Development and Assessment of a Prototype for a Training Program to Enhance Implementation Leadership of Unit Nurse Managers in the Chinese Nursing Context

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Abstract

Background: Unit nurse managers are in a key position to influence the implementation of evidence-based practice (EBP) in nursing. However, research indicates that nurse managers in China lack the competencies and behaviours to effectively lead implementation. The purpose of this study was to develop a prototype for an implementation leadership training program for unit nurse managers in China, and assess the prospective acceptability of the prototype.

Methods: The dissertation was conducted in three study phases using multiple methods: 1) a mixed-methods systematic review of leadership development interventions for managers supervise nurses; 2) a qualitative descriptive study using an integrated knowledge translation (IKT) approach to develop a prototype for an implementation leadership training program based on the Ottawa Model of Implementation Leadership in Changsha, China; and 3) a qualitative descriptive study to investigate the prospective acceptability of the prototype among potential program deliverers and participants (n=14) from three tertiary hospitals in Changsha, China.

Results: The systematic review analyzed 69 studies and found that leadership development interventions, including lectures, group work, and mentoring, positively impacted managers' leadership competencies in supporting, developing, and recognizing nurses. However, obstacles such as understaffing, time constraints, and lack of support hindered the application of these competencies in practice. In the co-development stage, nurse managers (n=7) identified all 14 O-MILe behaviours as important for EBP implementation, with some behaviours requiring modifications for clarity and cultural relevance. Managers outlined specific actions related to clinical practices, EBP, nurses, patients, interprofessional staff, incentives, resources,

organization, and external entities. They emphasized the need for competencies in EBP, professional nursing, and implementation leadership. The training program prototype consisted of five interactive modules to be delivered through multimodal forms such as lectures, group discussions and coaching. Unit nurse managers (n=14) found the prototype acceptable, expecting it to enhance care provision and align with their professional values. Time constraints, the COVID-19 impact, and support from senior leadership were identified as influencing future participation.

Conclusion: The prototype for the implementation leadership training program was perceived as acceptable to unit level nursing managers in the hospital context in Changsha, China. Future research is needed to explore the impact of the training program on enhancing implementation leadership competencies and behaviours of unit nurse managers, and the subsequent influence on nursing practice and patient outcomes.

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Abbreviations

AIMD	Aims, ingredients, mechanisms, delivery
AONE	American Organization of Nurse Executives
BPSO	Best Practice Spotlight Organizations
CFIR	Consolidated Framework for Implementation Research
CINAHL	Cumulated Index to Nursing and Allied Health Literature
EBP	Evidence-based practice
EPIS	Exploration, Preparation, Implementation, Sustainment
HHRDC	Human Health Resources Development Center
IKT	Integrated knowledge translation
i-PARIHS	Integrated Promoting Action on Research Implementation in Health Services
JBI	Joanna Briggs Institute
L-EBP	Leadership Behaviours Supportive of EBP Institutionalization
LEO	Leading an Empowered Organization
MMAT	Mixed Methods Appraisal Tool
MMSR	Mixed methods systematic reviews
MScN	Masters of Science in Nursing
NMF	Nurse Manager Fellowship
O-MILe	Ottawa Model of Implementation Leadership
PARIHS	Promoting Action on Research Implementation in Health Services
PRISMA	Preferred Reporting Items for Systematic Review and Meta-Analysis
RCTs	Randomized control trials
RNAO	Registered Nurses' Association of Ontario
SPSS	Software Package Statistical Analysis
TDF	Theoretical Domains Framework
TFA	Theoretical Framework of Acceptability
TIDieR	Template for Intervention Description and Replication
WOA	WeChat Official Account

Chapter 1: Introduction

The overall purpose of this dissertation was to develop a prototype for an implementation leadership training program, and to assess the prospective acceptability of the prototype among unit nurse managers in China. The training program aims to enhance the leadership of unit nurse managers to facilitate the implementation of evidence-based practice (EBP) in the Chinese nursing context. Unit nurse managers in my thesis were defined as those who directly supervise point-of-care nurses and all activities related to the nursing practice as well as overseeing patient care in their respective units in hospital settings (Wong et al., 2013). I present the introduction chapter as follows: 1) research problem, 2) study purpose and objectives, 3) an overview of the study design, 4) researcher positionality statement, and 5) outline of the dissertation.

1.1 Research problem

1.1.1 Implementation leadership

1.1.1.1 Implementation Science

Consistent findings from clinical and health services research manifest an obvious time lag between the up-to-date research evidence and practice (Bauer & Kirchner, 2020; Morris et al., 2011). Classic studies indicate that it takes 17-20 years to get research evidence into clinical practices, and fewer than 50% of clinical innovations ever make it into general usage (Bauer & Kirchner, 2020). Investments in health science research remain wasted if effective clinical or preventive interventions, medical devices or organizational models are not applied in practice. Chalmers and Glasziou (2009) estimated that nearly 85% of investment was wasted across

health science research, ranging from clinical, health services research to basic science. There has been calls to pay particular attention to the successful translation of these research evidence to application in health care (Chalmers et al., 2014).

Over the past two decades, implementation science has emerged and highly developed with the aim of bridging the gap between the discovery of new knowledge and its application in health care practices. It has been defined as the scientific study of methods to promote the systematic uptake of research findings and other EBP (the conscientious, explicit, and judicious use of current best evidence in making decisions about the care of individual patients) (Ingersoll, 2000)) into clinical practice to improve the quality and effectiveness of health services (Eccles & Mittman, 2006). The ultimate goal is to enhance the quality of healthcare by minimizing the non-utilization of significant research findings and the inappropriate utilization of clinical resources (Wilson & Kislov, 2022). Implementation science seeks to understand how to best apply scientific advances in the real world by focusing on converting evidence-based knowledge into routine use (Bauer et al., 2015). It is based on the assumption that research findings, that were generated in a particular population and setting, can be generalized and applied to a similar population and setting elsewhere (Wilson & Kislov, 2022). It also assumes that this transfer of knowledge can be studied and developed in a scientific way, and that knowledge of implementation helps to improve health outcomes in patients and populations (Wensing, 2015). Implementation science has been advancing in many aspects, including but not limited to the development of implementation theories (Weiner, 2009), strategies (Grimshaw et al., 2004), understanding of implementation determinants and mechanisms (Cane et al., 2012; Michie et al., 2011), investigation of implementation interventions adaptation

(Stirman et al., 2013), sustainability and scalability (Klingner et al., 2013). Recently de-implementation as a new research field has also attracted high attention among implementation scientist (van Bodegom-Vos et al., 2017; Wilson & Kislov, 2022).

One key aspect of the development in implementation science is the understanding of implementation determinants, which comprises a number of different levels of barriers and enablers that influence implementation outcomes, from the individual user or adopter (e.g. health care practitioners) to the organization and beyond (Nilsen, 2015). Understanding different levels of implementation determinants is important to inform the development of implementation strategies and to improve outcomes (Nilsen & Bernhardsson, 2019). Numerous frameworks have been developed to describe the implementation determinants (Nilsen, 2015). For example, the Promoting Action on Research Implementation in Health Services (PARIHS) identified three key determinants (i.e. characteristics of the evidence, context and facilitation) that influence the success of EBP implementation (Rycroft-Malone & Bucknall, 2010). The Theoretical Domains Framework (TDF) revealed 14 theoretical domains of implementation determinants, such as knowledge, skills, intentions, goals, social influences and beliefs about capabilities (Atkins et al., 2017). In addition, many empirical studies have explored implementation determinants and have identified common aspects that can either hinder or facilitate the implementation process, such as the quality and accessibility of evidence being implemented (Finch et al., 2020), the characteristics of implementation context (e.g., systems, organizations) (Nilsen & Bernhardsson, 2019), clinical practitioners (e.g. nurses) (Bach-Mortensen et al., 2018) and clients (e.g. patients) (Carlson & Plonczynski, 2008; Juckett et al., 2020). Although EBP implementation can be influenced by determinants at various levels,

leadership consistently emerges as a significant factor in implementation (Aarons et al., 2014; Gifford et al., 2018).

1.1.1.2 Leadership in EBP implementation

Leadership has been described as a process of influencing others to achieve common goals (Yukl, 2006). Effective leadership plays a crucial role in promoting the implementation of EBP within an organization (Aarons et al., 2014; Birken et al., 2018; Gifford et al., 2017; Hill et al., 2012; Kitson et al., 2021). Aarons et al. (2015) found that leadership in supporting EBP implementation is likely to foster a work group climate that is conducive to learning and innovation. Farahnak et al. (2020) highlighted that effective leadership can help to promote positive attitudes toward EBP, which is critical in overcoming resistance to change and increasing buy-in from staff. Leaders who communicate the importance of EBP and its potential benefits for patients and the organization can help to create a culture of continuous improvement and innovation (Farahnak et al., 2020). Moreover, Hill and colleagues (2012) found that effective leadership is essential in promoting individuals' commitment to organizational change, which is often required for successful EBP implementation. Leaders who provide clear guidance and support, involve staff in decision-making processes, and establish a shared vision and mission can help to build momentum and create a sense of shared responsibility for change (Hill et al., 2012). Guerrero et al. (2016) identified that effective leadership helps to address ongoing barriers that are likely to maintain implementation efforts. Leaders can strategically react to challenges that arise during implementation and persevere through successes and setbacks (Shuman et al., 2020). Kitson et al. (2021) and Birken et al. (2018) both discovered that effective leadership mediates the organizational strategies and

day-to-day activities. This includes setting clear goals and expectations, developing policies and practices that enhance implementation efforts, and promoting the integration of EBP into the unit's day-to-day activities.

On the other hand, poor leadership can create barriers to EBP implementation (Hu et al., 2020; Vaughn et al., 2019). Specifically, leaders may resist change in some cases, as they may perceive EBP as a disruption to established routines and practices (Sharplin et al., 2019). This can create a lack of support for EBP implementation, resulting in nurses feeling unsupported and unmotivated to engage in EBP activities (Sharplin et al., 2019; Vaughn et al., 2019). Additionally, a lack of leadership support may give rise to insufficient resources, including funding, staff, and time for EBP implementation (Li et al., 2018). Poor leadership can also result in inadequate communication, leading to a lack of clarity about roles and expectations, which can further impede EBP implementation efforts (Gifford et al., 2018).

In sum, leadership could either facilitate or impede EBP implementation in health care organizations. It is well-needed to harness and enhance the power of leadership to ensure the success implementation of EBP.

1.1.1.3 Definitions of implementation leadership

In recent years, 'implementation leadership' has been used by researchers when describing leadership specifically in the context of EBP implementation (Castiglione, 2020; Mosson et al., 2018). Currently, no consensus has been reached on the definition of implementation leadership. In 2014, Aaron et al. (2014) developed the first instrument to measure implementation leadership, which classified implementation leadership as four dimensions of

behaviours that promote a strategic climate for implementing and sustaining EBP. Those four dimensions include leaders being proactive to respond to implementation needs, supportive to assist staff members during the uptake of new practices, knowledgeable to properly guide the implementation process, and perseverant to address ongoing barriers that are likely to stall implementation efforts (Aarons et al., 2017; Guerrero et al., 2016). Moullin et al (2018) simplified the definition as 'being knowledgeable about the EBP to be implemented, proactive in problem-solving, supporting others, and persevering through the ups and downs of the implementation process' (p 561). Shuman et al. (2018) defined implementation leadership in their cross-sectional study as 'specific leadership behaviours enacted by leaders to facilitate EBP implementation and foster an EBP climate on their unit' (Shuman et al., 2018, p 4). Stetler (2014) conducted a case study of EBP institutionalization to identify leadership behaviours to facilitate and maintain EBP implementation. They refer implementation leadership as 'ongoing, strategic, vision-focused, deliberative thinking and day-to-day behaviours that role model, reinforce and live EBP' (Stetler et al., 2014, p 220). Gifford et al. (2007, 2018) conducted two reviews of studies that explored the leadership activities of managers that influence the use of research evidence by staff in nursing and allied health professionals. They defined implementation leadership as 'a multidimensional process of influence to enable staff to use research evidence in clinical practice, and includes behaviours and activities of leaders that exert direct and indirect influence on individuals, their environment, and organizational infrastructures' (Gifford et al., 2007, p 128).

Overall, the current definitions of implementation leadership contained common elements including the mention of behaviours and impact on implementation. In my study, I

referred to Gifford et al.'s (2007) definition of implementation leadership, as it encompasses not only a set of behaviors but also a process in which leaders engage in various behaviours and activities to influence key components (i.e., individuals, the environment, and organizational structures) in the implementation of EBP to achieve optimal nursing practice and patient outcomes. It is critical to view implementation leadership as a process that leaders could influence the EBP implementation because it allows for a more comprehensive understanding of the dynamic and complex nature of the implementation process. By understanding the role of leaders in shaping the environment and organizational structures, as well as influencing individuals to adopt EBP, it becomes possible to develop effective strategies to support and sustain EBP implementation (Gifford et al., 2017).

1.1.1.4 Frameworks for implementation leadership

Frameworks have also been developed in recent years to guide the development and evaluation of implementation leadership programs. Among those are frameworks that list leadership as one of the determinants that influence EBP implementation. For instance, the integrated Promoting Action on Research Implementation in Health Services (i-PARIHS) framework (Harvey & Kitson, 2016), Consolidated Framework for Implementation Research (CFIR) (Damschroder et al., 2022), and TDF (Cane et al., 2012) highlighted leadership as one of the critical contextual factors for successful implementation. Aarons et al (2011) developed the Exploration, Preparation, Implementation, Sustainment (EPIS) framework in which they specified that leadership at both the organization and unit or workgroup level influence the EBP implementation process.

Some frameworks focus on identifying the implementation leadership behaviours of particular leadership roles or the ways in which leaders influence EBP implementation. Leadership Behaviours Supportive of EBP Institutionalization (L-EBP) developed by Stetler et al. (2014) identified that leaders at all levels of health care settings should be equipped with three types of leadership behaviours to facilitate the EBP implementation and institutionalization: strategic, functional and cross-cutting leadership behaviours. Specifically, strategic leadership behaviours involve planning, organizing, and aligning, which demonstrated underlying vision-focused and systems-oriented thinking; Functional leadership behaviours include inspiring and motivating others, actively intervening and involving oneself in EBP, educating and developing team members, setting a positive example through role modeling, monitoring progress and providing constructive feedback, and implementing specific EBP projects; Cross-cutting leadership behaviours were strategic thinking, communicating, building and sustaining an EBP supportive culture (Stetler et al., 2014). However, there is a lack of empirical studies to test the behaviours proposed in L-EBP.

Birken and colleagues (2012) focussed on the role of middle managers (i.e. those who are supervised by senior managers and supervise front-line employees) in leading EBP implementation and developed a theory of middle managers' role in the implementation of healthcare innovations. In the theory, the authors proposed four roles of middle managers that could impact the effectiveness of implementing EBP. These roles include: 1) Sharing information: middle managers can use various means to provide relevant information to stakeholders; 2) Synthesizing information: middle managers can combine different elements of information to create a clear and comprehensive understanding; 3) Bridging strategy and day-

to-day activities: middle managers can address frontline employee concerns, remove barriers, hold them accountable, and provide coaching to help them meet their implementation responsibilities; 4) Advocating for EBP: middle managers can persuade and encourage stakeholders to participate in EBP implementation (Birken et al., 2012). The hypothesised four roles in the theory were demonstrated by a survey and a systematic review that explored middle managers' experiences in overseeing EBP implementation (Birken et al., 2016, 2018).

Based on theoretical and empirical research over the last two decades on leadership for EBP implementation, Gifford et al. (2017) developed the Ottawa Model of Implementation Leadership (O-MILe). In the O-MILe, Gifford and colleagues (2017) specified that unit-level leaders could practice relations-oriented, change-oriented, and task-oriented implementation leadership behaviours to promote staff to implement EBP, meanwhile creating a positive environment and supportive organizational structures and procedures for the implementation process. Relations-oriented behaviors involve communication, recognition, and support for staff's effort to change, and facilitating consensus on change among interdisciplinary professionals. Change-oriented behaviors are concerned with practice change, such as demonstrating commitment, reinforcing vision, overcoming obstacles to change, and advocating for change both within and outside the organization. Task-oriented behaviors center on role clarification, efficient planning, resource utilization, monitoring operations, and performance evaluation (Gifford et al., 2017).

Moreover, in the O-MILe, the authors illustrated the essential knowledge and skills for leaders to practice these three types of implementation leadership behaviours (Gifford et al., 2017). Particularly, the O-MILe specified knowledge of: 1) effective leadership practices, 2) site-

specific evidence-practice gaps, 3) implementation strategies, and 4) planned change processes including barriers management, and skills, 5) prioritize change, 6) set goals and target outcomes, 7) engage patients and staff, and 8) develop an implementation plan. The O-MILe has been utilized to guide the implementation of evidence-based fall prevention, diabetic foot ulcers, and pediatric pain management practices with demonstrated desirable outcomes (Gifford et al., 2011, 2013, 2019).

In conclusion, many frameworks in implementation science highlight leadership as one of the essential factors that influence EBP implementation, such as i-PARIHS, CFIR, and TDF. Frameworks developed by Stetler et al. (2014), Birken et al. (2012), and Gifford et al. (2017) focus on different levels of leaders and their use of specific leadership behaviours as potential mechanisms to improve the implementation of EBP in healthcare settings. The O-MILe developed by Gifford et al. (2017) also explicates the knowledge and skills that are necessary for leaders to perform implementation leadership behaviours, and identifies interpersonal processes to facilitate the EBP implementation.

1.1.2 Implementation leadership and unit nurse managers

1.1.2.1 Implementation leadership of unit nurse managers

In clinical settings, unit nurse managers oversee patient flow and staffing, provide opportunities for point-of-care nurses to improve healthcare delivery, establish positive work environments and ensure high-quality nursing practice (American Organizational for Nursing Executives & American Organizational for Nursing Leadership, 2015; Wong et al., 2013). In light of these responsibilities, they are well-situated to promote the implementation of EBP (Shuman et al.,

2020). Specifically, with frequent interactions with point-of-care nurses and physicians, significant involvement in supervising and guiding nursing care, and the ability to connect senior leaders (e.g. hospital administrators, nursing directors) who has a decisive role in adopting EBP, unit nurse managers have great advantages in facilitating EBP implementation (Shuman, 2017; Williams et al., 2020).

There is a growing body of research explicating that unit nurse managers' leadership behaviours are crucial factors that influence the implementation of EBP in health care settings (Aarons et al., 2016; Bianchi et al., 2018; Birken et al., 2018; Gifford et al., 2018; Sandström et al., 2011; Shuman, 2017). For example, studies have found that unit nurse managers promote the use of evidence by point-of-care nurses by building a solid relationship and communicating with them on a daily basis, supporting them to access and use the best available evidence to inform their clinical decision-making, and recognizing their implementation efforts (Birken et al., 2018; Engle et al., 2017; Gifford et al., 2018; Stetler et al., 2014). In addition, unit nurse managers emphasis the importance of EBP implementation by demonstrating their commitment to change, creating and reinforcing a shared vision to achieving quality of care through EBP (Bianchi et al., 2018; Graham et al., 2018; Sandström et al., 2011; Shuman, 2017; Stetler et al., 2014). Researchers also found that unit nurse managers are in a key position to pursue support for EBP implementation from senior leaders, interprofessional staff (e.g. physicians), and entities external to the healthcare setting (e.g. professional nursing associations) (Bianchi et al., 2018; Gifford et al., 2018; Kueny et al., 2015). Moreover, unit nurse managers can plan for and monitor the implementation process, provide resources and training opportunities, modify organization structure, and foster practice climates that promote EBP

implementation (Aarons, et al., 2014; Gifford et al., 2018; Kueny et al., 2015; Shuman et al., 2018; Williams et al., 2020).

Overall, the existing literature suggests that the leadership behaviours of nurse managers have a significant impact on the implementation of EBP. These include task-oriented behaviours such as planning, supervising, and providing resources; relation-oriented behaviours such as communication, support, encouragement, and recognition; and change-oriented behaviours such as demonstrating commitment and reinforcing vision (Gifford et al., 2017). While all these behaviours play a crucial role in influencing EBP implementation, some scholars make a distinction between managerial and leadership behaviours. For example, Liphadzi et al. (2017) argued that management focuses on planning and finishing tasks (task-oriented) to maintain stability and achieve short-term efficiency, whereas leadership is often associated with driving change (change-oriented) and achieving long-term goals. In this thesis, while acknowledging these differences, I do not emphasize the distinctions between management and leadership. Rather, my focus is on the implementation leadership of managers, which encompasses both task-oriented behaviours that prioritize efficiency, and relational- and change-oriented behaviours that align more closely with conventional definitions of leadership (Yukl, 2012). I view leadership and management as complementary processes that influence a group of individuals (i.e. point-of-care nurses) to achieve the goal of successful EBP implementation.

