outcomes or type of outcomes (e.g., implementation, service or client outcomes) over time (e.g., >2 yrs.). A mixed study design using any one of the four levels of change (e.g., individual, group/team, organization, or system level) identified by Proctor et al (2009) is recommended for this future research. Results would inform the Outcome construct identified in Article #4, expanding the knowledge base for the sustainability of healthcare innovations in practice.

Understanding and measuring how sustainability research efforts can reduce expenditures and enhance progress towards improved patient outcomes is critical. Much remains to be learnt about this complex concept of sustainability. More focus is needed to understand the dynamic interactions between and among factors across a variety of contexts and to evaluate planned KTIs to support the sustainability of healthcare innovations in real-world settings.

6.6 Conclusions

The integration of the findings from the case study and systematic review resulted in a comprehensive listing (i.e., resource) for the sustainability of healthcare innovations in acute care (see Table 6.1). This novel resource consists of seven sustainability constructs, forty-nine unique factors and twenty-nine unique related KTIs for acute care. Findings further demonstrates sustainability of BPGs in ever-changing healthcare environments, such as acute care, is an ongoing, dynamic, and complex process. This finding provides further conceptual clarity, corroborating the recommendation by Nadalin Penno et al (2019) to add it to the current sustainability definition by Moore et al (2017). This novel resource also has practical

implications for researchers, practitioners and administrators when designing, implementing and sustaining healthcare innovation, such as BPGs, for clinical practice in acute care contexts. The majority of the forty-nine sustainability factors identified were within the context constructs, providing insight into ‘why’ the sustained use of BPGs may vary among units and departments within the same or different setting. This finding also highlights the need to focus on the specific unit level contextual factors influencing use (or not) before developing or choosing KTIs/approaches to effectively embed a BPG into routine practice. Additionally, the three key factors identified as having a continuous influence during both the implementation and sustained use phases: a need for an innovation (e.g., BPG), leadership commitment, and external demand/pressure for the innovation, are also important considerations for sustainment of BPGs in acute care. Practitioners and researchers need to be mindful of the underlying conditions influencing these three factors over time for sustainment to prevail. Notably, findings reveal sustainability of BPGs in acute care does not rest solely on identifying the factors influencing its use, but how we manage the factors matters.

As indicated, to promote sustainment, factor identification is only part of the equation for healthcare innovation sustainability, developing effective KTIs to improve nursing practice and related patient outcomes is the other critical part. To this end, the linking or tailoring of KTIs to promote, address, or overcome the identified factors aimed at sustaining BPGs during the dynamic ongoing sustainability phase is a necessary step. Twenty-nine KTIs promoted sustainment of the BPG in acute care, eight KTIs had a continuous impact during implementation phase (0-2yrs), the sustained use phase (>2-10 yrs.), and at the ten-year timeframe. The eight KTIs provide insight into how the focus of the KTIs evolved over time with the change in level of application (e.g., across units/ departmental verses unit specific

application) to fit within the context. This novel finding is important to consider when designing KTIs to be used in an ever-changing healthcare setting such as acute care.

Together factors and KTIs, undoubtedly do influence the way in which healthcare innovations are sustained over time. It is important to understand the influences underlying the factors in real world settings and how the focus of the KTIs must evolve with the integration of an innovation at different levels of application (e.g., departmental verses unit level use) and over time. Given healthcare innovation sustainability is a ‘process’ or ‘ongoing stage’, it is apparent by these findings, what really matters is how and what the organization does to sustain the innovation at all levels over time within ever-changing acute care contexts.

Table 6.1. Combined findings from Articles #1-4 for healthcare innovation sustainability in acute care contexts