1.1.2.2 Interventions to enhance implementation leadership of unit nurse managers

Recognizing the crucial role that unit nurse managers play in implementing EBP, researchers have developed interventions to enhance the implementation leadership of managers (Välimäki et al., 2018). Kvist et al. (2014) designed an 8-month evidence-based nursing leadership intervention to improve nurse managers' knowledge of implementation leadership and EBP implementation, while helping managers identify their roles as leaders in EBP implementation. The intervention consisted of lectures and small working groups that involved developmental assignments and covered four main topics: leadership in evidence-based practice, the role of leaders in promoting work well-being, challenges and opportunities in leadership, and the importance of patient satisfaction and safety (Kvist et al., 2014). The intervention made use of a web-based learning environment, and advanced mentors supervising the clinical group assignments. Through a pre- and post-intervention design, Kvist et al. (2014) found that over half of the managers agreed that the intervention helped them understand the significance of research knowledge in guiding clinical decision making. The authors also found that most of the nurse managers (91%) believed that the intervention developed them as leaders for EBP implementation, improved their skills of supporting the staff, role modeling and developing collaboration (Kvist et al., 2014).

Wallen et al. (2010) developed a structured multifaceted mentorship program to improve nurse managers' EBP knowledge and skills, their beliefs about the value of EBP, and ability to implement it. The program included two-day workshops, lectures and tutorials. The authors aimed to provide a general foundation for developing EBP skills for nurse managers to promote, implement and sustain EBP via the workshops. Wallen et al. (2010) found that nurse managers who participated in the mentorship program demonstrated significantly better EBP

beliefs for EBP, and experienced a greater increase in perceived organizational culture and readiness compared to those who did not participate ($p < .05$). In addition, the qualitative findings suggested that implementation leadership of nurse managers helped to foster a culture of EBP (Wallen et al., 2010).

Richter et al. (2016) developed the iLead -- a generic implementation leadership intervention for healthcare managers based on the full-range leadership model. The iLead involved a series of five half-day workshops focused on identifying and analyzing necessary changes in employee and managers' behaviours to ensure successful implementation. Managers were required to identify and define the practice to be implemented, analyze potential obstacles, communicate the implementation, identify relevant implementation leadership behaviours, address resistance to the implementation, and evaluate and ensure its sustainability (Richter et al., 2016). Richter et al. (2020) revealed that the iLead resulted in an improvement in managers' knowledge. However, they observed mixed effects in terms of changes in behaviours.

Gifford et al. (2011, 2019) developed implementation leadership interventions for nurse managers to facilitate nurses' use of guideline recommendations for diabetic foot ulcers and fall prevention. The leadership intervention was informed by the O-MILe (Gifford et al., 2017). The intervention consisted of interactive workshops and follow-up telephone coaching sessions. During the workshops, nurse managers received information on knowledge of leadership theory, evidence-based practices (e.g. diabetic foot ulcers, fall prevention) as recommended in guidelines, and implementation strategies. After that, managers identified EBPs that were compatible with the organization's goals and were relatively easy to implement, set target goals

for change, and developed leadership action plans. In the leadership action plans, managers specified the relations, change, and task-oriented leadership behaviours they would engage in to implement the evidence-based diabetic foot ulcers and fall prevention practices (Gifford et al., 2013, 2019). During the follow-up coaching, participants discussed the leadership behaviours identified in their action plans, their progress in implementing these behaviours, factors that facilitated or hindered their progress, and made any necessary modifications to their leadership action plans.

Gifford et al. (2013) conducted a cluster randomized control trial to evaluate the impact of the intervention in nurses' use of evidence-based diabetic foot ulcer care practices in home care settings. They found that the intervention was feasible overall, and managers in the intervention group documented a significantly higher proportion of foot ulcer indicators (e.g. foot circulation, foot sensation, ulcer length and width, and ulcer depth) compared to those in the comparison group ($p < .05$). This suggested that the intervention had a positive influence on the nursing practice change. Moreover, the interview findings showed that managers from the intervention group reported using more relation-and change-oriented behaviours (Gifford et al., 2013). Subsequently, Gifford et al. (2019) conducted a pre-and-post study to investigate the impact of leadership interventions in facilitating the implementation of evidence-based fall prevention practice in a residential care facility. They found that the intervention was feasible, useful and promoted participants' engagement in implementing EBP (Gifford et al., 2019). However, neither two studies explored the influence of the intervention on the implementation leadership behaviours of nurse managers.

In sum, there are limited experimental studies that use leadership interventions to promote nurse managers to implement EBP (Välimäki et al., 2018). The interventions developed by Kvist (2014) and Wallen et al. (2010) were designed to improve managers' knowledge, skills, and belief in leadership and EBP, as well as organizational culture and readiness. Richter et al. (2016) and Gifford et al.'s (2011, 2019) leadership-focused interventions emphasised on developing managers' implementation behaviours to facilitate implementing EBP. These interventions have the potential to promote nursing practice change and enhance patient outcomes. Furthermore, Gifford et al. (2017) highlighted essential knowledge and skills related to leadership theory, EBP, current practices and implementation strategies to foster the development of implementation leadership behaviours and facilitate the EBP implementation process. However, no studies have investigated implementation leadership interventions with nurse managers in China, highlighting a significant gap in the literature. Given the unique cultural and contextual factors that may influence implementation leadership in the Chinese nursing context, previous studies may require adaptations to effectively meet the needs of nurse managers in China. Thus, there is a pressing need for further research to develop and test culturally tailored implementation leadership interventions for nurse managers in China, which can ultimately improve the quality of care provided to patients in Chinese healthcare settings.

1.1.3 EBP implementation and leadership in the Chinese nursing context

1.1.3.1 Current situation of EBP implementation in the Chinese nursing context

Since its introduction in 2001, the EBP approach has brought about a culture shift in Chinese nursing, moving clinical nursing care from an experience-based practice towards the integration of the latest research evidence and clinicians' expertise into clinical practice (Chang et al., 2014;

Zhao et al., 2022). The World Health Organization and World Bank published "Healthy China: Deepening Health Reform in China" in 2018, which highlights the accomplishments and lessons learned from decades of healthcare system reform in China (World Bank & World Health Organization, 2018). The report urged health care leaders in China to reassess the existing healthcare practice based on evidence-based principles, and called for respect for the professional perspective of clinical experts and the adoption of research-based evidence (World Bank & World Health Organization, 2018). To promote the implementation of nursing practice and science, China has established over 10 affiliated centers with the Joanna Briggs Institute (JBI) and seven Best Practice Spotlight Organizations (BPSO) (Joanna Briggs Institute, 2023; Registered Nurses' Association of Ontario, 2023). JBI is a renowned research institute that collaborates with healthcare professionals and researchers worldwide to advance evidence-based healthcare practices (Joanna Briggs Institute, 2023). The BPSO program is a certification provided by the Registered Nurses' Association of Ontario (RNAO) to healthcare organizations that have shown dedication to integrating RNAO's Best Practice Guidelines in their clinical practice, education, and research endeavors (Registered Nurses' Association of Ontario, 2023). Additionally, in the last 15 years, China has had the highest number of nursing trainees participating in the JBI Evidence-based Clinical Fellowship program outside of Australia (McArthur et al., 2020).

At the same time, researchers and clinicians in China are seeking ways to optimize patient care in an effective and efficient manner (Chen et al., 2018). In the last two decades, there has been an increasing number of studies aimed at implementing EBP in the Chinese healthcare context. Zhao et al (2022) conducted a scoping review on the EBP implementation

research progress in healthcare in China and their search yielded 309 papers. They found that the first study about EBP implementation in China was conducted in 2005, and 94.8 % of the included studies were published after 2013. Almost 95% of these studies came from the nursing field, with the most researched areas being symptom management (24.27%), tube care (14.89%), perioperative care (13.92%), and fundamental care (13.92%). The authors found that over 64% of the studies used a before-after design, with many measuring patient outcomes, but without any actual control being performed on patients, indicating a lack of experimental research designs (Zhao et al., 2022). One-third of the EBP implementation research utilized multidisciplinary approaches with point-of-care nurses, unit nurse managers, nursing directors, physicians, implementation researchers as the common team members. Very few studies described the involvement of knowledge users (e.g. patients) throughout the research process. Audit group meetings, discussions with key stakeholders, expert consultation, and brainstorming were the primary methods used to develop implementation strategies in Chinese EBP implementation projects (Zhao et al., 2022). However, concept mapping, group model building, conjoint analysis, and intervention mapping were seldom used. Education and training were the most frequently described implementation strategies for healthcare professionals and patients. Optimizing workflows and developing evaluation tools were the primary strategies adopted by organizations. Nearly 95% of the studies measured patient-level outcomes such as skin and subcutaneous tissue outcomes, and gastrointestinal outcomes. Only over half of the studies reported on healthcare professional behaviour changes, and less than 10% of them reported family member outcomes (e.g. satisfaction) and organizational outcomes (e.g. healthcare procedures, quality of care) (Zhao et al., 2022).

Notably, Zhao and others (2022) identified 21 facilitators for implementing EBP across organizational, healthcare professional and patient levels. The most significant facilitator was leadership support, which was consistent with a previous scoping review by Cheng et al. (2017) that examined EBP implementation in the Chinese nursing context. This suggests that nursing leadership support has consistently been recognized as an essential requirement for successful EBP implementation in China.

1.1.3.2 Chinese leadership is deeply rooted in the traditional Chinese culture

The traditional Chinese cultural system has a strong influence on the leadership style in China. Confucianism, Daoism, and Legalism are three main philosophies that are commonly accepted to have had uninterrupted impacts on Chinese society for more than two thousand years (Chai & Rhee, 2010; Chen & Lee, 2008; Ma & Tsui, 2015; Pan et al., 2011). These philosophies are highly recognized and have been deeply embedded in the Chinese people's worldviews and understanding of leadership, providing principles and tenets for leading the state and managing citizens (Chang, 2003; Ma & Tsui, 2015; Wong, 2001).

Confucius contributed substantially to Chinese philosophical humanism (Slote & De Vos, 1998). The primary concern of Confucianism is to promote a good society based on an ethical and effective government, harmonious human relations maintained by benevolence and consideration, and reciprocity within a hierarchical structure (Chai & Rhee, 2010). According to Confucianism, the most essential component of leadership is modeling, sharing, and inspiring (Farh & Cheng, 2000). Because followers learn by modeling their leaders' willingness to share and affiliations with each other, leaders behave in ways to stimulate and encourage followers

through proper conduct to obtain personal achievements (Li, 2014). Confucianism also emphasizes hierarchical relationships, emphasizing that followers must obey senior authorities while leaders must be benevolent and provide moral role models (Fu et al., 2007).

In the Daoist tradition, the Dao is regarded as the original unity and ultimate reality that precedes creation and reveals itself in all things (Farh & Cheng, 2000). This philosophy perceives all things as interconnected and inseparable from the same cosmic whole (Nadeau, 2012). While Confucianism emphasizes social order and worldly life, Daoism concentrates on harmonious natural order, tranquility, and a transcendental spirit (Pan et al., 2011). From the perspective of Daoism, the most essential component of leadership is harmony through respect and consideration because an intimate and harmonious relationship with the leader builds trust and respect in the followers (Wu et al., 2012). Leaders need to be decisive, demonstrating determination or firmness in dealing with incidents without bias to maintain good cooperative relationships, but Daoism also emphasizes solutions that draw on consideration and empathy for others rather than reliance on punishments and rules (Farh & Cheng, 2000).

Legalism is directly about leadership in establishing and implementing detailed policies and systems, and its exercise and preservation of power (Ma & Tsui, 2015). According to Legalism, the most essential component of leadership is its position for setting up standards, rules and strategies, because the role of a leader is to educate their followers on the standards and rules, and regulate their behaviours (Cheng, 2011). Legalism also emphasizes punishment when a person has knowingly broken the rules, and warnings to motivate followers to avoid mistakes and complete their missions (Cheng, 2011).

The modeling, sharing, and inspiring proposed in Confucianism, and the respect and consideration in Daoism with its emphasis on building a good relationship with followers, have similarities with leadership models originating in Western culture (Li, 2014). For instance, transformational leadership assumes that leaders can motivate followers to assume more responsibilities and achieve better work outcomes by articulating visions, establishing themselves as role models, showing individualized concerns for followers, building and sharing challenging goals, and stimulating followers' intellectual development (Ma & Tsui, 2015). However, there are also differences. For example, under a Confucian system, the status of an individual is based on their relationship with the group rather than individuality and equality in the law. Laws are enforced by rewards and punishments (Wu et al., 2012). Influenced by the legalist philosophy, leaders use formal authority (i.e., position) to influence followers which may involve demanding obedience and using punishment to dissuade subordinates from making mistakes (Farh & Cheng, 2000).

Emphasizing social harmony, collective obedience, and hierarchies, Chinese philosophies that influence the conduct of people in China have some profound differences with Western philosophies that posit individuals have the inherent right to pursue their own interests, be independent, and compete for status and resources (Fu et al., 2007). In contrast to Chinese cultural values, Western philosophies emphasis individual freedom, independence, and achievements, and competition is regulated by laws to maintain the order and stability of society (Fu & Tsui, 2003). Another difference between Western and Chinese styles of leadership is that Western leadership styles focus more on how a leader can inspire individuals to achieve goals whereas Chinese leadership styles focus more on obligations and fostering mutual

relationships within society (Chang, 2003). While Western leadership emphasizes individualism and independence, Chinese leadership emphasizes the collective and seeks to promote a sense of social cohesion and interconnectedness (Ma & Tsui, 2015).

Overall, Confucianism, Daoism, and Legalism philosophies within traditional Chinese culture influence how health care providers and the broader civil society understanding and practice leadership in the Chinese context. These ways of viewing the world are embedded in Chinese literature, education, and political institutions, and influence the basic conduct of people in China.

1.1.4 Knowledge gaps

Cheng et al. (2017) and Zhao et al. (2022) conducted reviews on the research progress on EBP implementation research in China, and their findings indicated that leadership support is a crucial element for achieving successful implementation of EBP in nursing. Among different levels of managers supervising nurses in hospital settings, unit nurse managers are in a key position to influence EBP implementation (Birken et al., 2018; Shuman, 2017; Williams et al., 2020). Moreover, as the role of advanced practice nurses has not been fully established in China, unit nurse managers are typically clinical experts in their units and do not have specific leadership or management training (Cheng et al., 2018). In addition, Chinese cultural practices and philosophies have a significant impact on the leadership and working environment in China (Farh & Cheng, 2000). For example, respect for hierarchy and harmony with others is highly emphasized, and leaders in management positions are typically granted the authority and perceived superiority to command the obedience and loyalty of subordinates within hierarchical

work environments (Cheng et al., 2018). Therefore, there is a need to enhance the implementation leadership of unit nurse managers to facilitate point-of-care nurses implement EBP in clinical nursing practice.

There have been numerous studies on developing nursing leadership worldwide. Two systematic reviews have been published to synthesize interventions for developing nursing leadership (Cummings et al., 2008, 2021). Cummings et al. (2008) included nine studies in the first review that examined the influence of leadership development programs and all reported significant positive influences on the observed leadership of nurses. The second review was an updated version of the first review and the authors found that leadership development programs had a positive impact on the leadership of nurses in 44 of the 49 studies (Cummings et al., 2021). However, these reviews primarily focussed on leadership development for point-of-care nurses (rather than nursing managers). The leadership needs and priorities of point-of-care nurses can be fundamentally different from that of nursing managers due to their different roles and responsibilities. Moreover, Cummings (2008, 2021) did not include qualitative data that could help reveal managers' perceptions of leadership programs. In addition, none of the two reviews synthesised the key components of the leadership development interventions. It is therefore important to synthesize the research evidence on interventions to improve the leadership of managers supervising nurses, including components of the interventions, impact of the interventions on improving leadership of managers, and managers' perceptions of participating in the interventions.

Two cross-sectional surveys on approximately 1300 nurse managers and 1100 point-of-care nurses from 64 hospitals in China revealed that nurse managers had positive attitudes

towards EBP, but they lacked EBP knowledge and seldom implemented EBP (Chen et al., 2020; Hu et al., 2021). The results of two qualitative studies also showed that Chinese unit nurse managers lacked the knowledge and skills necessary to lead EBP projects (Chen et al., 2020; Cheng et al., 2018). There is a clear need for an effective training program to enhance the implementation leadership of nurse managers. In 2016, a group of international scholars developed a theory-informed leadership intervention to implement evidence-based pain management practices in Shanghai, China (Hu et al., 2021). To my knowledge, this is the only intervention in China that focuses on the role of nursing leadership in promoting EBP implementation. The intervention focused on the leadership behaviours in the O-MILe. However, the team did not explore whether the implementation leadership knowledge, skills and behaviours specified in the O-MILe were acceptable among Chinese nurse managers, or whether the Chinese culture and nursing context had any influence on managers' implementation leadership practices. Therefore, there is a need to identify implementation leadership behaviours that are critical for unit nurse managers in China, and develop context-fitting interventions to enhance their implementation leadership to facilitate EBP implementation.

1.2 Purpose and objectives

The overall purpose of this study is to develop a prototype for an implementation leadership training program and prospectively assess its acceptability among unit nurse managers in Changsha, Hunan province, China. Specifically, the study aims to: 1) synthesize the existing evidence on leadership development interventions for managers supervising nurses; 2) describe the development process of a prototype for a Chinese context-specific training program to

enhance the implementation leadership of unit nurse managers; 3) assess the acceptability of the implementation leadership training program prototype as perceived by potential participants and deliverers.

1.3 Study design

This dissertation consists of multiple studies and methods.

1.3.1 Study One: A mixed-methods systematic review of interventions to improve leadership competencies of managers supervising nurses

In study one, I conducted a mixed-method systematic review to synthesis qualitative and quantitative evidence on interventions to improve the leadership of managers supervising nurses, including components of the interventions, influences of the interventions on improving leadership of managers, and managers' perceptions of participating in the interventions to provide recommendations for further leadership interventions development. Systematic reviews aim to provide a comprehensive, unbiased synthesis of many relevant studies in a single document using rigorous and transparent methods (Aromataris et al., 2020). Mixed methods systematic reviews (MMSR) can bring together the findings of effectiveness (quantitative evidence) and individuals' experience (qualitative evidence) to enhance their usefulness to decision-makers (Bressan et al., 2017). The core intention of MMSR is to combine quantitative and qualitative data (from primary studies) or integrate quantitative evidence and qualitative evidence to create a breadth and depth of understanding that can confirm or dispute evidence and ultimately answer the review questions posed (Lizarondo et al., 2020).

1.3.2 Study Two: Development of a training program prototype to enhance implementation leadership of Chinese nurse managers: A qualitative descriptive study

Study two follows an integrated knowledge translation (IKT) approach to develop the prototype of an implementation leadership training program for unit nurse managers in a tertiary hospital in Changsha, Hunan Province China. Similar to other collaborative research approaches (Nguyen et al., 2020), an IKT approach involves researchers working collaboratively with knowledge users to coproduce knowledge for the optimisation of healthcare delivery systems and improvements in health system performance and associated outcomes (Graham et al., 2018; Rycroft-Malone et al., 2016; Straus et al., 2013). An IKT approach to co-production was chosen because of its focus on increasing knowledge use and impact, and its ability to be applied pragmatically. I also applied the qualitative descriptive design to acquire an in-depth understanding of the development of the training program prototype from the perspective of various levels of nurse managers in the participated hospital.

1.3.3 Study Three: Chinese nurse managers' perceptions of the prospective acceptability of a co-developed prototype for an implementation leadership training program: A qualitative descriptive study

Study three concerns the assessment of the prospective acceptability of the training program prototype. This involves measuring the level of acceptability before its initiation to identify any problematic aspects that need to be addressed before delivery (Sekhon et al., 2021). I explored the viewpoints of both potential program participants and deliverers to identify any potential issues in delivering and participating in the program, and make necessary modifications to the prototype before it is fully launched. This comprehensive approach ensures that the program

aligns with the leadership development needs of potential participants while also increasing the willingness of deliverers to participate in its delivery (Sekhon et al., 2021). I applied the qualitative descriptive study design to generate a descriptive summary of the information for adapting the program, and to facilitate a comprehensive exploration of the training prototype's acceptability in the Chinese nursing context (Sandelowski, 2010).

1.4 Researcher positionality statement

Positionality refers to the position that a researcher has chosen to adopt within a given research study (Savin-Baden & Major, 2013). In this section, I outlined how my positionality informed the way I conducted this study, focusing on two key aspects: 1) my experience as a nursing researcher from China, and 2) my study experience in the field of implementation leadership.

My focus on unit nurse managers stems from my research experience during my graduate studies as a Master of Science in Nursing (MScN) in China. In 2016, the Chinese National Health Commission's Human Health Resources Development Center (HHRDC) initiated a national investigation into the professional activities of unit nurse managers to clarify their roles and responsibilities (Zhang et al., 2017). As an MScN graduate student, I assisted the HHRDC researchers with the investigation in Hunan province, which involved conducting a survey with 32 unit nurse managers and interviewing five nursing directors in five public hospitals. We discovered that unit nurse managers performed 86 professional activities in their daily work, ranging from monitoring the quality and safety of patient care to managing financial and human resources and work environment, and interprofessional networking (Zhang et al.,

2017). These findings inspired me to focus my master's research on surveying over 1200 unit nurse managers in 50 public hospitals in Hunan province to explore their perceptions of the frequency and importance of the 86 identified professional activities (Chen et al., 2021). Through these investigations, I gained a deep appreciation of the critical role that unit nurse managers play in leading and influencing clinical nursing practice. Additionally, those investigations created opportunities for me to build connections with the nursing directors in the participating hospitals.

My experience during the PhD study helped me determine my research topic and methods. Since 2017 when I started my PhD journey at the University of Ottawa, I have been reading literature relating to EBP implementation and nursing leadership under the guidance of my supervisor whose expertise is implementation leadership. I have also attended relevant courses and conferences, and communicated with scientists in the field. My supervisor's projects on developing leadership among unit nurse managers to lead point-of-care nurses in using evidence to improve patient care quality, including a study in mainland China, have also inspired me in many ways, including the research population and research methods. Through these experiences, I gained a deeper understanding of the crucial role of EBP implementation in enhancing clinical nursing practice, as well as the key responsibilities of unit nurse managers in leading the implementation process. Additionally, during my PhD training, I learned about the idea of integrated knowledge translation, which helped me recognize the power of engaging knowledge users in the research process to generate relevant and accessible knowledge products.

In general, these experiences influenced both the direction of my PhD and the research process. Specifically, they influenced: 1) the scope of my PhD research; 2) the target population (unit nurse managers) of my research; 3) the theoretical frameworks chosen to inform the implementation leadership training program prototype development (see Chapter 3); 4) my decision to adopt the integrative knowledge translation approach to guide the co-development of the training program prototype with knowledge users (see Chapter 3); 5) my choice to assess the prospective acceptability of the program as perceived by knowledge users (see Chapter 4).

1.5 Structure of the dissertation

In this chapter, I have described the literature in the field of implementation leadership, clarified the knowledge gaps, illustrated the purpose, objectives, and methods of my dissertation, and presented my researcher positionality statement. Chapters 2-4 contain the three manuscripts that present the three interrelated research studies of this dissertation and Chapter 5 contains the integrated discussion of the dissertation findings. Please see the structure of the dissertation outlined in Table 1.1.

Table 1.1 Manuscript-based dissertation structure and content

Chapter	Objectives of the Chapter	Study design	Manuscript
Chapter 1: Introduction	To describe the research problem, study purpose, objectives, and overview of methods, positionality statement, and the outline for this manuscript-based dissertation.	-	-
Chapter 2: Systematic review of	To synthesize the existing evidence on leadership	Systematic review	Published: Chen, W., Modanloo, S., Graham D., I., Hu, J., Lewis, K. B., & Gifford, W. (2022). A mixed-methods

leadership development interventions for managers supervising nurses	development interventions for managers supervising nurses.		systematic review of interventions to improve leadership competencies of managers supervising nurses. Journal of Nursing Management, 30, 4156–4211. https://doi.org/10.1111/jonm.13828
Chapter 3: Prototype development of the implementation leadership training program	To describe the development process of a prototype for a Chinese context-specific training program to enhance the implementation leadership of unit nurse managers.	Qualitative descriptive design	The manuscript is drafted for submission to the Implementation Science
Chapter 4: Acceptability of the implementation leadership training program prototype	To assess the prospective acceptability of the implementation leadership training program prototype as perceived by potential participants and deliverers.	Qualitative descriptive design	The manuscript is drafted for submission to the Worldview on Evidence-Based Nursing
Chapter 5: Integrated discussion	To integrate the dissertation findings and discuss implications for nursing practice and future research.	-	-

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Chapter 2: A mixed-methods systematic review of interventions to improve leadership competencies of managers supervising nurses

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In Chapter one, I introduced the background and rationale of the present research, along with the purpose and objectives, research design, and my personal experiences that influenced the research direction and methods. In this chapter, a mixed-methods systematic review was conducted to synthesize evidence on the current leadership development interventions for managers who supervise nurses. This review explored the interventions' components, their impact on managers' leadership competencies, and the managers' perceptions of participating in these interventions.

Abstract

Aim: This study aimed to synthesize evidence on interventions to improve leadership competencies of managers supervising nurses.

Background: In recent years, numerous interventions have been developed to improve the leadership competencies of managers supervising nurses. However, researchers and nursing leaders are unclear about what aspects of interventions are effective for developing which competencies.

Methods: We conducted a mixed-methods systematic review following the Joanna Briggs Institute (JBI) approach for evidence synthesis. The Medline (Ovid), CINAHL, Embase, Scopus, Nursing and Allied Health Database were reviewed. Data extraction, quality appraisal and narrative synthesis were conducted in line with Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines.

Results: A total of 69 studies (35 quantitative, 22 mixed-methods, 12 qualitative) evaluating 68 interventions were included. Studies showed that interventions used multi-modal activities such as lectures, group work, and mentoring generally had positive effects on improving leadership competencies such as supporting, developing and recognizing nurses. Opportunities to interact with peers increased managers' engagement in the interventions, however many barriers existed for managers to use the competencies in practice including understaffing, insufficient time, and lack of support from supervisors and staff.

Conclusions: Leadership interventions were shown to have beneficial effects on developing different competencies. Managers predominately felt positive about participating in leadership interventions however they expressed many difficulties applying what they learned in practice.

Implications for nursing management: Leadership interventions should include multi-modal activities that give managers opportunities for interaction. When considering interventions for developing the leadership of managers, it is imperative to consider the practice environments for managers to be successful in applying the competencies they learned in practice.

Keywords: Intervention; Leadership competencies; Nurse managers; Systematic review

2.1 Background

Leadership is "the process of influencing others to understand and agree about what needs to be done and how to do it, and the process of facilitating individual and collective efforts to accomplish shared objectives" (p. 8) (Yukl, 2006). It concerns inspiring, motivating, counseling, and coaching members of a team while modeling, delegating, and cultivating a productive learning environment to enable followers to achieve organizational goals (Graham, 2003). Leadership has been widely studied in many disciplines, ranging from management, business, education, to health sciences (Cummings et al., 2008). Nursing leadership has particularly faced increased challenges due to ongoing problems such as staff shortages, heavy workloads and lack of resources (World Health Organization, 2020). According to the World Health Organization (2020), there is a global shortage of over nine million nurses including nursing leaders, making the Sustainable Development Goal meant to promote well-being for all ages by the year 2030, unattainable. In addition, leadership challenges in nursing have increased dramatically with the ongoing COVID-19 pandemic (Wymer & Stucky, 2021). Studies in Canada, China, Australia, and the US, to name a few, have shown that point of care nurses during the COVID-19 pandemic experienced higher levels of stress and burnout that resulted in trauma, job dissatisfaction, higher rates of turnover, and subsequently lower quality of patient care (Chen et al., 2021; International Council of Nurses, 2021; Jalili et al., 2021). With the COVID-19 pandemic accentuating the long-standing challenges in clinical settings, strong nursing leadership is imperative to manage and protect point-of-care nurses, thus supporting them to provide high-quality patient care (Daly et al., 2020; Rosser et al., 2020).

Managers that supervise nurses in clinical settings are predominately nurses but may

include other health care professionals such as physicians or other health care providers (Chase, 2010). They can work at both senior or unit levels while overseeing the delivery of patient care, management and budgetary decisions, shift schedules, and the coordination of meetings (Chase, 2010). At the senior level, managers participate in organizational-level decision-making processes that influence nursing practice (Huston, 2008; Laschinger et al., 2014) while unit level managers supervise patient flow and staffing, ensure high-quality nursing practice, and provide opportunities for clinical nurses to improve the overall delivery of health services (Wong et al., 2013).

Leadership competencies are a combination of leadership knowledge, skills, and abilities to influence staff achieve particular organizational goals (Hollenbeck et al., 2006). Leadership knowledge refers to the theoretical or practical understanding of leadership acquired through experience or education, whereas skills are the use of knowledge in execution or performance, and ability is the capacity to perform a skill (Connelly et al., 2000; Lord & Hall, 2005; Yukl, 2012). Leadership competencies have been shown to influence staff's work engagement (Manning, 2016), job satisfaction (Abualrub & Alghamdi, 2012), organizational commitment and retention (Hayes et al., 2012). Strong leadership competencies have also been associated with better financial performance of healthcare organizations (Brewer et al., 2016), better use of evidence in practice (Gifford et al., 2018), and improve patient outcomes such as patient safety and satisfaction with care (Wong, 2015).

Researchers and policymakers globally spend a considerable amount of time and resources on developing leadership competencies of healthcare personnel. In our preliminary search of the literature, we found only two systematic reviews that synthesised interventions

for developing nursing leadership. One identified nine studies in 2008 (Cummings et al., 2008), and the another one was conducted in 2021 as an updated version of the same review (Cummings et al., 2021) and included 49 studies. The 2021 review showed a growing attention to leadership development in nursing over the last decade and demonstrated that the majority of interventions had positive effects on leadership development. However, these reviews did not focus specifically on developing the leadership of managers who have different leadership requirements than point-of-care nurses. Rather, most of the studies in the reviews targeted the leadership of point-of-care nurses in the provision of patient care (Cummings et al., 2008, 2021). The leadership needs and priorities of managers can be fundamentally different due to their differing roles and responsibilities. Furthermore, these reviews did not report on how managers perceived the interventions, nor did they include qualitative data to understand managers' perceptions more deeply. To develop leadership interventions for nursing managers, it is important to understand the effectiveness of the interventions in addition to which aspects of interventions worked well (or not) for developing different leadership competencies.

Leadership theorists have outlined important differences between leadership and management. For example, it is postulated that leadership is oriented toward change and long-term goals, whereas management focusses on stability and short-term efficiency (Liphadzi et al., 2017; Toor et al., 2008). In this study we have focused on leadership of managers and adopted a definition that includes elements of management such as task-oriented behaviours that focus on efficiency, in addition to relational- and change-oriented behaviours that aligned more with classic definitions of leadership (Yukl, 1999). Within the conceptualization of leadership, managers can accomplish both short-term and long-term goals.

We conducted a mixed-methods systematic review to synthesize the research evidence on interventions to improve the leadership of managers supervising nurses. The specific objectives were to: 1) identify the components of leadership interventions; 2) explore the influences of the interventions on improving leadership competencies, and 3) understand managers' perceptions of participating in these interventions.

2.2 Methods

2.2.1 Design

We conducted a mixed-methods systematic review following the Joanna Briggs Institute (JBI) Manual for Evidence Synthesis (Aromataris et al., 2020). The JBI manual provided guidance for conducting and preparing systematic reviews and synthesizing evidence (Aromataris et al., 2020). This review was reported according to Preferred Reporting Items for Systematic Review and Meta-Analysis (PRISMA) criteria (Page et al., 2021). The protocol was registered at International Prospective Register of Systematic Reviews (CRD42020163734).

2.2.2 Inclusion and Exclusion Criteria

We used the following criteria for study inclusion.

Population: Senior and unit managers supervising nurses. Senior managers include nurse executives or directors who are responsible for the management of multiple nursing units, teams, or healthcare settings (e.g., acute care hospitals, urgent care centers, rehabilitation centers, nursing homes or long-term care facilities, outpatient centers, etc.), with one or more managers reporting to them. Unit managers include head nurses, ward sisters, clinical managers, or nurse supervisors who are responsible for managing a nursing unit or a

team of point-of-care nurses (Gunawan et al., 2018). We excluded studies where 1) more than 50% of intervention participants were not managers supervising nurses, or 2) the managerial role of participants was not explicitly identifiable.

Interventions: Any interventions aimed at developing or improving the knowledge, skills or abilities (i.e., leadership competencies) of managers supervising nurses, such as training, workshops, mentoring, and coaching.

Comparison: If present, comparators included another intervention, or a non-exposed control group if any. Intervention studies with no comparator were included.

Outcomes: Leadership knowledge, skills, or abilities as outcomes, or managers' perceptions of or experiences with their participation in an intervention. Studies that only reported on organizational or patient outcomes were excluded.

Study Designs: We included: 1) Quantitative studies that used experimental designs (e.g., randomized controlled trial), quasi-experimental designs that lacked full control or randomization (e.g., non-randomized controlled trials, pre-post studies), and non-experimental designs (e.g., cross-sectional survey); 2) Qualitative studies (e.g., interviews, focus groups, observations); 3) Mixed-methods studies that combined elements of both qualitative and quantitative research approaches (e.g., survey with interview data collection) (Johnson et al., 2007). We excluded systematic reviews and meta-analyses.

Other: We included peer-reviewed, published full-text articles. Theoretical papers, books and book chapters, letters, dissertations, editorials and study protocols were excluded.

2.2.3 Search Strategy

In consultation with a health sciences librarian, we developed the search strategy (see Appendix 2.1). A three-step approach was used to search for eligible studies. First, we conducted an initial search in the Medline (Ovid) database. Second, we used the identified keywords according to MeSH terms to search in Medline (Ovid), CINAHL, Embase, Scopus, Nursing and Allied Health, from their date of inception to June 28, 2022. Finally, the reference lists of selected studies from the first and second searches, and the included studies by Cummings et al. (2008, 2021) were reviewed and examined for additional studies. There was no language restriction.

2.2.4 Study Screening and Selection

Three independent reviewers screened the titles and abstracts for eligible studies using Covidence systematic review software (v2422) (Veritas Health Innovation, 2016). Full texts of potentially eligible studies were reviewed independently by two reviewers. Any disagreement between the two reviewers was resolved through discussion with a senior reviewer.

2.2.5 Quality Assessment

Two independent reviewers assessed the methodological quality of included studies. As recommended by JBI we used the Mixed Methods Appraisal Tool (MMAT) for the mixed-methods studies (Souto et al., 2015). We chose to use a numerical rating system for quality assessment that is not present in JBI tools, so we used the McMaster Critical Review tool for quantitative and qualitative studies (Law et al., 1998; Letts et al., 2007). We adopted a scoring system used in previously published systematic reviews (Gifford et al., 2018, 2021). For each

article, a rating score was derived by taking the number obtained in the quality rating and dividing it by the total number of possible points allowed, giving each manuscript a total quality rating between 0 and 1. Studies were then classified as weak (0–0.25), weak-moderate (0.26–0.50), moderate (0.51–0.75), or strong (0.76–1.0).

2.2.6 Data Extraction

A data extraction spreadsheet was developed and iteratively refined after pilot testing one quantitative, qualitative, and mixed methods study (n=3 in total) to ensure data extracted reflected the objectives of the review. One reviewer extracted data from all included articles, a second reviewer verified the accuracy, and a third reviewer resolved discrepancies. Data were extracted on publication year, country, research design, setting, data collection methods, sample size, participant characteristics, intervention components, and study outcomes. Details about the components of the interventions were extracted into categories of the aims, ingredients, mechanisms, delivery (AIMD) framework (see details in Appendix 2.2) that encompasses the following four domains: (1) Aims (what the intervention is intended to achieve and for whom); (2) Ingredients (what comprises the intervention); (3) Mechanisms (how the intervention is proposed to work); and (4) Delivery (how the intervention is delivered) (Bragge et al., 2017). The AIMD framework was developed to enhance understanding of how interventions work to inform healthcare practices and policies (Bragge et al., 2017).

2.2.7 Data Synthesis

We conducted a narrative data synthesis to produce a summary from a wide range of research designs (Popay et al., 2006). We were not able to conduct a meta-analysis since there were too

few studies with the same study design, interventions, and outcomes to aggregate. Instead, we tabulated the characteristics of included studies in Excel and descriptively synthesized data on interventions and outcomes. To summarized components of the interventions we coded data into categories of the AIMD framework, and inductively developed themes within each domain as they emerged from the studies. To describe the intervention aims, we differentiated between the development of knowledge, skills or abilities.

We grouped outcomes into categories based on Yukl's Hierarchical Taxonomy for leadership behaviours (Yukl, 2012). We chose this taxonomy because it describes the leadership behaviours to effectively influence staff which requires leadership knowledge, skills and abilities. Yukl's (2012) taxonomy is supported by a plethora of research evidence and has been validated globally. The taxonomy consists of four domains: 1) task-oriented, 2) relation-oriented, 3) change-oriented, and 4) external leadership behaviours, with 15 specific leadership behaviours distributed throughout the domains (See detailed descriptions in Appendix 2.3). We deductively categorized leadership outcomes into the four domains and inductively created new domains if data did not fit into the taxonomy. For example, a domain was created for the outcome "overall leadership". We applied the following classification system based on analysis of outcomes: statistically significant increased (+), no statistically significant change (0), statistically significant decreased (-), and improvements based on qualitative data (Q+). We also created a category to capture participants' perceptions of participating in the leadership interventions.

2.3 Results

2.3.1 Search results

Our search strategy generated 9408 potentially relevant records. Upon removing the duplicates, 510 articles met the eligibility criteria for full-text screening. A total of 73 articles were included in this study, representing 69 studies (35 quantitative studies, 22 mixed-method studies, 12 qualitative studies), reporting on 68 interventions. The main reasons for full-text screening articles being excluded were interventions not targeted toward managers supervising nurses (n=202, 47%), they were not empirical studies (n=154, 36%), or did not involve leadership interventions (n=52, 12%). See figure 1 for Prisma diagram.

2.3.2 Characteristics of included studies

We included 35 qualitative studies (51%), two (3%) randomized control trials (RCTs) (reference number 58, 62 in Table 2.1), and the remainder quasi-experimental designs (i.e., pre- /post-intervention, n=30, 43%) or observational designs (i.e., cross-sectional studies, n=3, 4%). All quantitative studies used surveys to collect data (Characteristics of included studies are shown in Table 2.1). Twenty-two studies used mixed-methods designs with surveys, interviews, group discussions, or written comments for data collection. The qualitative studies (n=12, 17%) employed interviews, focus groups document review, and observation to collect data. Sixteen studies (23%) applied both self-and observer-assessment (e.g., nurse administrators, point-of-care nurses) methods; the remainder of studies used self-assessment.

Included studies were conducted in 21 different countries such as the US (n=26, 38%), the UK (n=8, 12%), Sweden (n=5, 7%), and Australia (n=5, 7%). Studies had diverse healthcare settings. The majority were set in acute care hospitals (n=33, 48%), six were in nursing homes or long-term care facilities (9%), and five were in community hospitals (7%). The total number

of managers in each study ranged from 5 to 731. The study participants, including senior managers such as nursing directors, administrators, facility heads, care home managers, and point of care managers (e.g., head nurses, ward sisters, unit managers, charge nurses), all had a formal leadership position. There were two interventions evaluated in two studies; for example, the American Organization of Nurse Executives (AONE) Nurse Manager Fellowship (NMF) was evaluated in two studies by Mackoff et al. (reference number 36, 37 in Table 2.1). Studies by Cooper (reference number 7 in Table 2.1) and Hancock et al. (reference number 22 in Table 2.1) implemented and evaluated the Leading an Empowered Organisation program (LEO). Skytt et al. (reference number 61 in Table 2.1) evaluated two interventions (i.e., training programs and self-development programs) in one study. The remainder of the interventions were evaluated in one single study each.

2.3.3 Methodological quality assessment

As presented in Table 2.1, quality assessments for the two experimental studies were moderate (reference number 58, 62 in Table 2.1). Thirteen (43%) of the 30 quasi-experimental studies were assessed as weak to moderate, and seven and nine studies were rated as weak and moderate, respectively. Only one study was rated as strong. The three observational studies were assessed as moderate (n=1) and weak to moderate (n=2). Of the 22 mixed-methods studies, eight were rated as strong, five as moderate, and another nine as weak to moderate. For the qualitative descriptive studies, ten were rated as moderate and two as weak to moderate. Weaknesses in methodological quality assessments varied according to the study design, with issues in quantitative studies predominately related to intervention integrity, outcome assessor(s) awareness of the intervention, and numbers and reasons for dropouts or

withdrawals from the study. In the mixed-methods studies, weaknesses involved lack of clarity on integrating qualitative and quantitative components, and no clear rationale for using a mixed-methods design. In the qualitative studies, quality assessment concerns involved the inadequate reporting of theoretical perspectives, roles and positioning of researchers and their relationship with participants.

2.3.4 Intervention aims and ingredients

The duration of interventions ranged from one-day of shadowing (reference number 31 in Table 2.1) to a three-year multi-faceted program (reference number 8 in Table 2.1). The overarching aims of the interventions were to improve leadership knowledge (n=34, 49%), and skills and/or abilities (n=64, 93%). We identified eight different ingredients in the interventions: in-person lectures (n=53, 77%), discussion groups (n=46, 67%), coaching or mentoring (n=23, 33%), reading materials (pre-lecture + reading alone) (n=18, 26%), self-reflection, mindfulness or journaling (n=13, 19%), online learning modules (n=13, 19%), peer support (n=9, 13%), and role-playing scenarios (n=8, 12%). The vast majority of the interventions (n=57, 83%) were multi-modal, meaning more than one type of ingredient was used. No studies compared the difference between the single-modal and multi-modal activities in interventions. Aims and ingredients of the interventions are presented in Table 2.2.