Article #4 Themes/ constructs	Article #4 Factors (N= 49)	Article #4 Unspecified setting Fwks					Article #4 Acute care Fwks			Article #1 Imp Factors (0-2yrs.) n=3	Article #1 Sust Factors (>2-10yrs) n=12	Article #3 Sust Factors (at 10yrs) n=31	Article # 1 Department Level Corporate RNs Implementation (0-2yrs.) KTIs (n=12)	Article #1 Department Level Corporate RNs Sustainability (>2-10yrs.) KTIs (n=21)	Article #3 Unit Level Unit RNs Sustainability (at 10 yrs.) KTIs (n=9)
		1	2	3	5	6	4	7	8						
Innovation <i>(defined as: new process/chan ge/ product/practi ce or program, innovation, intervention)</i>	*Relevance/consistent with competitive strategy (to addresses need/problem)	✓	✓			✓		✓		*✓	*✓				
	*Characteristics (scale, shape & form, age, nature, type, integrity)	✓	✓		✓			✓							
	*Perceived centrality to organizational performance /platform /services	✓	✓		✓			✓							
	Fit with org's vision/mission, procedures/ strategies	✓		✓				✓							
	Adaptability of innovation				✓		✓		✓				‡Embedding of Pain P/P into existing unit processes	‡Embed ongoing refinements into existing routine practices/processes & Pain P/P	‡Routinize recommendations into nursing forms and practices/processes: embed prompts
															Digitalized Pain P/P and forms into new eHealth record
													Pain P/P established Interdisciplinary for all disciplines		
*Benefits to patient, staff, organization (cost effective, efficiency & quality of care)		✓	✓	✓	✓		✓			✓					
Barrier Identification							✓					Use frameworks to guide implementation and Id barriers			
Adopters <i>(defined as: staff, stakeholder, user, adopter, actor, and or individual)</i>	Human resources - recruitment, processes, succession and leave planning (staffing/compliment)				✓	✓							Secure internal financial commitment – time and Human resources to participate on cttees and to implement KTIs		
	**Student turnover (medical)									✓					
	*Individual commitment to innovation	✓	✓			✓		✓			✓				
	*Individual competency (skill knowledge, absorptive capacity) to perform innovation and time management to use innovation	✓	✓		✓			✓	✓		✓✓				
	**expert consultants /resources										✓				
Internal cohesion btwn individual & commitment within the organization /stakeholder engagement leads to increased performance (senior nurse mentors /influencers)		✓						✓		✓				Mentorship used by senior nurses to support Pain P/P use:	

	Stakeholder Commitment to innovation				✓			✓				✓		✓✓✓✓	✳️Joint collaboration of human resources from all levels of nursing plus other disciplines to develop departmental implementation plan	✳️Engages IP stakeholder involvement: all professions to follow policy participate on ctees		
	Stakeholder beliefs, attitude, perceptions, emotions, expectations towards innovation and user motivation/resistance	✓			✓			✓					✓					
	**Population characteristic/needs/acuity level													✓				
	**Users awareness / familiarity with innovation													✓				
	Champion presence & involvement							✓				✓						
Leadership & Management <i>(defined as: style, approach, behaviors, engagement support, or feedback)</i>	**leadership commitment (dept level)													✳️✓	✳️✓	✳️Formalize BPG Coordinator role	✳️Comparing survey results among units created a sense of competition among leaders and users to improve	✳️Leadership strategies -Clinical Coordinator- dept level: (support for big issues during shifts) -Clinical Care Leaders - unit level (get involved in unit level issues to support ongoing improvements) -Unit Managers - unit level (get involved in unit wide issues, help with remedial action plans to reinforce target behaviors, review incidents, encourages education training)
	*Management approach & engagement (commitment unit level)	✓		✓	✓	✓						✓	✓		✳️✓			
	*Senior Leadership involvement & actions	✓		✓	✓								✓		✓	✳️✓✓✓✓		
Inner Context <i>(defined as: context, practice setting or organization)</i>	*Infrastructure support- Policies & Procedures based on Innovation	✓			✓							✓	✓		✓			
	Infrastructure support for innovation in job description with mechanism for recognizing achievement	✓			✓							✓					Performance Evaluation indicators for monitoring rt innovation= leaders, managers, and staff	
	*Infrastructure support-equipment & supplies for innovation (and resources = pamphlets)				✓			✓	✓	✓					✓			
	Organization - Absorptive capacity for innovation											✓	✓					
	**physical layout/structure of wards														✓			
	**competing corporate priorities													✓				
	Cultural - Beliefs, values & perceptions to innov	✓											✓		✓			
	*Cultural - Climate	✓		✓		✓							✓		✓			
Cultural - innovation integrated into Norms (documents, protocols, manuals)	✓							✓								Unit leaders lead dept and unit level patient centered initiatives for pain care		