2.3.5 Study outcomes

In total, 62 studies (90%) reported at least one task-oriented, relations-oriented, change-oriented or external leadership outcome (Yukl, 2012). Forty-nine (71%) showed positive influences of the intervention on at least one leadership outcome. From the 48 quantitative or

mixed-methods studies, 69% (n=33 studies) reported a statistically significant positive effect. The two included experimental studies (reference number 58, 62 in Table 2.1) both showed positive effects on developing managers' competencies of supporting, developing and recognizing point-of-care nurses.

Various standardized scales were used to measure leadership outcomes, of which the Nurse Manager Inventory Tool (n=7) and Leadership Practices Inventory (n=6) most frequently used. Relation-oriented leadership outcomes were reported in 85% (n=53 studies) studies and were the most frequently reported among the four leadership domains. External leadership outcomes were the least reported with only 19 studies (31%) evaluating external leaders. Only nine studies (15%) evaluated outcomes from all four domains of leadership (reference number 7, 9, 20, 48, 50, 51, 56, 64, 67 in Table 2.1). Thirty-three studies reported "overall leadership" outcomes with 76% of these showing a positive influence. In addition, thirty-six studies reported managers' perception of interventions.

See Table 2.2 for leadership outcome, and Appendix 2.4 for data collection instruments with descriptions of outcomes. Description of managers' perceptions of the interventions are presented in Table 2.3.

2.3.5.1 Relation-oriented leadership outcomes

Of the 53 studies evaluating relation-oriented leadership outcomes, 'supporting' (n=43 studies, 81%) was the most frequently reported outcome. Supporting included acquiring qualities or skills such as sincerity, honesty, resiliency, or interpersonal relations (reference number 7, 11, 49, 50, 58, 62, 64, 66, 69 in Table 2.1), behaviours to build teams (reference number 9, 16, 17,

29, 30, 34, 39, 43, 53, 65, 67 in Table 2.1), coaching or mentoring (reference number 34, 36, 37 in Table 2.1), creating supportive environments such as managing conflict (reference number 6, 20, 25, 35, 46, 49, 53, 56 in Table 2.1), supporting diversity (reference number 16, 17, 43, 51, 64 in Table 2.1), and role modeling (reference number 3, 5, 7, 9, 13, 30, 39, 41, 47, 52, 59 in Table 2.1). Just over half of the studies (55%) reported the interventions had a positive influence on improving supportive leadership outcomes. Two third of the studies (n=36, 68%) reported on empowering leadership behaviours as an outcome that were related to communication (reference number 2, 11, 20, 22, 25, 31, 36, 37, 46, 48, 49, 50, 62, 64, 66, 67 in Table 2.1), shared decision-making (reference number 7, 16, 17, 22, 35, 43, 49, 51 in Table 2.1), and enabling others (reference number 7, 13, 34, 37, 39, 41, 52, 59, 60, 67 in Table 2.1) or delegating within the organization (reference number 20, 46, 62 in Table 2.1). Sixty nine percent (n=25) reported the intervention had a positive effect on empowering outcomes.

2.3.5.2 Task-oriented leadership outcomes

Thirty-nine studies reported task-oriented leadership outcomes, with the majority of them related to 'planning' (n=23 studies, 59%) and 'monitoring' (n=21 studies, 54%) such as financial management (reference number 16, 17, 42, 43, 44, 51, 57 in Table 2.1), human resource management (reference number 16, 17, 20, 43, 51, 54, 57 in Table 2.1), strategic management and assessment (reference number 1 5, 10, 16, 17, 43, 50, 51 in table), staff performance and unit management (reference number 7, 9, 16, 17, 20, 43, 51, 57, 66, 67, 69 in Table 2.1), and feedback and reflective practice (reference number 16, 17, 43, 51, 66, 68 in Table 2.1). Nearly two third (n=25) of the 39 studies reported a positive effect on task-oriented leadership outcomes. The study by Cunningham and Kitson (reference number 9 in Table 2.1) was the only

one to report a statistically significant negative influence of the intervention on monitoring behaviours (i.e., active management-by-exception). Eight studies (21%) evaluated "clarifying" behaviours that involved clarifying skills (reference number 19, 34, 46 in Table 2.1), articulating individual and organizational goals (reference number 7, 46, 65 in Table 2.1), increasing the understanding of contexts (reference number 52, 56 in Table 2.1), and differentiating leadership and management (reference number 48 in Table 2.1). Seven of the eight studies (88%) reported a positive influence (reference number 7, 34, 46, 48, 52, 56, 65 in Table 2.1). Nine studies (reference number 2, 6, 12, 20, 22, 48, 65, 67, 68 in Table 2.1) (23%) evaluated problem-solving abilities, with five of them showing a positive influence (reference number 2, 12, 20, 22, 68 in Table 2.1).

2.3.5.3 Change-oriented leadership outcomes

Thirty-five studies evaluated change-oriented leadership outcomes. 'Encouraging innovation' (n=25, 71%) is the most reported outcome. Seventeen of these 25 studies (68%) reported positive change. 'Encouraging innovation' encompassed acquiring relevant knowledge and skills for conducting research or evidence-based practices (reference number 30, 36, 37, 40, 46, 57 in Table 2.1), developing foundational thinking skills (reference number 16, 17, 43, 51 in Table 2.1), being willing to challenge the routine process (reference number 3, 7, 13, 39, 41, 52, 59 in Table 2.1), and taking risks (reference number 22, 64 in Table 2.1). Only three studies (9%) evaluated outcomes related to 'facilitating collective learning' (reference number 37, 46, 56 in Table 2.1) and all reported a positive influence.

2.3.5.4 External leadership outcomes

Of the 19 studies reporting on the external dimensions of leadership as an outcome, the majority (n=12, 63%) addressed 'networking' that involved developing interprofessional relationships (reference number 6, 51, 55, 56, 57, 64 in Table 2.1), pursuing external networks and support (reference number 7, 9, 34 in Table 2.1) and engaging key external stakeholders (reference number 33, 37 in Table 2.1). Two third (n=8 studies) of these 12 studies reported positive effects of the interventions on 'networking'. Nine studies (47%) evaluated outcomes related to external monitoring (e.g., acquiring information on the healthcare system, nursing legislation, or policies), with four of these (21%) reporting positive change (reference number 9, 20, 50, 61, 67 in Table 2.1). One study (5%) reported outcomes related to being a spokesperson for their nursing unit to represent their organization (reference number 50 in Table 2.1).

2.3.5.5 Perceptions of intervention

As shown in Table 2.3, just over half the studies (n=36, 52%) evaluated managers' perceptions of the intervention, which included the acceptability and feasibility of the intervention content and delivery methods (reference number 6, 7, 16, 21, 23, 27, 34, 38, 39, 41, 46, 52, 54, 61, 67 in Table 2.1), the importance and usefulness of the intervention (reference number 5, 7, 10, 14, 29, 32, 35, 48, 51, 65 in Table 2.1), satisfaction (reference number 12, 23, 24. 32, 39, 40, 49, 56, 60 in Table 2.1), and managers' attitudes towards implementation of the intervention in their facilities (reference number 15, 16, 27, 31, 39, 53 in Table 2.1). All studies used qualitative data and most reported that participants felt positively about the interventions. Group work (e.g., leadership projects development, discussions) (reference number 16, 32, 38, 51 in Table 2.1), mentoring (reference number 7, 24, 38, 52 in Table 2.1), self-reflection (reference number 6, 14, 24 in Table 2.1), and peer support (reference number 10, 31, 35, 52, 60 in Table 2.1) were

perceived as particularly helpful strategies for developing leadership. Managers reported that interactions with peers and networking were important, and group-based activities created a safe and trusting atmosphere for sharing and learning from peers (reference number 10, 32, 35, 48 in Table 2.1). Participants identified the support of their supervisors and point-of-care nurses as important (reference number 23, 68 in Table 2.1). Only four studies (7%) reported participants had negative perceptions towards the intervention (reference number 7, 14, 21, 61 in Table 2.1). For example, Greenwood and Parsons (reference number 21 in Table 2.1) reported that participants felt there was an overwhelming number of theoretical materials, and that mentors lacked skills and did not inspire trust with them. Cooper (reference number 7 in Table 2.1) reported that managers perceived parts of the intervention did not have relevance to their work, including networking and the importance of articulating goals to point-of-care nurses.

Four studies (reference number 21, 22, 41, 52 in Table 2.1) reported the barriers or facilitators to performing the competencies managers learned in the interventions. Barriers included organizational level issues such as understaffing and heavy workloads which led to participants not having enough time to enact the leadership competencies they acquired in the intervention. Individual level barriers included lack of confidence in performing the competencies learned, and ineffective communication between managers and point-of-care nurses (reference number 21, 22, 41, 52 in Table 2.1). Facilitators to enacting the leadership competencies learned in the interventions included: maintaining effective relationships with experienced and knowledgeable colleagues, autonomy, and support from senior managers (reference number 22,41 in Table 2.1).

2.4 Discussion

We identified 69 studies that reported on outcomes of 68 leadership interventions for managers supervising nurses. Interventions targeted managers at the point of care such as unit managers and charge nurses as well as senior-level managers such as administrators or facility directors. We found considerable heterogeneity concerning intervention design, duration, aims, ingredients, evaluation methods, and outcomes. The most frequently used approaches in the interventions were in-person course-based lectures and group formats. Overall, nearly three-quarters (n=49) of all studies in our review reported that the interventions had positive influences on leadership outcomes. Over two-thirds (n=33) of the quantitative data from both quantitative and mixed-methods studies reported statistically significant positive effects. Relations-oriented leadership outcomes, such as supporting and empowering, were the most commonly reported dimensions of the leadership. Qualitative results showed that managers predominately perceived the interventions favourably and were satisfied with their experiences participating in them.

While our review showed beneficial effects of leadership interventions on outcomes measured, findings must be interpreted with caution as much heterogeneity existed. Similar to Cummings et al's (2008, 2021) reviews, the majority of quantitative studies (93%) did not use experimental study designs; rather most adopted one group pre/post or post-only intervention design and therefore results can not be attributed to the intervention alone. In addition, self reporting was the most used in data collection with only a quarter of studies using observer-assessment approaches. A previous study showed that self-reporting of leadership

competencies by nurse managers tended to be more positive than if ratings were done by their staff or subordinates (Goh et al., 2018).

A unique aspect of our review is that we included qualitative data to understand managers' perceptions and experiences of the leadership interventions with over half of all studies incorporating qualitative data. When asked, all managers reported positive influences of the interventions on leadership behaviours described within the Yukl (2012). For example, studies demonstrated that after participating in the interventions, managers recognized the importance of role modeling (Clarke et al., 2012), became better at managing teams (Cunningham & Kitson, 2000; Kabinga-Makukula, Lyambai, Wahila, & Mwape, 2019; Marath & Ramachandra, 2015; Menegaz & Fontes, 2020; Spiva, Case-wirth, & Hogue, 2020) and more active in promoting professional and individual development of staff (MacKoff et al., 2017; Penney & Ryan, 2018; Vitello-cicciu et al., 2014). These findings are consistent with a study by Gentry et al. (2014) that described the closer an intervention is aligned to the specific developmental needs of managers, the more effective it will be in achieving desired individual and organizational outcomes.

Research has shown that the methods and processes in which the leadership interventions are delivered are an important aspect of how they are received, interpreted and applied to leadership practices (Ayeleke et al., 2019; Cleary et al., 2020). Our review found that interventions mainly delivered their content through in-person lectures and group work, a finding that is consistent with previous reviews showing in-person lectures and seminars commonly used these approaches for improving leadership knowledge, skills and abilities (Frich et al., 2015; Galuska, 2014; Straus et al., 2013)

Findings from our review showed an increasing number of studies evaluated leadership interventions for nursing managers in the last decade, and most of the interventions included two or more ingredients such as coaching, mentoring, and self-reflection. This differs from Cumming et al's (2008) review that found all studies used lecture formats as their primary ingredient. In comparison, another systematic review revealed that multi-modal activities that include lectures and seminars have the potential to support learning, and acquiring new leadership knowledge and skills (Frich et al., 2015). Similar to our findings, previous reviews showed that multi-modal activities in leadership interventions such as action learning, providing feedback, and self-development projects could improve healthcare professionals' abilities to deal with increased levels of complexity in healthcare settings (Cleary et al., 2020; Frich et al., 2015; Hartley & Hinksman, 2003). Even though no studies in our review compared differences between single-modal and multi-modal interventions, more interventions applied multi-modal activities suggesting that multi-modal activities may be more effective in improving leadership of managers. No studies in our review explored the effectiveness of specific ingredients with an intervention on improving leadership competencies. However, qualitative results showed that managers perceived that group work, mentoring, and peer support were important ingredients as they provided opportunities for interactions with and learning from peers. Interactions with peers was additionally shown to help managers realize that they were not alone in facing leadership challenges and generated a sense of community and belonging (Galuska, 2014), thus increasing their willingness to participate in leadership development activities.

We identified multiple barriers for managers performing the competencies they learned in the interventions into their work environments, among which insufficient time was most

commonly identified (Greenwood & Parsons, 2002; Martin et al., 2014; Pedaline et al., 2012). Participants in three studies (Hancock & Campbell, 2006; Martin et al., 2014; Pedaline et al., 2012) reported that they had heavy workloads due to understaffing, and therefore did not have sufficient time to assimilate their newly acquired knowledge and apply it in their workplace. Our results are similar to findings from Joseph and Huber (2015) that found substantial investments from organizations are required to create a work context for managers to assimilate knowledge, skills and abilities they developed into their work environment. Action-learning is a helpful intervention ingredient for nursing managers to integrate what they learned during the intervention into their practices.

We found that managers valued the support and trust they received from their supervisors and point-of-care nurses, and lack of this support was a barrier to improving leadership. Similarly, Galuska (2014) highlighted that support and recognition from hospital administrators and staff was important for creating a supportive environment for managers. Notably, only four of the 69 studies in our review reported on barriers and facilitators to implementing competencies learned in the interventions (Greenwood & Parsons, 2002; Hancock & Campbell, 2006; Martin et al., 2014; Pedaline et al., 2012). Moving forward, we suggest researchers focus on identifying the factors and corresponding strategies that influence managers' success in performing the leadership competencies they learned.

2.5 Limitations

There are several limitations to our review process. First, we limited our search to the peer-reviewed literature, excluding data on interventions that may be reported in the grey literature.

Second, while we conducted a narrative synthesis, we were unable to identified how many participants had the same perception of the intervention components and therefore we report on the interventions as whole and not each aspect of them. Third, it must be noted, as with all systematic reviews, our findings likely involve publication bias where interventions that showed no significant effect on leadership outcomes were likely underrepresented (McGowan et al., 2020).

2.6 Conclusions

Our review has shown that current leadership interventions have largely beneficial effects on managers supervising nurses by their enhancing knowledge, skills, and abilities. Managers generally had positive attitudes and were satisfied participating in the interventions. Group work, mentoring, and peer support were beneficial components of the interventions as they provided opportunities for interactions and learning with peers. Managers require support and trust from supervisors and point-of-care nurses to enact the leadership competencies they developed in the interventions. More robust evidence on the effectiveness of intervention ingredients and how they improve leadership outcomes are needed to guide future leadership intervention design.

2.7 Implications for nursing management

Several implications for researchers and nursing leaders arise from the results of this study. First, more studies that use 360-degree observed assessments by staff and third parties are needed to strengthen the validity of finding in future studies. Second, studies evaluating leadership interventions should include qualitative process evaluations to better understand

participants perceptions of the interventions, their experiences with them, and their perceived impacts to help tailor interventions to meet the needs of managers in specific healthcare settings. Third, future leadership interventions for managers should consider incorporating multi-modal activities such as group work, mentoring, and peer support to give opportunities for interaction. Fourth, future leadership interventions must consider the practice environments of managers and pursue the support from supervisors and point-of-care nurses in their respective settings to help managers successfully perform the leadership competencies they learned. Lastly, we recognized that digitalization competencies are emerging for nursing leaders, especially in light of the COVID-19 pandemic. We suggest this is an important area to be studied in future research on leadership competencies of managers supervising nurses.

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Figures and tables

Figure 2.1 PRISMA flow diagram

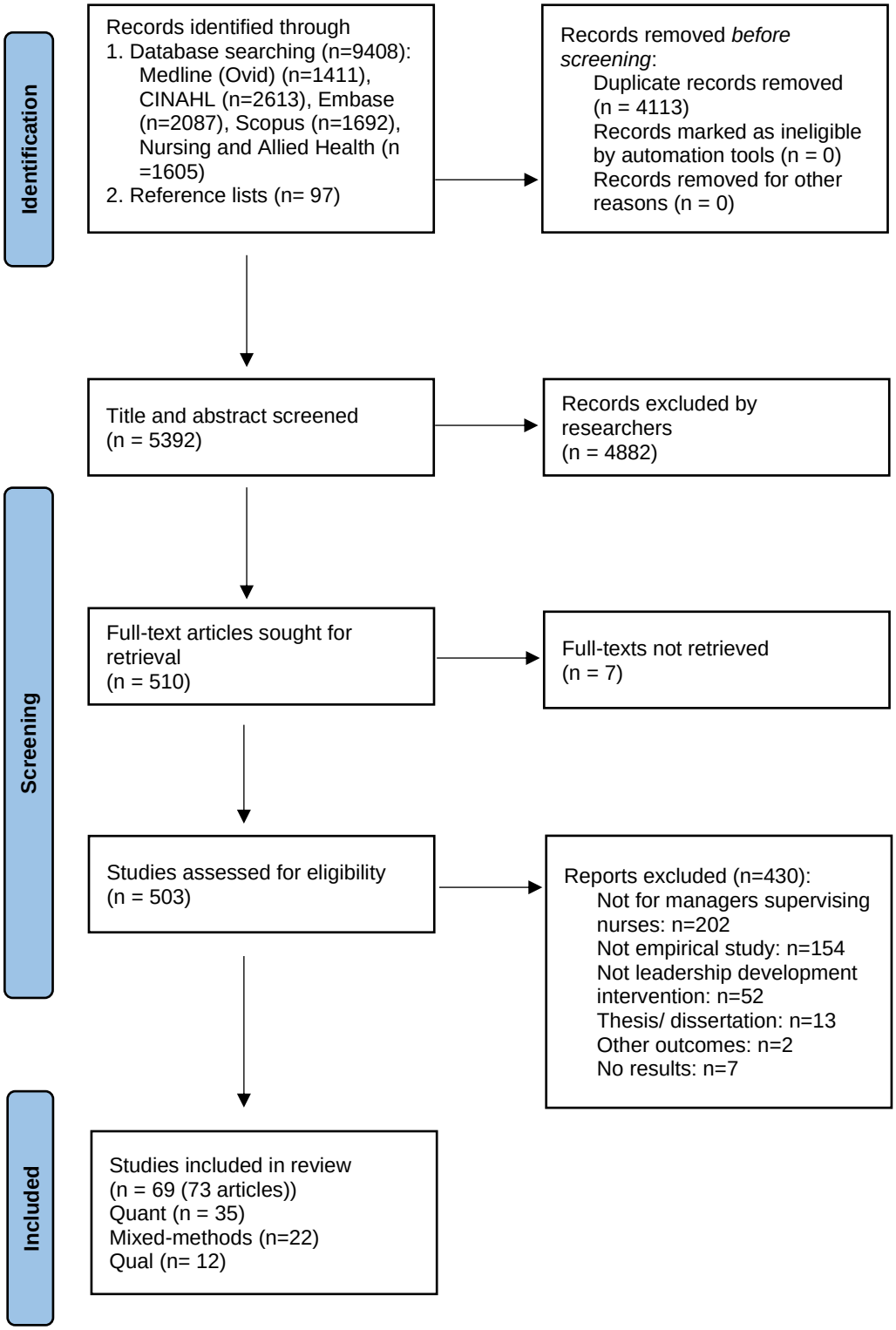

Table 2.1 Characteristics of included studies

(73 articles representing 69 studies, reported on 68 interventions)

Study		Study Design ‡	Intervention		Methodological Quality Assessment §
Ref # †	**Author, year Country Setting**	**Data collection methods Sample size (N) Gender**	**Name Description**	**# of participant (n) Age Gender Position Years in position**	**Ratings Component weaknesses**
1	• Al-Hussami, 2017 • Jordan • Hospitals	**Quasi-experimental** ● Survey (pre/post) ● N=61 ● 56% female	**Leadership guidance program** Three sessions: ● The first session was a pre-intervention (preprogram), which focused on introducing the program and introducing the pretest for participants. ● The second session included action learning and participants were required to put the learning into practice in the following modules: appraisal skills, assertiveness, coaching skills, coaching to support change, dealing with difficult people, innovation, leading, managing, dealing with change, managing absence, and implementing leadership action plan. ● The third section included the post-intervention and focused on introducing the post-test and getting feedback from the study participants regarding their experiences in this program.	● n=61 ● Average 28 years old ● 56% female ● Nurse managers ● average 5 yrs	Weak-moderate ● Outcome assessor(s) aware of the intervention. ● Numbers and reasons for dropouts or withdrawals were not indicated. ● Consistency of intervention not reported.
2	• Aqtash, 2022 • Australia • Hospitals	**Quasi-experimental** ● Survey (pre/post) ● N=105 ● 70% female	**Nursing leadership quality improvement training program** ● Intensive 3-day program covered a total of 24 training hours that focused on the day-to-day management skills and utilized interactive and hands-on group sessions, case studies, and live scenarios.	● n=105 ● 31-40 yrs. old (87%) ● 70% female ● Charge nurse, director of nursing ● Not reported	Weak-moderate ● Validity & reliability of data collection tools not reported. ● Consistency of intervention not reported.
3	• Bateman, 2020 • US • Pediatric health care system	**Quasi-experimental** ● Survey (pre/post) ● N=6 (blended group), 6 (face to face group) ● Not reported	**Blended learning** ● Online resources added to a face-to-face training. ● Use of the face-to-face charge nurse course lasted one day for 8 hours, with limited time for application of concepts and primarily lectures via PowerPoint. ● Online modules and resources were developed, allowing charge nurses to complete pre-class modules and resources that were developed, which permitted charge nurses to have resources available after the course to further develop their transformational leadership practices.	● n=6 ● 26-35 yrs. old (66%) ● Not reported ● Charge nurses ● 66% work at current role ≥5 yrs	Weak-moderate ● Outcome assessor(s) aware of the intervention. ● Numbers and reasons for dropouts or withdrawals were not indicated. ● Consistency of intervention not reported.
4	• Brown-DeVeaux, 2021 • US	**Quasi-experimental** ● Survey (pre/post) ● N=16	**Nursing leader mentorship program** ● Four monthly 4-hour educational and group mentoring workshops. ● Mentorship and executive meetings to better prepare minority leaders seeking career advancement in executive leadership roles.	● n=16 ● 31-50 (69%) yrs old ● 94% female	Moderate ● Outcome assessor(s) aware of the intervention.