condition, context, system, or environment)	**External pressure/demand (e.g., professional/regulatory bodies, Ministry, funding bodies)										*✓	*✓	✓	New evidence released - Integrating into BPG and ongoing education
	Connection to broader external context (regional, national, international links)		✓			✓			✓			✓		## Staff participation on a regional network- - provide access to new research and related outcomes for pain management
	External Support for innovation from Stakeholders (recognition)	✓	✓						✓			✓		Benchmarking to external sources best practices
	**Goal Alignment with external agencies (e.g., Education institutes)											✓		
	*Political-Policy, legislation & Interests		✓		✓	✓			✓					
	Financial-external funds & other non-financial resources of innovation								✓					
Outcomes (defined as: outcomes, teamwork behaviors, consequences, or continuation of benefits)		✓												
	No factors explicitly defined in frameworks for this concept													

Legend: 1= Buchanan SOCF, 2= Racine MSI, 3= Maher NHS-SM, 4= Slaghuis FMIS-WP, 5=Chambers DSF, 6= Fox SITF, 7= Fleiszer SIHF, 8=Frykmann DCOMF

* Common Factors - occurs in 4 or more frameworks (Article #4)

** 12 sustainability factors identified in case study (i.e., Article #1-3)

* Factors common across subcases over three timeframes

* KTI common across subcases over three timeframes

Table 6.2. Integrated factors identified over ten years in acute care (N= 49)

	N= 49 Sustainability Factors for Acute Care	N= 32 unique Factors identified in the Case Study		
Chapter 5 Article #4 Constructs	Chapter 5 Article #4 Factors	Chapter 2 Article #1 (0-2yrs.) Implementation Factors	Chapter 2 Article #1 (>2-10yrs.) Sustainability Factors	Chapter 4 Article #3 (at 10 yrs.) Sustainability Factors
7 Constructs	N= 49 Factors (37 from SR + 12 from Case Study)	n = 3 unique	n = 10 unique + 3	n= 19 unique +2+ 3
Innovation <i>(defined as: new process/change/ product/practice or program, innovation, intervention)</i>	*Relevance/consistent with competitive strategy (to addresses need/problem)	X	X	X
	*Characteristics (scale, shape & form, age, nature, type, integrity)			
	*Perceived centrality to organizational performance /platform /services			
	Fit with org's vision/mission, procedures/ strategies			
	Adaptability of innovation			
	*Benefits to patient, staff, organization (cost effective, efficiency & quality of care)			X
	Barrier Identification			
Adopters <i>(defined as: staff, stakeholder, user, adopter, actor, and or individual)</i>	Human resources - recruitment, processes, succession and leave planning (staffing/compliment)		X	
	**Student turnover (medical)		X	
	*Individual commitment to innovation			X
	*Individual competency (skill knowledge, absorptive capacity) to perform innovation and time management to use innovation			X
	**expert consultants /resources			X
	Internal cohesion btwn individual & commitment within the organization /stakeholder engagement leads to increased performance (senior nurse mentors /influencers)			X
	Stakeholder Commitment to innovation			X
	Stakeholder beliefs, attitude, perceptions, emotions, expectations towards innovation and user motivation/resistance		X	X
	**Population characteristic/needs/acuity level			X
	**Users awareness / familiarity with innovation			X
	Champion presence & involvement			
Leadership & Management <i>(defined as: style, approach, behaviors, engagement support, or feedback)</i>	**leadership commitment (dept level)	X	X	X
	*Management approach & engagement (Unit Leaders)		X	X
	*Senior Leadership involvement & actions		X	
Inner Context <i>(defined as: context, practice setting or organization)</i>	*Infrastructure support- Policies & Procedures based on Innovation			X
	Infrastructure support for innovation in job description with mechanism for recognizing achievement			
	*Infrastructure support-equipment & supplies for innovation (and resources = pamphlets)			X
	Organization - Absorptive capacity for innovation			
	**physical layout/structure of wards			X