Study		Study Design ‡	Intervention		Methodological Quality Assessment §
Ref # †	**Author, year Country Setting**	**Data collection methods Sample size (N) Gender**	**Name Description**	**# of participant (n) Age Gender Position Years in position**	**Ratings Component weaknesses**
	• Academic medical center	• 94% female		• Assistant nurse managers, nurse administrators • not reported	• Consistency of intervention not reported.
5	• Clarke, 2012 • Australia (New South Wales) • Not reported	**Qualitative descriptive** • One-on-one interviews & focus groups • N=16 • Not reported	**'Take the lead' program** • Three components: 1. a conceptual framework describing the purpose and core roles of N/MUMs. 2. Mechanisms to reduce N/MUMs' administrative load. 3. Five professional development modules, entitled Facilitate Critical Communication; Lean Thinking and Leadership; Financial Management of the Nursing/Midwifery Unit; Rostering for Patient Care; and Leadership – Making it Happen.	• Not reported • Not reported • Not reported • Nursing/Midwifery Unit Managers • Not reported	Moderate • No theoretical perspective identified. • Role of the researcher & relationship with participants not described. • 4 elements of study rigour/ trustworthiness not described (Credibility, Transferability, Dependability, Confirmability).
6	• Cole, 2020 • US • Not reported	**Quasi-experimental** • Survey (pre/post) • N=8 • 50% female	**Frontline nurse leaders (FLNLs) simulation scenarios** • Create relevant, "real-world" scenarios a frontline nurse leader would likely encounter in the clinical setting. • Actors for the scenarios were the same senior-level MSN in NL learners. • Seven scenarios were designed that could be altered from "beginner" to "advanced" level.	• n=8 • 26-40 yrs old 75% • 50% female • Frontline nurse leaders (50% in a management position) • Not reported	Weak-moderate • Outcome assessor(s) aware of the intervention. • Validity & reliability of data collection tools not reported. • Numbers and reasons for dropouts or withdrawals were not indicated.
7	• Cooper, 2003 • UK • Community-based hospital & acute care hospitals	**Mixed Methods** • Survey (pre/post) & interview • N=21 (survey), 15 (interview), 38 (Observer) • 80% female	**Leading an Empowered Organization (LEO) program** • Three-day program in which activities include group work, lectures and team development games. • To enable professionals to develop empowerment by addressing responsibility, authority, autonomy and accountability.	• Not reported • Not reported • Not reported • Not reported • Not reported	Strong • Cofounders not accounted for analysis.
8	• Crowne, 2017 • US • Nursing home	**Quasi-experimental** • Survey (pre/post) • N=20 • 95% female	**Leading nurses development program** • The three-year Leading Nurses project was developed and implemented to achieve Purpose P3 of the Nursing Education, Practice and Retention (NEPR) program. • Content for the Leading Nurses project was based on the results of a focus group conducted by the researchers in 2003 as well as their follow-up demonstration project called Management Skill Development for Nursing Leaders: Improving the Work Environment for Direct Care Workers.	• n=20 • Age:39-60 (mean=50) • 95% female • Nurse leaders (i.e. directors and nurse managers)/ • mean= 11 yrs at management position	Moderate • Outcome assessors not blinded to intervention. • Consistency of intervention not reported.

Study		Study Design ‡	Intervention		Methodological Quality Assessment §
Ref # †	**Author, year Country Setting**	**Data collection methods Sample size (N) Gender**	**Name Description**	**# of participant (n) Age Gender Position Years in position**	**Ratings Component weaknesses**
9	• Cunningham, 2000 (Part I & II) • UK • Acute hospital trusts	**Mixed methods** ● Survey (pre/post) & process evaluation ● N=131 (pre-intervention), 150 (post-intervention), (self+ observer) ● Not reported	**Royal College of Nursing Clinical Leadership Development Program** ● 18-month program including action learning workshop, mentoring, observation of care & patient narrative. Capability incorporates dimensions such as skills, style values, attitudes and behaviours.	● n=28 ● Age= 30-39 yrs ● 79% female ● Senior nurses (n=4) and ward sisters (n=24) ● Less than 1.5 yrs at current role (50%)	Moderate ● No adequate rationale for using a mixed-methods design. ● Qualitative and quantitative components not effectively integrated to answer research questions.
10	• Debono, 2016 • Australia • Area & state-wide Health Services	**Mixed methods** ● Semi-structured interview & survey with open-ended questions ● N=30 (self), 30 (observers) ● 90% female (self), 87% female (observer)	**'Take the lead' program** ● Three components: 1. a conceptual framework describing the purpose and core roles of N/MUMs. 2. Mechanisms to reduce N/MUMs' administrative load. 3. Five professional development modules, entitled Facilitate Critical Communication; Lean Thinking and Leadership; Financial Management of the Nursing/Midwifery Unit; Rostering for Patient Care; and Leadership – Making it Happen.	● Not reported ● Not reported ● Not reported ● Nursing-Midwifery Unit Managers (N/MUMs) ● 6yrs management position,	Strong ● Not clear whether the confounders were accounted for in the design and analysis.
11	• Dewar, 2019 • Scotland • Nursing home	**Mixed Methods** ● Survey (pre/post), group discussions, & Facilitate or feedback sheets ● N=119 ● 85% Female	**My Home Life Leadership Support program** ● 12-month program, 4-day workshop to integrate the eight best practice themes into everyday life and work through a complex social process of cultural development that has Relationship-Centered Care, Appreciative Inquiry, and Caring Conversations as the underpinning principles. ● The program rests on a social, dialogical, emancipatory, and iterative "theory of change" ● It recognizes that practice developments and the fostering of a relationship-centered culture happen through a series of steps that can be likened to a "ripple effect," which start with the individual nursing home manager.	● n=119 ● Not reported ● 85% Female ● Nursing home managers ● Not reported	Strong ● Cofounders not accounted for analysis.
12	• Dols 2021 • US • Hospitals	**Quasi-experimental** ● Survey (pre/post) ● N=24 (charge nurses), 12	**Charge nurses' education program (CNEP)** ● CNEP class included functional topics associated with the daily role responsibilities of the CN. Focused on the 7 categories of the CN Skills Competency Evaluation Tool.	● n=24 ● 19-38 yrs. old (62.5%) ● 92% female ● Charge nurses	Moderate ● Outcome assessor(s) aware of the intervention.

Study		Study Design ‡	Intervention		Methodological Quality Assessment §
Ref # †	Author, year Country Setting	Data collection methods Sample size (N) Gender	Name Description	# of participant (n) Age Gender Position Years in position	Ratings Component weaknesses
		(supervisors) ● 92% female (charge nurses)	● Unit-based scenarios related to frequently encountered experiences were included and was conducted over 3 days within 1 week. ● The same 3-hour session was repeated 3 times, providing CNs the opportunity to select the session that accommodated their schedule.	● Average 5.21 yrs. in management position	● Consistency of intervention not reported.
13	• Duygulu, 2011 • Turkey • Acute care hospitals	**Quasi-experimental** ● Survey (pre/post) ● N=30 (self), 151 (staff) ● Not reported	**Transformational leadership training program** ● The program included 14 hours of theoretical study and 14 hours of individual study. ● Composed of five sections: 1) Management, leadership and TL. 2) Process of influencing: Power. 3) Motivation. 4) Exemplary leadership practices. 5) Becoming an effective leader	● n=30 ● Average 35 yrs. old ● Not reported ● Unit charge nurses ● Average 5 yrs at management position	Weak-moderate ● Outcome assessor(s) aware of the intervention. ● Numbers and reasons for dropouts or withdrawals were not indicated. ● Consistency of intervention not reported.
14	• Eide, 2016 • Norway • Online	**Qualitative descriptive** ● Focus groups & interviews ● N=9 ● 35-48 yrs old ● 100% female ● Middle managers/3-12 yrs at management position	**Ethical leadership educational program** ● A small-scale, web-based, ethical leadership training program ● Person-centred and tailored to the individual participant's leadership vision, organizational challenges, and actual workplace environment. ● A 6-week educational design was developed, based on two main elements: (1) a leadership practice part, where the participants developed and ran a minor ethics project at their workplace which aimed to stimulate and develop the ethical mindfulness of their organizational culture, and (2) a web-based reflection part, where the participants – while managing their projects – answered reflection questions and reported from their projects online and received situational, written, supportive feedback from a coach.	● Not reported ● Not reported ● Not reported ● Not reported	Moderate ● Role of the researcher & relationship with participants not described. ● No identification of assumptions and biases of researcher. ● No decision trail developed.
15	• Eldh, 2018 • Sweden • Nursing home	**Mixed Methods** ● Survey (pre/post) & interview ● N=5 (Survey & interview) ● Not reported ● Not reported ● First-line managers	**Leadership program** ● Three half-day seminars and two teleconferences.	● n=5 ● Not reported ● Not reported ● First-line managers	Strong ● Cofounders not accounted for analysis.
16	• Fennimore, 2011 • US • University of Pittsburgh Medical Center	**Mixed Methods** ● Survey (pre/post) & discussion forum ● N=25	**University of Pittsburgh Medical Center (UPMC) Leadership Development for Nursing Middle Managers program** ● Focused on (1) contemporary issues in healthcare, (2) evidence-based content, (3) links to recommendations from professional organizations, and (4) knowledge of self through assessment.	● n>100 ● Not reported ● Not reported ● Nurse leaders	Weak-moderate ● No clear research questions. ● Cofounders not accounted for analysis.

Study		Study Design ‡	Intervention		Methodological Quality Assessment §
Ref # †	**Author, year Country Setting**	**Data collection methods Sample size (N) Gender**	**Name Description**	**# of participant (n) Age Gender Position Years in position**	**Ratings Component weaknesses**
		● Not reported ● Not reported ● Nurse managers/ over 16 as nurses (68%)	● Real-time dialogue with peers, nursing and human resource executives, and academic faculty. ● Five 8-hour sessions offered every other week over a 2-month period.		● Qualitative and quantitative components not effectively integrated to answer research questions.
17	• Flatekval, 2019 • US • Acute care hospitals	**Quasi-experimental** ● Survey (pre/post) ● N=8 ● Not reported ● Not reported ● Nurse managers	**Leadership development program** ● Two-day instructor-led course and ongoing weekly support. ● 12 hours of leadership training and continuing-education contact hours. ● Three components of the educational curriculum: 1) AACN ENMO course, which contains eight modules that address business management, effective leadership, and personal development, and provides 40 continuing education contact hours. 2) A weekly "lunch and learn" session. Topics included performance coaching, conflict resolution, and budgeting. This allowed for a discussion on the online modules, as well as instructor and peer support. 3) A live instructor-led course held for 2 full days, 1 week apart. Covered "Intrinsic Qualities of a Leader" on Day 1 and "Managing the Extrinsic Expectations of Leadership" on Day 2.	● n=8 ● Not reported ● Not reported ● Nurse managers	Weak ● Validity & reliability of data collection tools not reported. ● Numbers and reasons for dropouts or withdrawals were not indicated. ● Consistency of intervention not reported.
18	• Foster, 2018 • Zambia • Rural health centers and health posts	**Mixed Methods** ● Survey (post-intervention), focus group, & interviews ● N= 25 (Survey)/ 23 (Interview)/ ~100 (Focus group) ● Not reported	**Certificate in leadership and management practice (CLMP) program** ● 12-month blended learning program, engages community members, volunteers, and facility staff, including any additional clinical staff at the facility, CHAs, and environmental health technicians in a variety of learning exercises. ● Pre-orientation with the district nurse managers. ● Monthly calls, facilitate discussions, and monthly reviews of workbook exercises.	● Not reported ● Not reported ● Not reported ● Not reported ● Not reported	Strong ● Cofounders not accounted for analysis.
19	• Frasier, 2019 • US • Community hospital	**Quasi-experimental** ● Survey (pre/post) ● N=16 (self), 24 (staff) ● 69% female (self)	**Pilot leadership development program** ● Consisted of didactic learning sessions supplemented by reflective technique and peer support.	● n=16 ● Not reported ● 69% female ● Nurse managers and directors ● Over 5 years at management position (62.5%)	Weak-moderate ● Outcome assessor(s) aware of the intervention. ● Numbers and reasons for dropouts or withdrawals were not indicated. ● Consistency of intervention not reported.

Study		Study Design ‡	Intervention		Methodological Quality Assessment §
Ref # †	**Author, year Country Setting**	**Data collection methods Sample size (N) Gender**	**Name Description**	**# of participant (n) Age Gender Position Years in position**	**Ratings Component weaknesses**
20	• Goktepe, 2018 • Turkey • Acute care hospitals	**Quasi-experimental** • Survey (pre/post) • N=18 • 94% female	**Nurse Manager Development Program** • Approximately 80 hours. • The face-to-face training was conducted 8 hours a day, once a week, for 10 weeks. • Interactive adult learning methods such as group work, team-based learning, case studies, and role playing were implemented, with participants encouraged to come to classes after reading recommended studies and publications.	• n=18 • Age: ≥35 years (12), < 35 years (n=6) • 94% female • first-level nurse managers • 9 yrs at management position	Weak-moderate • Validity & reliability of data collection tools not reported. • Numbers and reasons for dropouts or withdrawals were not indicated. • Consistency of intervention not reported.
21	• Greenwood, 2002 (part I & (part II)) • Australia • Clinical Development Units	**Qualitative descriptive** • Focus group & interviews • N=9 • Not reported	**Clinical Development Unit (CDU) Leadership Preparation Program** • A six-month period and consisted of six 2-day workshops focusing on the nature and function of CDUs; ward philosophies and standards; time management; team building; management of change; reflective practice; strategic planning; care evaluation; and action research.	• n=9 • Not reported • Not reported • Clinical Development Unit leaders • Not reported	Weak-moderate • No theoretical perspective identified. • Role of the researcher & relationship with participants not described. • 4 elements of study rigour/ trustworthiness not described (Credibility, Transferability, Dependability, Confirmability).
22	• Hancock, 2006 • UK • Acute care hospital	**Qualitative descriptive** • Interview • N=4 (self), 32 (observer) • Not reported	**Leading an Empowered Organization (LEO) program** • Three-day program in which activities include group work, lectures and team development games. • To enable professionals to develop empowerment by addressing responsibility, authority, autonomy and accountability.	• Not reported • Not reported • Not reported • Grade G nurses • Not reported	Moderate • No theoretical perspective identified. • Role of the researcher & relationship with participants not described. • Process of data analysis not adequately described.
23	• Hsu, 2011 • Taiwan • Acute care hospitals	**Observational** • Survey (post/cross-sectional) • N=15(self), 20 (supervisors), 101 (subordinates) • 100% female	**Leadership Orientation Program** • (1) Leadership orientation workshop: developed jointly by a focus group of eight scholars and professionals from a teaching hospital and a nursing faculty. A 70-hour leadership training course was offered. The objective of the training course was to provide new nurse managers (NNMs) with instructional principles, standardized content for guiding point-of-care nurses, ways to improve their unit management knowledge and skills, application of computer software, and research methods. (2) Instruction for unit point-of-care nurses: The duration of the preceptorship was three months, and 101 point-of-care nurses were involved in evaluating the preceptorship	• N=15 • Age: 32.75±3.15 yrs. • 100% female • New nurse managers • Not reported	Moderate • Outcome assessor(s) aware of the intervention. • Numbers and reasons for dropouts or withdrawals were not indicated.

Study		Study Design ‡	Intervention		Methodological Quality Assessment §
Ref # †	**Author, year Country Setting**	**Data collection methods Sample size (N) Gender**	**Name Description**	**# of participant (n) Age Gender Position Years in position**	**Ratings Component weaknesses**
24	• Hubley 2022 • Canada • Acute care hospitals	**Quasi-experimental** ● Survey, opened questions & document review ● N=16 ● Not reported	**Strengths-Based Nursing and Healthcare Leadership and Management program** ● Include 10 modules in three segments that integrated mentorship and story sharing. ● Arts-based active learning exercises to facilitate reflection about the clinical context and encourage story sharing, self-reflection and small-group and peer learning. ● A three-month structured mentorship program	● n=16 ● Not reported ● Not reported ● Nurse leaders ● 1-15 yrs. management experience	Moderate ● No adequate rationale for using a mixed-methods design. ● Qualitative and quantitative components not effectively integrated to answer research question.
25	• Hyrkäs, 2005 • Finland • Not reported	**Qualitative descriptive** ● Empathy-based stories & writing short essays ● N=11 ● Not reported	**Clinical supervision** ● The ward-sisters' and nurse managers' peer supervision intervention. ● Peer supervision sessions were held once a month and the duration was 2 hours per session. The total duration of peer supervision in the project was 32 hours. ● The sessions were organized in two groups: for the ward-sisters and nursing managers. Included two whole and two half-study days attended by both ward-sisters and nurse managers. The timing of these study days was at the beginning and at the end of the intervention. The total duration of the study days was 18 hours.	● n=20 ● Not reported ● Not reported ● Ward-sisters and nurse managers ● Not reported	Weak-moderate ● No theoretical perspective identified. ● Purposeful sampling selection not described. ● 4 elements of study rigour/ trustworthiness not described (Credibility, Transferability, Dependability, Confirmability).
26	• Jeon, 2018 • Korea • Acute care hospitals	**Quasi-experimental** ● Survey (pre/post) ● N= 44 (self), 158 (observers) ● 100% female (self), 97.5% (observers)	**Ethical leadership program (ELP)** ● A competency development program ● The ELP was a six-month program with seven classes. With two main active learning elements: 1) practice, where participants planned and practiced EL activities for the next month after each class based on self-evaluation EL skill checklists, and 2) small-group discussion, where participants actively learned from sharing experiences based on reflection on their own EL activities during the last month. Each class took 2 h: one for small group discussion and one for lecture and planning EL activities.	● n=44 ● Age=40-59 (70%) ● 100% female ● Unit managers ● over 5 yrs at management position (73%)	Strong ● Outcome assessors not blinded to intervention.
27	• Johannessen, 2019 • Norway • Nursing homes and home care services	**Qualitative descriptive** ● Focus groups ● N=9 ● Not reported	**'Improving Quality and Safety in Primary Care—Implementing a Leadership Intervention in Nursing Homes and Home care' (SAFE-LEAD) intervention** ● Structured around eight common quality challenges: structure, politics, culture, education, emotions, technical and physical conditions, leadership, and external demands. ● It consists of a series of questions to stimulate reflection and an accompanying decision-aid menu of potential options, including empirical examples of possible quality and safety improvement solutions across macro, meso, and micro system levels. ● The Medical Research Council's (MRC) guidance framework was used	● Not reported ● Not reported ● Not reported ● Nursing home/home care service managers ● Not reported	Moderate ● No theoretical perspective identified. ● Purposeful sampling selection not described. ● No identification of assumptions and biases of researcher.