	**competing corporate priorities		X	
	Cultural - Beliefs, values & perceptions to innov			X
	*Cultural - Climate			X
	Cultural - innovation integrated into Norms (documents, protocols, manuals)			X
	**Team culture embraces innovation			X
	Political internal stakeholder coalition, power, influence			
	Financial performance budgeting & measurement			
	Financial-internal funds & other non-financial resources of innovation			
Inner Processes <i>(defined as processes, methods, systems, or environment)</i>	**workload /staffing patterns			X
	*Education & training processes			
	Processual - Planning, method, & timing of embedding innovation			X
	*Processual- project structure & system to monitor/manage innovation			
	*Organization - communication capacity for monitoring (exchange & feedback)			X
	**Formal communicating/reporting systems for client info btwn practitioners (documented)			X
	Behavioural change strategies			
Outer Context <i>(defined as: external condition, context, system, or environment)</i>	Soci-economic political threats, stability			
	*External conditions, compatibility for innovation (consumer demand)		X	
	**External pressure/demand (e.g., professional/regulatory bodies, Ministry, funding bodies)	X	X	X
	Connection to broader external context (regional, national, international links)		X	
	External Support for innovation from Stakeholders (recognition)		X	
	**Goal Alignment with external agencies (e.g. Education institutes)		X	
	*Political-Policy, legislation & Interests			
Financial-external funds & other non-financial resources of innovation				
Outcomes (defined as: outcomes, teamwork behaviors, consequences, or continuation of benefits)	No factors explicitly defined in frameworks for this concept			

Legend:

* **Common Factors** - occurs in 4 or more frameworks identified in systematic review and theory analysis (Article #4)

** **12 factors identified in case study** (e.g., Articles #1-3)

X = **unique factors** identified in implementation phase (0-2yrs) having continuous influence over the ten years (>2-10 yrs) and 10 years post-implementation (at 10 yrs)

X = **unique factors identified during sustainability phase having influence between >2-10yrs.**

X = **unique factors identified 10 years post-implementation influencing sustainability (at 10 yrs.)**

Table 6.3. Twelve sustainability factors mapped to current reviews (Squires et al., 2019) (Shelton et al., 2018)

12 Sustainability Factors (case study factors aligned with systematic review constructs identified in Nadalin Penno et al., (2019) (Article #4)	Concept Analysis of ‘Context’ (Squires, Graham et al 2019)	Emerging Sustainability Factors (themes) (Shelton et al 2018)
<p><u>Adopter Construct factors:</u></p> <ul style="list-style-type: none"> ·student turnover (medical) ·expert consultants ·individual awareness/familiarity with innovation ·population characteristics/needs/acuity level 	<p><u>Domain = Providers within the Context</u> Attribute= People, Feature=Staffing composition Attribute=People Feature= Staffing qualifications & expertise Attribute=People Feature= Staffing qualifications & expertise <u>Domain = User of Context</u> Attribute=Patient Population, Feature=Patient/client demographics</p>	<p><u>Implementor & Population Characteristics Factors</u></p> <ul style="list-style-type: none"> -Provider/implementor characteristics -Implementation expertise -Implementer characteristics -Population characteristics
<p><u>Leadership & Management Construct factors:</u></p> <ul style="list-style-type: none"> ·leadership commitment (dept level); 	<p><u>Domain = Internal Arrangement of Context</u> Attribute=Leadership, Feature=Active and Formal leadership</p>	<p><u>Inner Context Factors</u></p> <ul style="list-style-type: none"> -Leadership/support
<p><u>Inner Context Construct factors:</u></p> <ul style="list-style-type: none"> ·physical layout ·competing internal priorities ·team culture embraces innovation 	<p><u>Domain= Internal Infrastructures/Networks</u> Attribute=Physical Infrastructure, Feature=physical structure Attribute=Social Infrastructure, Feature=formal organizational priorities Attribute=Communications & Relationships, Feature=Social influence</p>	<p><u>Inner Context Factors</u></p> <ul style="list-style-type: none"> -Structural Characteristic -Climate/culture -Climate/culture
<p><u>Inner Processes Construct factors:</u></p> <ul style="list-style-type: none"> ·workload/staffing patterns ·documented communication/ reporting systems; 	<p><u>Domain=Internal Infrastructure/Networks</u> Attribute= Social Infrastructure, Feature=organization of care processes Attribute=Communications & Relationships, Feature=formal communication</p>	<p><u>Processes Factors</u></p> <ul style="list-style-type: none"> -Team Functioning -Communication
<p><u>Outer Context Construct factors:</u></p> <ul style="list-style-type: none"> ·external pressure/demand from professional/ regulatory bodies ·goal alignment with external agencies. 	<p><u>Domain= Broader System related to Context</u> Attribute =Market, Feature= competitive pressure Attribute=Collaborative Relationship, Feature =collaborative practice</p>	<p><u>Outer Factors</u></p> <ul style="list-style-type: none"> -Policy and legislation -Values, priorities, needs

Table 6.4. Integrated KTIs for the sustainability of EBPs in acute care (N= 29)

Chapter 5 Article #4	Chapter 2 Article #1 Implementation Phase (0-2 yrs.)	Chapter 2- Article #1 Sustainability Phase (>2-10 yrs.)	Chapter 4 – Article #3 Sustainability Phase (at 10 yrs.)
Systematic Review	Department Level KTIs - Corporate RNs	Department level KTIs– Corporate RNs	Unit level KTIs – Unit RNs
7 constructs	8 Imp/Sust KTIs + 4 Imp KTIs unique to Corporate RNs (n=12)	8 Imp/Sust KTIs + 14 Sust KTIs unique to Corporate RNs (n=22)	8 Imp/Sust KTIs + 3 Sust KTIs unique to Unit RNs (n=11)
Innovation	**Embedding of Pain P/P into existing unit processes	**Embed ongoing refinements into existing routine practices/processes & Pain P/P	**Routinize recommendations into nursing forms and practices/processes: embed prompts
	Pain P/P established Interdisciplinary for all disciplines		Digitalized Pain P/P and forms into new eHealth record
	Use frameworks to guide implementation and Id barriers		
Adopters	Secure internal financial commitment – time and Human resources to participate on cttees and to implement KTIs		
		**Joint collaboration of human resources from all levels of nursing plus other disciplines to develop departmental implementation plan	Mentorship used by senior nurses to support Pain P/P use: **Engages IP stakeholder involvement: all professions to follow policy participate on cttees
Leadership & Management	**Formalize BPG Coordinator role to	**NPP dept leaders comparing survey results among units created a sense of competition among unit leaders and users to improve unit	**Leadership strategies -Clinical Coordinator- dept level: (support for big issues during shifts) -Clinical Care Leaders - unit level (get involved in unit level issues to support ongoing improvements) -Unit Managers - unit level (get involved in unit wide issues, help with remedial action plans to reinforce target behaviors, review incidents, encourages education training)
Inner Context		Performance Evaluation indicators for monitoring rt innovation=leaders, managers, staff	
		Unit leaders lead dept and unit level patient centered initiatives for pain care based on unit routine practices -with adoption of EBP care	

	**Obtaining buy-in and Formalize nurse leaders' involvement on Steering Cttee	**Corporate level Internal cttees' support ongoing review of clinical tactics support sustained use ie Patient Experience Steering cttee and Accreditation workgroup	**Fostering an IP and EBP culture among IP team to support Pain P/P use
		Dept determine EBP priorities	
	**Secure external funds a) RNAO PBSO – secure operating funds for initial training and resource s to build capacity b) secure capital external financial support - for point of care surveying system	**Development of an electronic monitoring system to measure nursing sensitive indicators provide monitoring of BPG adherence	
Inner Processes	** Pain Council established - Interdisciplinary taskforce leads initial policy development, education strategies and future policy revision	** NPP reps develop formal and informal education initiatives at dept and unit level in 2014 initially performed by the Pain Council.	** Ongoing Education to support Pain P/P use by NPP and Educators: -education days, -mandatory online modules - updates, refreshers, seminars
	**8 Training Champions –to be clinical experts on units, with APNs	**Trains 170 Unit level expertise to support use of Pain P/P s = Champions, educators, APNs, work across units as clinical resource	**Ongoing Training to support Pain P/P use by NPP and Educators: - general hospital orientation, -1 on 1 training, in-services, solve recurrent problems
		*Ongoing pain care education support at dept and unit levels becomes tailored over time i.e. 1 on 1, case studies	
		*Mandatory eLearn training system	
		*Unit specific training of staff provided based on audit remedial action plans to improve on related BPG survey indicators	
		Develop unit specific additional resources/tools over time	
	Use multi-modal approach to disseminate		
		Spread (sharing) EBPs to additional areas	
	** Established Pain BPG taskforce/workgroup in NPP dept – enduring central reporting and monitoring structure for ongoing implementation and evaluation	** NPP and Unit Leaders facilitate/lead remedial action plan for under performing units	** Monitoring and evaluation: <u>Dept level</u> - ongoing training to do survey <u>Unit level</u> - audit and feedback provided (timely sharing of audit data, focuses biannual audit questions on target behaviors) <u>Unit level</u> - Patient satisfaction survey results shared reviews incidents and develop strategies to prevent them in staff mtgs
		*Ongoing biannual training of staff to conduct prevalence survey	
	*NPP Establishes regular performance monitoring: includes results from biannual prevalence audit and internal incident reporting		