Study		Study Design ‡	Intervention		Methodological Quality Assessment §
Ref # †	**Author, year Country Setting**	**Data collection methods Sample size (N) Gender**	**Name Description**	**# of participant (n) Age Gender Position Years in position**	**Ratings Component weaknesses**
			for the development and evaluation of complex interventions. ● The Knowledge to Action framework guided the development process.		
28	• Johnson, 1991 • US • Community hospitals	**Quasi-experimental** ● Survey (pre/post) ● N= 11 (self), 27 (observers) ● Not reported	**Management training program** ● A 68-hour management training program over a 6-month period. ● To provide knowledge and skill development in the administrative areas of planning, organizing, leading, and controlling. ● One 8-hour workshop, presented by an outside consultant, covered leadership theories, leadership styles, power, and authority. ● The workshop on leadership styles had been preceded by a session covering definitions of leadership/management and an overview of the nurse manager role.	● Not reported ● Not reported ● Not reported ● Nurse managers ● Not reported	Weak ● Outcome assessors not blinded to intervention. ● Numbers and reasons for dropouts or withdrawals were not indicated. ● Consistency of intervention not reported.
29	• Kabinga-Makukula, 2019 • Zambia • Rural health centers & posts	**Qualitative descriptive** ● Document review (conversations on mobile phones) ● N=20 ● Not reported	**Instant messaging** ● A blended method to train nurse managers. ● Face-to-face interactions for three days. ● Individual study when learners returned to their facilities, a project, and use of mobile tools including WhatsApp instant messaging.	● n=20 ● Not reported ● Not reported ● Rural facility heads ● Not reported	Moderate ● No theoretical perspective identified. ● Purposeful sampling selection not described. ● Role of the researcher & relationship with participants not described.
30	• Kvist, 2014 • Finland • Acute care hopsital & Central Finland Health Care District	**Quasi-experimental** ● Survey (pre/post) ● N= 34 ● Not reported	**Evidence-Based Nursing Leadership (EBNL) training** ● Included four teaching days and a BNL closing conference day. ● This course gave students information on literacy skills training, necessary for the successful implementation of EBP and EBL and for continuing professional development. ● The teaching days' topics were 1) Leadership of evidence-based practice; 2) The leader as a promoter of work well-being; 3) Challenges and opportunities of leadership and 4) Patient satisfaction and patient safety.	● n=47 ● Not reported ● Not reported ● Nurse managers (76%) ● Not reported	Moderate ● Numbers and reasons for dropouts or withdrawals were not indicated. ● Consistency of intervention not reported.
31	• Lalleman, 2017 • Netherlands • Acute care hospitals	**Qualitative descriptive** ● Semi-structured interviews ● N=8 ● Not reported	**Peer-to-peer shadowing** ● One day shadowing a colleague from another hospital.	● Not reported ● Not reported ● Not reported ● Nurse middle managers ● Not reported	Moderate ● No theoretical perspective identified. ● Role of the researcher & relationship with participants not described.

Study		Study Design ‡	Intervention		Methodological Quality Assessment §
Ref # †	**Author, year Country Setting**	**Data collection methods Sample size (N) Gender**	**Name Description**	**# of participant (n) Age Gender Position Years in position**	**Ratings Component weaknesses**
					• No identification of assumptions and biases of researcher.
32	• Lankshear, 2010 • Canada • Home healthcare sector	**Mixed methods** • Web-based survey with open-ended questions & group discussions • N=44 (Survey) • Not reported	**Actively Leading In Virtual Environments (ALIVE) pilot program** • Four modules were identified for inclusion in the pilot offering of the ALIVE Community Nursing Leadership program. (1) managed competition, (2) quality indicators: development and use (incorporating content for defining measures of quality and quality indicators with root cause analysis), (3) dealing with performance practices, (4) managing multiple stakeholders (incorporating principles of conflict management into dealing with multiple stakeholders). • Designed to be delivered in two sessions: Session 1 spanned two consecutive days; Session 2 was a one-day follow-up held two months later.	• Not reported • Not reported • Not reported • Nursing leaders • Not reported	Weak-moderate • Cofounders not accounted for analysis. • No adequate rationale for using a mixed-methods design. • Qualitative and quantitative components not effectively integrated to answer research question.
33	• Lee, 2015 • Singapore • National Kidney Foundation	**Mixed methods** • Survey (pre/post) & reflective journaling • N=44 • Not reported	**A clinical leadership program** • Three days of intensive clinical leadership development workshops followed by a final workshop one month later. • Participants were required to write and submit eight reflective journals of their perception of their ability to apply theory to practice and learning experiences. • Participants were supervised through an online platform using online forum discussion of issues that emerged from their journal entries.	• n=44 • Not reported • Not reported • Clinical nurse managers • Not reported	Weak-moderate • Cofounders not accounted for analysis. • No adequate rationale for using a mixed-methods design. • Qualitative and quantitative components not effectively integrated to answer research question.
34	• Luk, 2018 • Hong Kong (China) • Acute care hospital	**Mixed Methods** • Survey (pre/post) & self-reflective essay • N=26 (survey)/ 7(essay) • Not reported	**Leadership Enhancement Program** • A one-year program with emphasis on self-reflection and self-cultivation. • Consisted of one seminar per month for 5 months, followed with five sessions of small group sharing. • The last part of the program was a one-day retreat.	• n=42 • Age=35-55 • 76% female • Senior nurse managers • Average 9yrs at management position	Weak-moderate • Cofounders not accounted for analysis. • Qualitative and quantitative components not effectively integrated and interpreted to answer research questions.
35	• Mackoff, 2013 • US • Not reported	**Mixed methods** • Survey (pre/post) & open-ended questions	**Leadership Laboratory (LL)** • 3 LLs involving nurse managers as participants, co-creators, and evaluators of the unique learning format. • Included peer-to-peer coaching and learning format grounded in the	• n=33 • Not reported • Not reported	Weak-moderate • Cofounders not accounted for analysis.

Study		Study Design ‡	Intervention		Methodological Quality Assessment §
Ref # †	Author, year Country Setting	Data collection methods Sample size (N) Gender	Name Description	# of participant (n) Age Gender Position Years in position	Ratings Component weaknesses
		• N=33 • Not reported	discussion of NMs' lived experiences and best practices.	• Nurse managers • Not reported	• No adequate rationale for using a mixed-methods design • Qualitative and quantitative components not effectively integrated to answer research question.
36	• Mackoff, 2017a • US • Not reported	**Mixed methods** • Survey (pre/post) & open-ended questions • N=72 (survey), 59 (open-ended questions) • Not reported	**American Organization of Nurse Executives (AONE) Nurse Manager Fellowship (NMF)** • A year-long professional development program designed to target the unique leadership development needs of nurse managers through an in-depth environment of learning.	• Not reported • Not reported • Not reported • Nurse managers • Not reported	Strong • Interpretation of results not sufficiently substantiated by data • Cofounders not accounted for analysis.
37	• Mackoff, 2017b • US • Not reported	**Mixed methods** • Survey (pre/post) & open-ended questions • N=21(self) & 18 (observers) • Not reported		• Not reported • Not reported • Not reported • Nurse managers • Not reported	Strong • Cofounders not accounted for analysis. • Qualitative and quantitative components not effectively integrated to answer research question.
38	• MacPhee, 2012 & MacPhee, 2014 • Canada • Not reported	**Mixed methods** • Survey (pre/post) & interview • N=128 (survey), 27 (interview) • 88% female	**Nursing Leadership Institute (NLI)** • A provincial, western Canadian leadership development program for novice first-line nurse leaders • Guided by an empowerment framework, and a curriculum that emphasizes strategies that leaders can use to empower staff. • Consists of a 4-day residential workshop with didactic leadership content and interactive learning sessions; a year-long innovation project of relevance to the leaders' respective organizations; mentorship from senior nursing leaders; organizational supports, such as release time for project work; and an online knowledge network to facilitate connections among leaders.	• Not reported • Not reported • Not reported • Nurse leaders • 1-8 yrs at management position	Weak-moderate • No clear research questions. • No adequate rationale for using a mixed-methods design. • Qualitative and quantitative components not effectively integrated to answer research question.
39	• Marath, 2015 • India • Acute hospital	**Mixed methods** • Survey (pre/post) & focus group • N= 60 (30 experimental, 30 control)	**Leadership development package (LDP)** • The leadership development package was designed to provide the fundamentals of leadership which were embedded in The Five Exemplary Practices of Leadership	• n= 30 • Age= 32-56 yrs • 100% female • Head nurses • 11-15 yrs (60%) at	Moderate • Interpretation of results not sufficiently substantiated by data. • Qualitative and quantitative components not effectively

Study		Study Design ‡	Intervention		Methodological Quality Assessment §
Ref # †	**Author, year Country Setting**	**Data collection methods Sample size (N) Gender**	**Name Description**	**# of participant (n) Age Gender Position Years in position**	**Ratings Component weaknesses**
		● 100% female		management position	integrated to answer research question.
40	● Maries-Tillott, 2006 ● UK ● Heart of England National Health Service Foundation Trust	**Quasi-experimental** ● Survey (pre/post) ● N=8 ● Not reported	**Development program for senior nurses** ● 9 days spread over 9 months, 136 sessions including workshops and coaching.	● n=8 ● Not reported ● Not reported ● Senior sister ● Not reported	Weak-moderate ● Outcome assessor(s) aware of the intervention. ● Validity & reliability of data collection tools not reported. ● Consistency of intervention not reported.
41	● Martin, 2012 & Martin, 2014 ● Switzerland ● Acute care Hospital	**Mixed methods** ● Survey (pre/post) & Interview ● N=14 (self) & 140 (observers) (survey); 6 (interview) ● 64 % female (survey), 50% female (interview)	**Clinical Leadership Program (CLP)** ● A total of 147 hours (approximately 18 days), over a 12-month period, with a follow-up day 6 months later and the program is delivered through lectures, one-to-one coaching, action learning sets, and workshops.	● n=14 ● 41-50 years (50%) ● 64 % female ● Nurse leaders ● Mean=11 yrs at management position	Moderate ● No adequate rationale for using a mixed-methods design. ● Qualitative and quantitative components not effectively integrated to answer research question.
42	● Mcfarlan, 2020 ● US ● Community hospital	**Quasi-experimental** ● Survey (pre/post) ● N=23 ● Not reported	**Focused didactic educational intervention** ● Two 4-hour interactive didactic sessions during a 2-month period. ● Specific attention was given to general budget terms, productivity measures, variance analysis, and personnel budgeting.	● n=23 ● Not reported ● Not reported ● Nurse managers ● Mean= 7 yrs at management position	Weak ● Reliability of data collection tools not reported. ● Numbers and reasons for dropouts or withdrawals were not indicated. ● Consistency of intervention not reported.
43	● Mcgarity, 2020 ● US ● Not reported	**Quasi-experimental** ● Survey (pre/post) ● N=38 ● Not reported	**Evidence-based leadership curriculum** ● An evidence-based leadership curriculum in which participants attended 12 four-hour classes. ● Each class was divided into three focused elements. Two hours of lectures and discussion components focused on the identified competencies and were led by subject matter experts from the facility or university. One hour concentrated on building the leader within and was led by an experienced Chief Nursing Officer and professor and focused on the art of reflection and leadership development. The	● n=38 ● Not reported ● Not reported ● First line leaders ● 87% at management position less than 6 yrs.	Weak-moderate ● Outcome assessor(s) aware of the intervention. ● Numbers and reasons for dropouts or withdrawals were not indicated. ● Consistency of intervention not reported.

Study		Study Design ‡	Intervention		Methodological Quality Assessment §
Ref # †	**Author, year Country Setting**	**Data collection methods Sample size (N) Gender**	**Name Description**	**# of participant (n) Age Gender Position Years in position**	**Ratings Component weaknesses**
			last hour centered on peer socialization and development through small work groups and/or open discussions.		
44	• McKinney, 2016 • US • Community hospital	**Quasi-experimental** • Survey (pre/post) • N=28 • 96% female	**Experiential learning** • Activities developed based on an evaluation of competency gaps and the resulting competency of nurse managers following the training.	• n=28 • Age= 41-50 years • 96% female • Nurse managers • 1-15 yrs at management position (71%)	Weak-moderate • Outcome assessors not blinded to intervention. • Numbers and reasons for dropouts or withdrawals were not indicated. • Consistency of intervention not reported.
45	• McNally, 2006 • US • No reported	**Observational** • Survey (post/cross-sectional) • N=64 • 80% female	**Coaching program** • Pairing Coaches/Leaders, before the orientation session, the coaches determined the best coach/leader pairings. • Orientation, a half-day program to review the professional practice model and describe the coaching process, the preparation for the intake process, and scheduling logistics. • Individual Coaching, to assist the leader to increase self-awareness, develop clarity and focus, create structures for accountability, and achieve desired professional and personal goals. • Group Coaching, designed as peer-learning roundtables to give the leaders the opportunity to discuss real work situations related primarily to implementing the professional practice model.	• n=64 • 80% female • Not reported • Clinical leaders • 0.5-30 yrs at management position	Weak-moderate • Outcome assessor(s) aware of the intervention. • Numbers and reasons for dropouts or withdrawals were not indicated. • Consistency of intervention not reported.
46	• Menegaz, 2020 • Brazil • Acute care hospital	**Qualitative descriptive** • Interviews**,** non-participant observation, & document review • N=8 • Not reported	**Executive coaching** • Peer coaching • The sessions were individual, weekly or biweekly, according to the availability of the coach and participants, with an average duration of one hour.	• n=8 • Not reported • Not reported • Nurse managers • Not reported	Moderate • No theoretical perspective identified. • Purposeful sampling selection not described. • Role of the researcher & relationship with participants not described.
47	• Mushtaq, 2021 • Pakistan • Acute care hospitals	**Quasi-experimental** • Survey (pre/post) • N=96 • 36-60 yrs. old (82%)	**Transformational leadership educational program** • Presentations, role plays, and scenarios were presented for transformational leadership skills. The educational program was based on literatures and text book of transformational leadership.	• Not reported • Not reported • Not reported • Not reported • Not reported	Moderate • Numbers and reasons for dropouts or withdrawals were not indicated. • Consistency of intervention not reported.

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Ref # †	Author, year Country Setting	Data collection methods Sample size (N) Gender	Name Description	# of participant (n) Age Gender Position Years in position	Ratings Component weaknesses
48	• Nghe, 2020 • US • Acute care hospital	**Quasi-experimental** ● Survey (pre/post) with open-ended questions ● N=57 ● Not reported	**A comprehensive leadership training program for mid-level leaders** ● Program content was based on organizational values and standards, particularly as they related to new leaders, and utilized the American Organization of Nurse Leaders (AONL) Competencies, with a focus on Leadership Skills, Relationship Management, and Influencing Behaviours (with a focus on communication), Financial Management, Personal and Professional Accountability, and Strategic Management. ● The result of collaboration among nursing directors, nursing professional development specialists, nurse managers (NMs), safety and quality specialists, and human resources specialists from multiple units and departments.	● Not reported ● Not reported ● Not reported ● Midlevel nurse leaders (e.g., nurse manager, clinical supervisors & clinical nurse experts) ● Not reported	Weak ● Outcome assessor(s) aware of the intervention. ● Validity & reliability of data collection tools not reported. ● Consistency of the intervention not measured
49	• Ogilvie, 2021 • US • Acute care hospitals & clinics	**Quasi-experimental** ● Survey (pre/post) ● N=412 ● Not reported	**Nurse Manager Leadership Development Program** ● A total of 4, 2-day learning events and 4, 1-hour videoconference activities over 9 months.	● n=412 ● Not reported ● Not reported ● Not reported ● Not reported	Weak . ● Validity & reliability of data collection tools not reported. ● Numbers and reasons for dropouts or withdrawals were not indicated. ● Consistency of intervention not reported.
50	• Omoike, 2011 • US • Acute care hospitals	**Quasi-experimental** ● Survey (pre/post) ● N= 43 ● Not reported	**Administrative nursing leadership (ANL) certificate program** ● 40% online and 60% videoconferencing ● Six core leadership courses of the administrative nursing masters program from the UIC CON that matched the identified learning needs of the nurse manager groups: leadership theory, operational management, organizational behaviour, human resource management, financial management, and strategic planning.	● n= 43 ● Not reported ● Not reported ● Nurse leaders (i.e., nurse directors, managers, assistant managers) ● Not reported	Weak ● Validity & reliability of data collection tools not reported. ● Numbers and reasons for dropouts or withdrawals were not indicated. ● Consistency of intervention not reported.
51	• Patrician, 2018 • US • Acute care hospitals	**Mixed Methods** ● Survey (pre/post) & interview ● N=17 (survey)/ 4 (interview)	**Mapping and Sustaining a Personal Leadership Journey** ● A 2-day facilitated workshop. ● Used short "theory bursts" or mini lecture group activities. ● Online strength assessment. Mindfulness meditation.	● n=99 ● Not reported ● Not reported ● Unit-level managers ● Not reported	Moderate ● Cofounders not accounted for analysis. ● No adequate rationale for using a mixed- methods design.

Study		Study Design ‡	Intervention		Methodological Quality Assessment §
Ref # †	**Author, year Country Setting**	**Data collection methods Sample size (N) Gender**	**Name Description**	**# of participant (n) Age Gender Position Years in position**	**Ratings Component weaknesses**
		• 94% Female			• Qualitative and quantitative components not effectively integrated to answer research question.
52	• Pedaline, 2012 • US • Acute care hospital	**Mixed methods** • Survey (pre/post) & interview • N=6 (Survey & interview), 48-60 (survey only-observer) • 100% female	**Mentoring program** • Individual mentoring sessions occurred monthly with each nurse manager for a period of 6 months. Sessions lasted 1 hour and included a similar format each time. • Included discussion of their chosen behaviour for focus and included definition of the behaviour, what resources existed to help improve the behaviour, and identification of specific strategies to employ before the next session.	• n=6 • Average 40 yrs old • 100% female • Front line nurse managers • 3-15 yrs at management position	Strong • Cofounders not accounted for analysis. • No adequate rationale for using a mixed-methods design.
53	• Penney, 2018 • UK (Northern Ireland) • Residential homes	**Qualitative descriptive** • Focus groups • N=15 • Not reported	**My Home Life program** • 12-month leadership support. • The chosen action learning design for the program is "critical reflection." • Consists of a four-day workshop followed by a cycle of eight, monthly action learning sets and practice development sessions.	• Not reported • Not reported • Not reported • Care home managers • Not reported	Moderate • No theoretical perspective identified. • Purposeful sampling selection not described. • No identification of assumptions and biases of researcher.
54	• Phillips, 2013 • UK • National Health Service Hospital Trust	**Observational** • Survey (post/cross-sectional) • N=22 • Not reported	**A leadership program for ward managers** • Four modules, each comprising two eight-hour days. • Addressed the development needs of ward managers. • These covered the themes of leading in context, leading others, and leading change. • A particular feature of the modules was the use of in-house expertise with that of an experienced, academic facilitator. • The Deputy Director of Nursing co-facilitated the taught element of the program providing ongoing opportunities for organizational conversations.	• n=22 • Not reported • Not reported • Ward managers • Not reported	Weak-moderate • Outcome assessor(s) aware of the intervention. • Validity & reliability of data collection tools not reported. • Consistency of intervention not reported.
55	• Platt, 2008 • UK • Acute care hospital	**Mixed Methods** • Survey • Witten comments • N=95 • Not reported	**Charge Nurse Development Program** • Ward Management Toolkit • 4-day program, in addition to nine 1-day events over a 16-week period	• n=95 • Not reported • Not reported • Charge nurses • Not reported	Weak-moderate • Cofounders not accounted for analysis. • No adequate rationale for using a mixed-methods design. • Qualitative and quantitative components not effectively

Study		Study Design ‡	Intervention		Methodological Quality Assessment §
Ref # †	Author, year Country Setting	Data collection methods Sample size (N) Gender	Name Description	# of participant (n) Age Gender Position Years in position	Ratings Component weaknesses
					integrated to answer research questions.
56	• Saab, 2019 • Ireland • Seven geographically dispersed Hospital Group	**Quasi-experimental** ● Survey (pre/post) ● N=79 ● 99% female	**Leaders for Compassionate Care Program** ● This program provided experienced and front-line nursing and midwifery leaders with time away from their organizations where, together with other leaders from a wide range of services and specialties, they participated in their own and each other's leadership development. ● The LCCP provided several opportunities for leaders to learn about patient-focused quality improvement and compassionate leadership. ● Offered over 3 days, grounded in experiential learning, and highly interactive.	● n=168 ● Not reported ● Not reported ● Clinical nurse/midwife managers ● Not reported	Weak-moderate ● Outcome assessor(s) aware of the intervention. ● Numbers and reasons for dropouts or withdrawals were not indicated. ● Consistency of intervention not reported.
57	• Seabold, 2020 • US • Public healthcare system includes medical center & acute care hospitals	**Quasi-experimental** ● Survey (pre/post) ● N=33 ● Not reported	**2-day training session** ● 2-day intensive training session. The content of the combined 2-day session directly aligned with 17 of the 53 components of the Chase Nurse Manager Competency Instrument (CNMCI), including patient acuity systems, research and EBP, effective communication, effective staffing strategies, recruitment strategies, retention strategies, effective discipline, constructive performance evaluation, staff development strategies, interviewing techniques, quality/process improvement, legal issues, conflict resolution, research process, productivity measurements, unit budget control measures, and financial resource monitoring.	● n=45 ● Not reported ● Not reported ● Nurse managers and assistant managers ● Not reported	Weak-moderate ● Outcome assessors not blinded to intervention. ● Consistency of intervention not measured.
58	• Shirazi, 2016 • Sweden • Acute care hospitals	**Experimental (RCT)** ● Survey (pre/post) ● N=731, 110 (self) & 621 (subordinates) ● 82.4% female	**Supportive leadership training** ● Two 1-day, 8-hour workshops. The content and expected outcomes of the workshop were based on the concepts of different leadership styles including the fundamentals of SLB and parts of a similar workshop.	● n=55 ● Not reported ● Not reported ● Head nurses ● Not reported	Moderate ● Consistency of intervention not measured.
59	• Simpson, 2017 • US • Acute care hospital	**Quasi-experimental** ● Survey (pre/post) ● N=8 ● Not reported	**A leadership development program and administrative assistant (AA) support** ● Four AAs were hired and shared among participating NMs to provide clerical support, assistance with payroll, scheduling, work orders, and other tasks. ● Transformational leadership development, Each NM was provided the	● n=8 ● Average 43 yrs old ● Not reported ● Nurse managers ● Average 10 yrs at	Weak-moderate ● Outcome assessor(s) aware of the intervention. ● Numbers and reasons for dropouts or withdrawals were not indicated.

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Ref # †	**Author, year Country Setting**	**Data collection methods Sample size (N) Gender**	**Name Description**	**# of participant (n) Age Gender Position Years in position**	**Ratings Component weaknesses**
			LPI development workbook for individualizing a personal leadership growth plan and to record developmental progress. ● The NM leadership development plan was self-directed and accompanied by coaching and support from the project leader and a mentor selected by each NM. ● The development methods incorporated individual coaching, group discussion, self-reflection, and readings.	management position	● Validity & reliability of data collection tools not reported. .
60	● Sisk 2021 ● US&UK ● Acute care hospitals	**Quasi-experimental** ● Survey (pre/post) ● N=28 ● 71% female	**Advanced Leadership Program** Three components: ● A 3-day in-person course focused on advancing leadership competency. ● A 2.5-hour on- line course focusing on communication. ● A cap- stone project completed over 6 months focusing on an organizational priority selected by executive leadership.	● n=28 ● Not reported ● 71% female ● Chief nurse officers, vice president/director ● Over 5 years of leadership experience	Moderate ● Outcome assessor(s) aware of the intervention. ● Consistency of intervention not reported.
61	● Skytt, 2011 ● Sweden ● Acute care hospitals & primary care	**Mixed Methods** ● Survey (pre/post) & interview ● N=13 (training program), 15 (self-development program), 14 (comparison) ● 77-86 % female	**Self-development program** ● Four overnight seminars (ten days in all) and one "follow-up day". ● Assignments to complete between the seminars: interviewing and shadowing one of their colleagues, conducting literature studies, and carrying out a minor project in a smaller group. **Training Program** ● First phase: five days, group met on four occasions, one of which was a two-day overnight seminar. ● Second phase: Four half-day sessions to four whole days. A one-day follow-up was arranged four months after the end of the program.	● n=13 (training program), 15 (self-development program) ● Not reported ● 77-86 % female ● First-line nurse managers ● 4.5-6.5 yrs as managers	Moderate ● No adequate rationale for using a mixed-methods design. ● Qualitative and quantitative components not effectively integrated to answer research questions.
62	● Spiva, 2020 ● US ● 11 hospital integrated non-profit healthcare system	**Experimental (RCT)** ● Survey (pre/post) & course evaluation ● N=41 (intervention + control) ● 84.5% female (control); 100% female (intervention)	**Charge nurse pilot training program** ● 8-hour, 1-day, in-person session, focused on building a foundation for self-awareness and rejuvenation, understanding factors that lead to burnout, exploration of various life components, and strategies to create equilibrium and wellness. ● Leader Training: an evidence-based curriculum using a classroom-based, instructor-led training model. ● Two employees received training via WebEx from the vendor (8-hour online interactive training) to provide the training content to the charge nurses. ● More than 70% of the course curriculum was spent in group discussions and interactive learning activities. ● Class courses included supervisory skills for positive outcomes and	● n=22 ● Average= 45 yrs ● 100% female ● Charge nurses ● Average 5 yrs. At management position	Moderate ● There were important differences between groups prior to the intervention. ● Outcome assessor(s) aware of the intervention. ● Numbers and reasons for dropouts or withdrawals were not reported. ● Consistency of intervention not reported.

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Ref # †	**Author, year Country Setting**	**Data collection methods Sample size (N) Gender**	**Name Description**	**# of participant (n) Age Gender Position Years in position**	**Ratings Component weaknesses**
			critical thinking for charge nurses.		
63	• Spiva 2021 • US • Acute care hospitals	**Mixed-method** • Survey (pre/post) • N=46 • 43% female	**Nurse leader training and strength-based coaching** • 40-hour course: eight-module course includes business, finance, quality, human resource management and strate- gic thinking, as well as leadership development. • Strength-based coach: provide coach on how to complete their strengths assessment and interpret the assessment report.	• n=46 • Average 41.6 yrs. old • 43% female • Nurse managers and associate nurse managers • Not reported	Weak-moderate • Outcome assessor(s) aware of the intervention. • Consistency of intervention not reported.
64	• Taylor-Ford, 2015 • US • Acute care hospitals	**Mixed methods** • Survey (pre/post) & open-ended questions • N=7 frontline managers & 35 observers (i.e., supervisors, direct reports, and peers) • Not reported	**Leadership Practice Circle Program (LPCP)** • Monthly group sessions in which leadership concepts were explored and utilized for the purposes of enhancing professional growth. • Individualized coaching in which participants met with the leadership coach or nursing leader on a monthly basis for 30 minutes to 1 hour for individualized coaching to discuss participants' learning progress, development issues, and organizational barriers.	• Not reported • Not reported • Not reported • Not reported • Not reported	Weak-moderate • Cofounders not accounted for analysis. • No adequate rationale for using a mixed-methods design. • Qualitative and quantitative components not effectively integrated to answer research questions.
65	• Ueda, 2012 • Japan • Health center	**Quasi-experimental** • Survey (pre/post) • N=86 • Not reported	**Leader-training program** • On-the-job training (OJT) Group training. Group training: three times in the one-year program: in the first to second, fifth to sixth, and tenth to twelfth months after the start of the program.	• n=135 • Not reported • Not reported • Public health nurse leaders • Not reported	Weak-moderate • Validity & reliability of data collection tools not reported. • Numbers and reasons for dropouts or withdrawals were not indicated. • Consistency of intervention not reported.
66	• Vitello-Cicciu, 2014 • US • Not reported	**Qualitative descriptive** • Focus groups & online responses • N=13 • 100% female	**Leadership development program (LDP)** • 4 sessions over a period of 8 weeks using concepts similar to those in the AONE Nurse Manager Leadership Partnership Learning Domain Framework, used with permission. • Teaching modalities included presentation of content, group activities, reflection, journaling, case studies, project development, coaching, and mentoring.	• n=34 • Not reported • 94% female • Nursing leaders • Not reported	Moderate • No theoretical perspective identified. • Role of the researcher & relationship with participants not described. • No identification of assumptions and biases of researcher.

Study		Study Design ‡	Intervention		Methodological Quality Assessment §
Ref # †	**Author, year Country Setting**	**Data collection methods Sample size (N) Gender**	**Name Description**	**# of participant (n) Age Gender Position Years in position**	**Ratings Component weaknesses**
67	• Weston, 2008 • US • University of Arizona Eller College of Management	**Quasi-experimental** ● Survey (pre/post) & subjective assessments ● Not reported ● Not reported	**Arizona Healthcare Leadership Academy** ● 4-day educational program designed to teach fundamental leadership skills. Each module consists of 2.5 hours of interactive classroom instruction plus 1 hour of outside reading assignments and exercises. Material is organized into eight distinct, yet related, modules focused on key leadership topics.	● n=180-270 ● Not reported ● Not reported ● Frontline nursing supervisors ● Not reported	Weak ● Validity & reliability of data collection tools not reported. ● Numbers and reasons for dropouts or withdrawals were not indicated. ● Consistency of intervention not reported.
68	• Wilson, 2013 • Australia • Acute care hospitals	**Qualitative descriptive** ● Stakeholders' analysis, one-on-one interviews, & written feedback ● N=16 ● Not reported	**Nurse unit manager leadership development program (LDP)** ● The program offered opportunities for nurse unit managers to consolidate and extend the knowledge and skills they obtained through attending the workshops offered by the state health department, which had the explicit purpose of developing nurse unit managers across the state.	● n=17 ● Not reported ● 90% female ● Nurse unit managers ● Not reported	Moderate ● Purposeful sampling selection not described. ● Role of the researcher & relationship with participants not described. ● No identification of assumptions and biases of researcher.
69	• Xie, 2021 • China • Acute care Hospitals	**Quasi-experimental** ● Survey (pre/post) ● N=60 (head nurses) ● 98% female (head nurses)	**Patient safety leadership program** ● The training involving 15 lessons requiring a total of 80 hours was divided into 5 sections. ● A senior lecturer in MBA was invited to give the lessons. Other theoretical lessons were given by clinical managers with rich experience in safety management, including directors and deputy directors of the nursing department, experts in safety management, and team leaders involved in hospital safety management. The feedback was conducted by QQ and WeChat online.	● n=60 ● 36-40 yrs. old (51.7%) ● 98% female ● Head nurses ● Not reported	Moderate ● Numbers and reasons for dropouts or withdrawals were not indicated. ● Consistency of intervention not reported.

Notes:

† Numbers assigned to each included article are used for referencing throughout the results section.

‡ **Study design**: Observational designs include cross-sectional studies in which there is no randomization and no control group. Quasi-experimental designs lack full control or randomization for example of participants, location, and timing of the intervention. Experimental designs use randomization and control, for example randomized control trial (RCT). Qualitative descriptive designs include qualitative studies with no specific methodology, but a qualitative data collection and analysis, e.g., in-depth interviews or focus groups, and hybrid thematic analysis (inductive and deductive). Mixed methods designs include those combine elements of qualitative and quantitative research approaches (e.g., use of qualitative and quantitative viewpoints, data collection, analysis, inference techniques) (Johnson, Onwuegbuzie, & Turner, 2007).

§ **Quality**: Studies were classified as weak (0–0.25), weak-moderate (0.26–0.50), moderate (0.51–0.75), or strong (0.76–1.0).

Table 2.2 Intervention aims, ingredients and leadership outcomes categorized into Yukl's Taxonomy†

First author, year	Intervention												Leadership Outcomes Categorized into Yukl Taxonomy†				
	Name	Aims		Ingredients													
		To improve knowledge (n=34)	To improve skills or abilities (n=64)	In-person course-based lectures (n=53)	Discussion group (n=46)	Coach/ Mentor (n=23)	Read materials (pre-lecture+ read alone) (n=18)	Self-reflection, mindfulness, or journal (n=13)	Online learn modules (n=13)	Peer support (n=9)	Role play scenarios (n=8)	Relation-oriented Leadership (n=53)	Task-oriented Leadership (n=39)	Change-oriented Leadership (n=35)	External Leadership (n=19)	Overall Leadership (n=33)
Goktepe, 2018	Nurse Manager Development Program		✓	✓	✓		✓				✓	Support (+) Recognize (+) Empower (+)	Plan (+ & 0) Monitor operations (+ & 0) Problem solve (+)	Advocate change (+) Envision change (+) Encourage innovation (+)	External monitor (+)	
Patrician, 2018	Mapp and Sustain a Personal Leadership Journey	✓	✓	✓	✓			✓				Support (+) Develop (+) Empower (+)	Plan (+) Monitor operations (+)	Encourage innovation (+)	External monitor (+)	
Omoike, 2011	Administrative nurs leadership (ANL) certificate program	✓	✓						✓			Support (+) Empower (+)	Plan (+ & 0) Monitor operation (+)	Encourage innovation (+)	Network (+) External monitor (0) Represent (+)	+
Cooper, 2003	Lead an Empowered Organization (LEO) program		✓	✓	✓							Support (0 & +) Recognize (0) Empower (0)	Clarify (+) Monitor operations (0)	Envision change (+) Encourage innovation (0 & +)	Network (+)	+
Saab, 2019	Leaders for Compassionate Care Program		✓	✓	✓							Support (+)	Clarify (+)	Advocate change (+) Facilitate collective learn (+)	Network (+)	
Cunnham, 2000	Royal College of Nurs Clinical Leadership Development Program		✓	✓		✓						Support (+ & Q+)	Monitor operations (- & 0)	Envision change (Q+) Encourage innovation (+)	Network (Q+) External monitor (Q+)	+

First author, year	Intervention											Leadership Outcomes Categorized into Yukl Taxonomy†				
	Name	Aims		Ingredients												
		To improve knowledge (n=34)	To improve skills or abilities (n=64)	In-person course-based lectures (n=53)	Discussion group (n=46)	Coach/ Mentor (n=23)	Read materials (pre-lecture+ read alone) (n=18)	Self-reflection, mindfulness, or journal (n=13)	Online learn modules (n=13)	Peer support (n=9)	Role play scenarios (n=8)	Relation-oriented Leadership (n=53)	Task-oriented Leadership (n=39)	Change-oriented Leadership (n=35)	External Leadership (n=19)	Overall Leadership (n=33)
Taylor-Ford, 2015	Leadership Practice Circle Program (LPCP)	✓	✓	✓	✓	✓	✓	✓				Support (0) Develop (+) Empower (0)	Plan (0)	Envision change (0) Encourage innovation (0)	Network (0)	
Nghe, 2020	A comprehensive leadership train program for mid-level leaders	✓	✓	✓	✓	✓	✓				✓	Empower (0)	Clarify (+) Problem solve (0)	Advocate change (Q+) Envision change (0)	Network (0)	
Weston, 2008	Arizona Healthcare Leadership Academy	✓	✓	✓	✓		✓				✓	Support (0) Empower (0)	Plan (0) Monitor operations (0) Problem solve (0)	Advocate change (0)	External monitor (0)	
Aqtash, 2022	Nurs leadership quality improvement train program		✓	✓	✓						✓	Support (+) Develop (+) Empower (+)	Plan (+) Problem solve (+)	Envision change (+) Encourage innovation (+)		+
Mcgarity, 2020	Evidence-based leadership curriculum	✓	✓	✓	✓					✓		Support (+) Develop (+) Empower (+)	Plan (+) Monitor operations (+)	Encourage innovation (+)		
Ogilvie, 2021	Nurse Manager Leadership Development Program	✓	✓		✓			✓	✓			Support (+) Empower (+)	Plan (+) Monitor operations (+)	Envision change (+) Encourage innovation (+)		
Spiva 2021	Nurse leader train and strength-based coach		✓	✓	✓	✓	✓		✓			Support (+)	Monitor operations (+ & 0)	Encourage innovation (+)		+
Pedaline, 2012	Mentor program		✓			✓	✓	✓				Support (0) Recognize (+)	Clarify (Q+)	Envision change (+)		

First author, year	Intervention											Leadership Outcomes Categorized into Yukl Taxonomy†				
	Name	Aims		Ingredients												
		To improve knowledge (n=34)	To improve skills or abilities (n=64)	In-person course-based lectures (n=53)	Discussion group (n=46)	Coach/ Mentor (n=23)	Read materials (pre-lecture+ read alone) (n=18)	Self-reflection, mindfulness, or journal (n=13)	Online learn modules (n=13)	Peer support (n=9)	Role play scenarios (n=8)	Relation-oriented Leadership (n=53)	Task-oriented Leadership (n=39)	Change-oriented Leadership (n=35)	External Leadership (n=19)	Overall Leadership (n=33)
												Empower (+)		Encourage innovation (+)		
Jeon, 2018	Ethical leadership program (ELP)	✓	✓	✓	✓							Develop (+)	Plan (+)	Envision change (0)		0
Ueda, 2012	Leader-train program	✓	✓	✓	✓							Support (0)	Clarify (+) Plan (+) Monitor operations (0) Problem solve (0)	Envision change (0)		
Menegaz, 2020	Executive coach		✓			✓						Support (Q+) Empower (Q+)	Clarify (Q+) Monitor operations (Q+)	Encourage innovation (Q+) Facilitate collective learn (Q+)		
Clarke, 2012	Take the lead (ttl) program		✓	✓								Support (Q+) Empower (Q+)	Plan (Q+)	Envision change (Q+)		
Hancock, 2006	Lead an Empowered Organization (LEO) program		✓	✓	✓							Empower (Q+)	Problem solve (Q+)	Encourage innovation (Q+)		Q+
Wilson, 2013	Nurse unit manager leadership development program (LDP)	✓		No description								Empower (Q+)	Monitor operations (Q+) Problem solve (Q+)	Encourage innovation (Q+)		
Flatekval, 2019	Leadership development program		✓	✓					✓	✓		Support (0) Develop (0) Empower (0)	Plan (0) Monitor operations (0)	Encourage innovation (0)		

First author, year	Intervention											Leadership Outcomes Categorized into Yukl Taxonomy†				
	Name	Aims		Ingredients												
		To improve knowledge (n=34)	To improve skills or abilities (n=64)	In-person course-based lectures (n=53)	Discussion group (n=46)	Coach/ Mentor (n=23)	Read materials (pre-lecture+ read alone) (n=18)	Self-reflection, mindfulness, or journal (n=13)	Online learn modules (n=13)	Peer support (n=9)	Role play scenarios (n=8)	Relation-oriented Leadership (n=53)	Task-oriented Leadership (n=39)	Change-oriented Leadership (n=35)	External Leadership (n=19)	Overall Leadership (n=33)
Fennimore, 2011	University of Pittsburgh Medical Center (UPMC) Leadership Development for Nurs Middle Managers program	✓	✓	✓	✓		✓					Support (0) Develop (0) Empower (0)	Plan (0) Monitor operations (0)	Encourage innovation (0)		
Maries-Tillott, 2006	Development program for senior nurses	✓	✓	✓	✓	✓						Empower (0)	Monitor operations (0)	Encourage innovation (0)		
Luk, 2018	Leadership Enhancement Program	✓	✓	✓	✓							Support (0) Develop (0) Empower (+)	Clarify (+)		Network (+)	
Cole, 2020	Frontline nurse leaders (FLNLs) simulation scenarios		✓		✓		✓		✓	✓		Support (0)	Problem solve (0)		Network (0)	
Xie, 2021	Patient safety leadership program	✓	✓	✓								Support (+)	Monitor operations (+)			+
Sisk 2021	Advanced Leadership Program		✓	✓					✓	✓		Support (+) Empower (+)	Plan (+)			
Dols 2021	Charge nurses' education program (CNEP)		✓	✓							✓	Support (+ & 0)	Plan (+) Problem solve (+)			

First author, year	Intervention											Leadership Outcomes Categorized into Yukl Taxonomy†				
	Name	Aims		Ingredients												
		To improve knowledge (n=34)	To improve skills or abilities (n=64)	In-person course-based lectures (n=53)	Discussion group (n=46)	Coach/ Mentor (n=23)	Read materials (pre-lecture+ read alone) (n=18)	Self-reflection, mindfulness, or journal (n=13)	Online learn modules (n=13)	Peer support (n=9)	Role play scenarios (n=8)	Relation-oriented Leadership (n=53)	Task-oriented Leadership (n=39)	Change-oriented Leadership (n=35)	External Leadership (n=19)	Overall Leadership (n=33)
Shirazi, 2016	Supportive leadership train		✓	✓	✓						✓	Support (+) Develop (+) Recognize (+)	Plan (0&+)			+
Mackoff, 2013	Leadership Laboratory (LL)		✓	✓	✓		✓					Support (+) Empower (+)	Plan (+)			
Hyrkäs, 2005	Clinical supervision		✓		✓	✓						Support (Q+) Empower (Q+)	Monitor operations (Q+)			
Vitello-Cicciu, 2014	Leadership development program (LDP)	✓	✓	✓	✓	✓		✓				Support (Q+) Empower (Q+)	Monitor operations (Q+)			
Mackoff, 2017b	American Organization of Nurse Executives (AONE) Nurse Manager Fellowship (NMF)		✓	No description								Support (Q+) Empower (Q+)		Encourage innovation (0&Q+) Facilitate collective learn (Q+)	Network (Q+)	0&Q+
Mackoff, 2017a												Support (0) Empower (0)		Encourage innovation (0)	External monitor (0)	0
Duygulu, 2011	Transformational leadership train program		✓	✓								Support (+) Recognize (+) Empower (+)		Envision change (+) Encourage innovation (+)		+
Marath, 2015	Leadership development package (LDP)		✓	No description								Support (+ & Q+) Recognize (+) Empower (+)		Envision change (+) Encourage innovation (+)		Q+