		*Timely exchange of prevalence survey results led to course correcting changes	
			Establishing effective communications between providers , reporting practices - bedside exchange, whiteboards, clipboards
Outer Context		New evidence released - Integrating into BPG and ongoing education	
		Staff participation on a regional network- - provide access to new research and related outcomes for pain management	
		Benchmarking to external sources best practices	
Outcomes			

** Common KTIs across both implementation (0-2yrs.) and sustained (>2-10 yrs.) use phases and at 10 yrs.

Table 6.5. Integrated KTIs (N=29) compared to literature (Lennox et al., 2018)

Chapter 5 Article #4 Systematic Review 7 constructs	Chapter 2 - Article #1 Implementation Phase (0-2 yrs.) Department Level KTIs - Corporate RNs 8 Imp/Sust KTIs + 4 Imp KTIs unique to Corporate RNs (n=12)	Chapter 2 - Article #1 Sustainability Phase (>2-10 yrs.) Department level KTIs- Corporate RNs 8 Imp/Sust KTIs + 14 Sust KTIs unique to Corporate RNs (n=22)	Chapter 4 - Article #3 Sustainability Phase (at 10 yrs.) Unit level KTIs – Unit RNs 8 Imp/Sust KTIs + 3 Sust KTIs unique to Unit RNs (n=11)	Lennox 2018 Approaches for Sustainability (% = no. of studies using approach/total studies in review)	Lennox 2018 6 Themes
Innovation	**Embedding of Pain P/P	**Embed ongoing refinements	** embed prompts	• Intervention adaptation and receptivity 73% (45/62)	Initiative Design
	Interdisciplinary Pain P/P established		Digitalized Pain P/P and forms	Integration with existing programs and policies 79% (49/62)	
	Use frameworks to ID barriers to integrate into routine practices			Integration with existing programs and policies 79% (49/62)	
Adopters	Secure internal financial commitment – time and Human resources to			<input type="checkbox"/> Staff involvement 42% <input type="checkbox"/> Resource Staff 26% <input type="checkbox"/> Resource Time 6% } 74% (46/62)	The People Involved
			Mentorship by senior nurses	• Relationships and collaboration and networks 65% (40/62) • Stakeholder participation 79% (49/62)	
Leadership & Management	**Formalize BPG Coordinator role to	**NPP dept leaders comparing survey results among units created a sense of competition among unit leaders and users to improve unit	**Leadership strategies -Clinical Coordinator- dept level: -Clinical Care Leaders - unit level -Unit Managers - unit level	• Leadership and champions 73% (45/62)	
Inner Context		Performance Evaluation indicators for monitoring		• Accountability of roles and responsibilities 56% (35/62)	The Organizational Setting
		Unit leaders lead dept and unit level patient centered initiatives for pain care		• Defining aims and shared vision 53% (33/62)	
	**Obtaining buy-in and Formalize nurse leaders' involvement on Steering Cttee	**Corporate level Internal cttees' support ongoing review of clinical tactics support sustained use	**Fostering an IP and EBP culture among IP team to support Pain P/P	• Organizational values and culture 71% (44/62)	
	Dept determine EBP priorities			• Defining aims and shared vision 53% (33/62)	
Inner Processes	**Secure external funds a) RNAO PBSO – secure operating funds for initial training and resource s to build capacity b) secure capital external financial support - for point of care surveying system	**Development of an electronic monitoring system to measure nursing sensitive indicators provide monitoring of BPG adherence	** Ongoing Education to support Pain P/P use by NPP and Educators:	• Funding 68% (42/62) • General resources 90% (56/62)	The Resources
	** Pain Council established - Interdisciplinary taskforce	** NPP reps develop formal and informal education initiatives at dept & unit level in 2014 performed by Pain Council.		• Training and capacity building 76% (47/62)	

	** Training Champions	**Trains 170 Unit level expertise = Champions, educators, APNs, work across units	**Ongoing Training to support Pain P/P use by NPP and Educators:	<ul style="list-style-type: none"> • Training and capacity building 76% (47/62) 	Negotiating Initiative processes and Initiative Delivery
		*Ongoing pain care education support at dept and unit levels becomes tailored over time i.e. 1 on 1, case studies		<ul style="list-style-type: none"> • Training and capacity building 76% (47/62) 	
		*Mandatory eLearn training system		<ul style="list-style-type: none"> • Training and capacity building 76% (47/62) 	
		*Unit specific training of staff provided based on audit remedial action plans to improve			
		Develop unit specific additional resources/tools over time		<ul style="list-style-type: none"> • General resources 90% (56/62) 	
	Use multi-modal approach to disseminate			<ul style="list-style-type: none"> • Training and capacity building 76% (47/62) 	
		Spread EBP to additional areas		<ul style="list-style-type: none"> • Training and capacity building 76% (47/62) 	
	** Established Pain BPG taskforce/workgroup in NPP dept –	** NPP and Unit Leaders facilitate/lead remedial action plan for under performing units	** Monitoring and evaluation: Dept level - ongoing training to do survey Unit level - audit and feedback Unit level - Patient satisfaction survey results shared	<ul style="list-style-type: none"> • Monitoring progress over time 84% (52/62) 	
		Ongoing biannual staff training to conduct prevalence survey		<ul style="list-style-type: none"> • Monitoring progress over time 84% (52/62) 	
		NPP Establishes regular performance monitoring:		<ul style="list-style-type: none"> • Monitoring progress over time 84% (52/62) 	
	Timely exchange of prevalence survey results led to course correcting changes		<ul style="list-style-type: none"> • Monitoring progress over time 84% (52/62) 		
		Establishing effective communications between providers,	<ul style="list-style-type: none"> • Relationships and collaboration and networks 65% (40/62) 		
Outer Context		New evidence released – integrate into BPG		<ul style="list-style-type: none"> • Evidence base for the initiative 52% (32/62) 	The External Environment
		Staff participation on a regional network		<ul style="list-style-type: none"> • Community participation 56% (35/62) 	
		Benchmarking to external sources best practices		<ul style="list-style-type: none"> • Evidence base for the initiative 52% (32/62) 	
Outcomes					

** common KTIs across both Implementation (Imp) (0-2 yrs.) and Sustained use (Sust) (>2-10yrs.) phases and at 10 yrs.

6.5 References

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Appendix G

AMSTAR 2: a critical appraisal tool for systematic reviews that include randomised or nonrandomised studies of healthcare interventions, or both

Overall rating = Moderate to High in critical domains given item 15 is partially related

Box 1 AMSTAR 2 critical domains

- Protocol registered before commencement of the review (item 2) **Yes**
- Adequacy of the literature search (item 4) **Yes**
- Justification for excluding individual studies (item 7) **Yes**
- Risk of bias from individual studies being included in the review (item 9) **No**
- Appropriateness of meta-analytical methods (item 11) **NA**
- Consideration of risk of bias when interpreting the results of the review (item 13) **Yes**
- Assessment of presence and likely impact of publication bias (item 15) **NA but Yes discussed Publication bias as only published studies included**

Box 2 Rating overall confidence in the results of the review

- **High**
- *No or one non-critical weakness*: the systematic review provides an accurate and comprehensive summary of the results of the available studies that address the question of interest
- **Moderate**
- *More than one non-critical weakness**: the systematic review has more than one weakness but no critical flaws. It may provide an accurate summary of the results of the available studies that were included in the review
- **Low**
- *One critical flaw with or without non-critical weaknesses*: the review has a critical flaw and may not provide an accurate and comprehensive summary of the available studies that address the question of interest
- **Critically low**
- *More than one critical flaw with or without non-critical weaknesses*: the review has more than one critical flaw and should not be relied on to provide an accurate and comprehensive summary of the available studies
- *Multiple non-critical weaknesses may diminish confidence in the review and it may be appropriate to move the overall appraisal down from moderate to low confidence