First author, year	Intervention											Leadership Outcomes Categorized into Yukl Taxonomy†				
	Name	Aims		Ingredients												
		To improve knowledge (n=34)	To improve skills or abilities (n=64)	In-person course-based lectures (n=53)	Discussion group (n=46)	Coach/ Mentor (n=23)	Read materials (pre-lecture+ read alone) (n=18)	Self-reflection, mindfulness, or journal (n=13)	Online learn modules (n=13)	Peer support (n=9)	Role play scenarios (n=8)	Relation-oriented Leadership (n=53)	Task-oriented Leadership (n=39)	Change-oriented Leadership (n=35)	External Leadership (n=19)	Overall Leadership (n=33)
Simpson, 2017	A leadership development program and administrative assistant (AA) support	✓	✓		✓	✓	✓	✓		✓		Support (+) Develop (+) Recognize (0) Empower (0)		Envision change (+) Encourage innovation (+)		+
Martin, 2012 & Martin, 2014	Clinical Leadership Program (CLP)		✓	✓	✓	✓						Support (0) Develop (0) Empower (0)		Envision change (+) Encourage innovation (+)		
Spiva, 2020	Charge nurse pilot train program		✓	✓	✓	✓						Support (+ & Q+) Develop (Q+) Empower (Q+)		Envision change (Q+) Encourage innovation (Q+)		+
Dewar, 2019	My Home Life Leadership Support program	✓	✓	✓	✓							Support (Q+) Empower (Q+)		Advocate change (Q+)		
Bateman, 2020	Blended learn		✓	✓	✓				✓			Support (0) Recognize (0) Empower (0)		Envision change (0) Encourage innovation (0)		
Kvist, 2014	Evidence-Based Nurs Leadership (EBNL) train	✓	✓	✓	✓	✓	✓		✓			Support (0)		Encourage innovation (0)		
Skytt, 2011	Self-development program	✓		✓								Support (0) Recognize (0)			External monitor (0)	
	Train Program	✓		✓	✓		✓					Support (0) Recognize (+)			External monitor (+)	
Platt, 2008	Charge Nurse Development Program		✓	✓			✓					Empower (0)			Network (Q+)	Q+

First author, year	Intervention											Leadership Outcomes Categorized into Yukl Taxonomy†				
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		To improve knowledge (n=34)	To improve skills or abilities (n=64)	In-person course-based lectures (n=53)	Discussion group (n=46)	Coach/ Mentor (n=23)	Read materials (pre-lecture+ read alone) (n=18)	Self-reflection, mindfulness, or journal (n=13)	Online learn modules (n=13)	Peer support (n=9)	Role play scenarios (n=8)	Relation-oriented Leadership (n=53)	Task-oriented Leadership (n=39)	Change-oriented Leadership (n=35)	External Leadership (n=19)	Overall Leadership (n=33)
Crowne, 2017	Lead nurses development program		✓	✓		✓				✓		Empower (+)				+
Mushtaq, 2021	Transformational leadership educational program	✓	✓	✓							✓	Support (+)				+
MacPhee, 2012 & MacPhee, 2014	American Organization of Nurse Executives (AONE) Nurse Manager Fellowship (NMF)		✓	✓	✓	✓				✓		Empower (+)				Q+
Hubley 2022	Strengths-Based Nurs and Healthcare Leadership and Management program		✓		✓	✓		✓		✓		Support (Q+)				+
Kaba-Makukula, 2019	Instant messag		✓		✓				✓			Support (Q+)				
Lalleman, 2017	Peer-to-peer shadow		✓			✓						Empower (Q+)				
Penney, 2018	My Home Life program		✓	✓	✓							Support (Q+)				Q+

First author, year	Intervention											Leadership Outcomes Categorized into Yukl Taxonomy†				
	Name	Aims		Ingredients												
		To improve knowledge (n=34)	To improve skills or abilities (n=64)	In-person course-based lectures (n=53)	Discussion group (n=46)	Coach/ Mentor (n=23)	Read materials (pre-lecture+ read alone) (n=18)	Self-reflection, mindfulness, or journal (n=13)	Online learn modules (n=13)	Peer support (n=9)	Role play scenarios (n=8)	Relation-oriented Leadership (n=53)	Task-oriented Leadership (n=39)	Change-oriented Leadership (n=35)	External Leadership (n=19)	Overall Leadership (n=33)
Seabold, 2020	2-day train session	✓		✓									Plan (0) Monitor operation (0)	Encourage innovation (0)	Network (0)	
Lankshear, 2010	Actively Lead In Virtual Environments (ALIVE) pilot program		✓	✓	✓		✓						Monitor operations (+)			
Mcfarlan, 2020	Focused didactic educational intervention	✓	✓	✓	✓								Plan (+)			
McKinney, 2016	Experiential learn	✓	✓		✓		✓				✓		Plan (+)			
Debono, 2016	'Take The Lead' program	✓	✓	✓	✓	✓							Plan (Q+)			0
Phillips, 2013	A leadership program for ward managers		✓	✓	✓								Plan (0) Monitor operations (0)			0
Frasier, 2019	Pilot leadership development program	✓	✓	✓				✓		✓			Clarify (0) Plan (0)			
Greenwood, 2002 (part I & part II)	Clinical Development Unit (CDU) Leadership Preparation Program	✓	✓	✓										Envision change (Q+)		Q+
Lee, 2015	A clinical leadership program	✓	✓	✓		✓		✓	✓						Network (Q+)	0 & Q+

First author, year	Intervention											Leadership Outcomes Categorized into Yukl Taxonomy†				
	Name	Aims		Ingredients												
		To improve knowledge (n=34)	To improve skills or abilities (n=64)	In-person course-based lectures (n=53)	Discussion group (n=46)	Coach/ Mentor (n=23)	Read materials (pre-lecture+ read alone) (n=18)	Self-reflection, mindfulness, or journal (n=13)	Online learn modules (n=13)	Peer support (n=9)	Role play scenarios (n=8)	Relation-oriented Leadership (n=53)	Task-oriented Leadership (n=39)	Change-oriented Leadership (n=35)	External Leadership (n=19)	Overall Leadership (n=33)
Brown-DeVeaux, 2021	Nurs leader mentorship program		✓	✓	✓	✓		✓							External monitor (0)	0
Al-Hussami, 2017	Leadership guidance program	✓	✓	✓	✓		✓	✓								+
McNally, 2006	Coach program		✓	✓	✓	✓										Q+
Eldh, 2018	Leadership program	✓	✓	✓	✓				✓							Q+
Foster, 2018	Certificate in leadership and management practice (CLMP) program	✓	✓	✓	✓	✓	✓		✓							Q+
Hsu, 2011	Leadership Orientation Program	✓	✓	✓	✓	✓										0
Johnson, 1991	Management train program	✓	✓	✓	✓											0

†: Categorised into the four domains of Yukl's Hierarchical Taxonomy for leadership behaviours: 1) task-oriented, 2) relation-oriented, 3) change-oriented, and 4) external leadership behaviours.

+: statistical significant increase; 0: no- statistical significant change; -: statistical significant decrease; Q+: improvement in based on qualitative data

Table 2.3 Participants' perceptions of participating in the interventions (n=36)

Study (Author, year) Intervention	Participants' perceptions of the interventions
Brown-DeVeaux, 2021 *[Nursing leader mentorship program]*	• Established mentorship relationships after intervention.
Clarke, 2012 *[Take the lead (ttl) programme]*	• Provided networking opportunities.
Cole, 2020 *[Frontline nurse leaders simulation scenarios]*	• The realism of the scenarios, post-simulation debriefings, simulation lab environment, formal debriefing process with time limit was crucial to learning experience.
Cooper, 2003 [*Leading an Empowered Organisation (LEO) programme]*	• More appropriate for point-of-care nurses. • Could be improved by reducing class size and employing an additional tutor. • Some components (i.e., communication issues, networking and the importance of articulating the goal to staff) had no impact on their work. • Mentorship and feedback were essential components.
Debono, 2016 *[Take The Lead' program]*	• Networking and peer support were helpful.
Dols 2021 *[Charge nurses' education program]*	• Positive attitude towards the intervention.
Eide, 2016 *[Ethical leadership educational programme]*	• "Situational feedback" was effective, it stimulated self-reflection, confidence in the leadership role and motivation for action. • "Reflection questions" were helpful and stimulating. • "Mindfullness exercises" received mixed response: boring, not easy VS pleasant, useful. • "I'm ok diary" was pleasant, rewarding and related to leadership. • suggested expanding the training program and placing content on website.
Eldh, 2018 *[Leadership program]*	• Appreciated the experience of participating in the intervention. • Lack of sharing experiences and progress between managers.
Fennimore, 2011 *[University of Pittsburgh Medical Center (UPMC) Leadership Development for Nursing Middle Managers program]*	• Overall positive attitude towards the intervention. • Appreciate group interaction, sharing & obtaining useful tools. • Most valuable content included finance and budgeting techniques, conflict management skills, and staff motivation strategies.

Study (Author, year) Intervention	Participants' perceptions of the interventions

Greenwood, 2002
(part I & part II)
"Clinical Development Unit (CDU) Leadership Preparation Program"
	• Pre-course reading provided important sources.
	• Overwhelming theoretical materials and insufficient time influenced the learning results.
	• Disappointing experiences of reflective mentoring.
	• Mentoring was too short to develop the trust prerequisite between mentor and mentee.
	• Mentors' lack of mentoring skills & trustworthiness.
	• Development of an evidence culture in nursing is impeded by a range of factors, including lack of:
	  • Knowledge of research methods.
	  • Confidence.
	  • Access to appropriate resources.
	  • Mentors.
	  • Exposure to positive attitudes towards research.
	  • Empowerment.
	  • Time for development work.
	  • Trust in others.
	• When recognized as valuable by supervisors and peers, they thrive.

Hancock, 2006 [*Leading an Empowered Organisation (LEO) programme]*	• Effective relationship between managers and their colleagues, enough autonomy and authority facilitated the utilization of knowledge and skills they learned. • Understaffing, lack of skills, more leadership experience, and ineffective communication impeded the utilization.
Hsu, 2011 *[Leadership Orientation Program]*	• Satisfied with the "teaching resources" and "curriculum and instruction". • Received most support from point-of-care nurses and nurse administrators.
Hubley 2022 *[Strengths-Based Nursing and Healthcare Leadership and Management program]*	• Overall positive attitude towards the intervention. • Became reflective leader, recognized the impact that social relationships had on influencing the culture of the work environment. • Mentoring enhanced communication, influenced the workplace culture and caring for families.
Hyrkäs, 2005 *[Clinical supervision]*	• Provided broader perspectives on work and enhanced the use of clinical supervision.
Johannessen 2019 *[Improving Quality and Safety in Primary Care—Implementing a*	• Committed to and positive about using leadership guide. • Quality improvement tool for structure and system is important. • Suggested to involve patients/users between workshops.

Study (Author, year) Intervention	Participants' perceptions of the interventions
Leadership Intervention in Nursing Homes and Home care (SAFE-LEAD)]	
Kabinga-Makukula, 2019 *[Instant messaging]*	• Provided opportunities for sharing professional-related information, consulting on challenging work-related problems and sharing information related to day-to-day work**.** • Helped transfer knowledge participants learned into their practice. • Helpful in fostering educational interactions. •
Lalleman, 2017 *[Peer-to-peer shadowing]*	• Positive expectations towards peer-to-peer shadowing. • Enjoy the experience of peer-to-peer shadowing. •
Lankshear, 2010 *[Actively Leading In Virtual Environments (ALIVE) pilot program]*	• Knowledge shared supported their role as nursing leaders**.** • Networking with other nursing leaders is vital. • Satisfied with the content and application to their role.
Luk, 2018 *[Leadership Enhancement Program]*	• Reflecting and refreshing, gain more self-understanding, reviving program. • Well organized, inspiring, enjoyable, enlightening and fruitful program.
Mackoff, 2013 *[Leadership Laboratory (LL)]*	• Provided learning opportunities, atmosphere of trust, emphasis on nurse managers' experiences. • Valued the peer consultation, discussion, and support.

MacPhee, 2012 & MacPhee, 2014 *[Nursing Leadership Institute]*	• Provided:
	  • Resources and tools.
	  • Project management competencies.
	  • Confidence.
	  • Validation/affirmation of self as a leader.
	• Evidence-based and rigorous.
	• More nursing focus and networking with other nurse leaders.
	• Most significant components to nurse leaders were mentor support and project work, online knowledge network was least used.

Marath, 2015 *[Leadership development package]*	• Satisfied with the intervention, easy to implement what they learned. • Agreed to attend similar program in the future. • Suggested replacing theory portion with stories of successful leaders. • Positive attitude towards leadership training program and ready to provide support.
Maries-Tillott, 2006 *[Development program for senior nurses]*	• Satisfied with coaching framework.

Study (Author, year) Intervention	Participants' perceptions of the interventions

Martin, 2012 & Martin, 2014
[Clinical Leadership Programme (CLP)]
	• Developmental of a vision is a creative, joyful, time-consuming and non-linear process.
	• Nurse leaders took cognitive-analytical, intuitive or combined approaches to develop a vision.
	• Fostering factors:
	  • Being able to discuss with colleagues who are knowledgeable about certain practice fields.
	  • Matching the leadership philosophy and the vision of the wider organization.
	  • Commitment of nurse managers.
	  • Had enough experience working in the practice field.
	• Hindering factors:
	  • Time constraints and high workload.
	  • Lack of inspiration and existing perspectives.
	  • Thinking about possible difficulties or problems in transferring the vision into practice.

McNally, 2006 *[Coaching program]*	• Program met and frequently exceeded expectation. • Perceived more value from one-to-one versus group coaching.

Menegaz, 2020
[Executive coaching]
	• Problems identified in:
	  • Conflicts with subordinates.
	  • Activity and work overload.
	  • Continuing education.
	  • Lack of communication.
	  • Motivation.
	  • Acting as leader.
	  • Personal problems.
	  • Unclear roles.

Nghe, 2020 *[A comprehensive leadership training program for mid-level leaders]*	• Networking was helpful.
Ogilvie, 2021 *[Nurse Manager Leadership Development Program]*	• Overall positive attitude towards the intervention.

Study (Author, year) Intervention	Participants' perceptions of the interventions
Patrician, 2018 *[Mapping and Sustaining a Personal Leadership Journey]*	• Helpful workshop by providing networking opportunities and professional development. • Use of action plan was helpful for behavioural change. •
Pedaline, 2012 [*Mentoring program]*	• The mentoring was helpful and valuable. • Time management was a barrier. • Mentoring coupled with 360-degree feedback, suggestions, and support increased clarity.
Penney, 2018 *[My Home Life programme]*	• Appreciated the time out to reflect and develop the information offered. • Appreciated the potential effect of the program on their relationships with staff and on practice development. • Appreciated the importance of relationship-centered care.
Phillips, 2013 *[A leadership programme for ward managers]*	• High attendance and completion of sessions. • Positive experience of action learning sets.
Saab, 2019 *[Leaders for Compassionate Care Programme]*	• Satisfied with program.
Skytt, 2011 *[Training Programme]*	• Well-organized lectures, open dialogue with experienced managers and directors, discussion and sharing of managerial experience.
[Self-development programme]	• Program enriched the interaction with peers; higher levels of manager involvement, useful tools; but too demanding & jammed outline.
Sisk 2021 *[Advanced Leadership Program]*	• Positive attitude towards peer support, it improved working relationships, and expectations.
Wilson, 2013 *[Nurse unit manager leadership development program (LDP)]*	• Support and trust are valuable. • Various issues influenced the formation of the group, such as time and prioritizing, group members, the consistency and size of the group membership, membership process. • Responsive to immediate learning needs. • External facilitator was identified as a role model and provided challenges. • Liked the program to continue and to mentor future groups.

Chapter 3: Development of a training program prototype to enhance implementation leadership of Chinese nurse managers: A qualitative descriptive study

In Chapter II, I conducted a mixed-method systematic review of leadership development interventions for managers supervising nurses. I synthesised the components and influence of 68 interventions to improve leadership competencies of managers supervising nurses, and explored the managers' perceptions of participating in these interventions. The interventions included nine different components, such as in-person lectures, discussion groups, coaching, mentoring, and self-reflection, among others. The studies showed that interventions using modalities such as lectures, group work, and mentoring generally had positive effects on improving leadership competencies. Based on the review findings, I provided five implications for future leadership interventions aimed at developing managers supervising nurses.

In this chapter, I aimed to develop a protype for a training program to enhance implementation leadership of unit nurse managers in China, based on the findings and implications of Chapter II, relevant frameworks and interventions. I submitted this manuscript to the Journal of Nursing Management. Please note that, in accordance with the journal's guidelines, I will remove the additional files in this chapter from the submission version to the journal.

Title Page

Development of a training prototype to enhance implementation leadership of Chinese nurse managers: A qualitative descriptive study

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Abstract

Background: Unit nurse managers hold leadership positions that can facilitate implementation of evidence-based practice (EBP). Studies show that nursing managers in China lack competencies and behaviours necessary to lead EBP implementation. The current study aimed to describe the development process of a prototype for a Chinese context-specific training program to enhance the implementation leadership competencies and behaviours of unit nurse managers.

Methods: We used a descriptive qualitative study design and followed an integrated knowledge translation (IKT) approach to co-develop the prototype in a tertiary hospital in Changsha, China. Seven nurse managers from the participated hospital and a researcher co-developed the prototype based on the Ottawa Model of Implementation Leadership (O-MILe). The development process encompassed four phases over 5 months: Phase 1: a group discussion with participating managers to introduce the study and engage them in the development process; Phase 2: two interviews with the 7 managers participating in the development process (n=14 interviews) and group discussions (n=2) to explore the importance of each O-MILe behaviour, identify the need for modifications and cultural relevance, actions to operationalize each behaviour and the competencies needed; Phase 3: interviews (n=7) and a group discussion (n=1) to develop elements of the training program and delivery strategies; Phase 4: group discussion (n=1) to modify the prototype. All data were analysed by two independent researchers using the thematic analysis method.

Results: Managers agreed that all O-MILe behaviours were important to EBP implementation in their setting. Four of the 14 O-MILe leadership behaviours were modified for clarification and adapted for cultural relevance. The actions that managers identified to operationalize the leadership behaviours related to current clinical practices and EBP, nurses, patients, interprofessional staff members, incentives and resources, organization and external entities. Managers identified the need for general competencies related to: 1) EBP, 2) professional nursing, and 3) implementation leadership. The training program includes multimodal activities such as lectures, experience sharing, group discussions, plan development and coaching.

Conclusions: All O-MILe leadership behaviours were perceived as essential for unit nurse managers to lead EBP implementation in the hospital context in China. This study revealed the leadership actions and the competencies required for nursing managers to implement EBP in China. Further studies are required to evaluate the acceptability and impact of this prototype.

Keywords: nursing leadership, evidence-based practice, implementation science, qualitative descriptive, integrated knowledge translation

3.1 Background

Evidence-based practice (EBP) refers to practitioners' conscientious, explicit and judicious use of current best evidence when making decisions about patient care [1]. The implementation of EBP is well-recognised as a global priority for bridging the gap between knowledge and action and for reducing health inequities [2]. Researchers have found numerous factors that impede or enhance the implementation process, such as the quality of evidence being used, the context of implementation (e.g. healthcare systems or organizational settings) and the characteristics of individuals involved in the process [3].

Leadership is increasingly recognised as a strong factor for the implementation of EBP [4]. Leadership has been defined in many ways. A widely employed definition of leadership is that it is a process that influences others to accomplish common goals [5]. Unit-level nurse managers (hereafter referred to as unit nurse managers) oversee point of care nurses in healthcare organisations and are supervised by senior managers (e.g. nursing administrators, executives and directors); they are thus in a unique position to promote the implementation of EBP in their organisations [6, 7]. When proactively engaged, unit nurse managers' leadership behaviours can promote the frontline use of research evidence and influence senior managers' directives for implementing EBP [6].

Notably, a lack of leadership has been consistently identified as a prominent barrier to EBP implementation [4]. Due to the accumulating interest in leadership and EBP over the last decade, several researchers have developed and tested interventions to improve nursing leadership for EBP implementation. Kvist et al. [8] and Wallen et al. [9] developed such interventions and produced positive but non-statistically significant effects on outcomes such as

leadership knowledge, belief in EBP, organisational readiness and culture that support EBP. Richter et al. [10] developed a generic implementation leadership intervention for healthcare managers and discovered that the intervention improved managers' knowledge of leading EBP implementation and mixed effects on their behaviours change. Gifford et al. [11, 12] developed a leadership-focused intervention for nurse managers to facilitate nurses implementing EBP. Authors found that the intervention had a positive influence on the nursing practice change [13]. This intervention was guided by the Ottawa Model of Implementation Leadership (O-MILe), which provides a theoretical foundation for developing and operationalizing unit-level leadership to implement EBP in health care settings, identifying both the knowledge and skills required to develop implementation leadership and the specific behaviours required for practice [14]. According to Gifford et al. [15], implementation leadership encompasses not only a set of behaviours but also a process in which leaders engage in various behaviours and activities to influence individuals, their environment, and organizational structures in the implementation of EBPs to achieve optimal nursing practice and patient outcomes.

In China, nurse managers work at either the senior (i.e. nursing directors and sector nurse managers) or unit level (i.e. unit nurse managers) [16]. Nursing directors are responsible for the management of all nursing units in the hospital. They make budgetary decisions and organise and approve continuing education for nurses. Sector nurse managers are supervised by nursing directors and are responsible for the management of multiple units in their sectors (e.g. surgical, internal medicine, outpatient), with one or more unit nurse managers reporting to them. Unit nurse managers directly supervise point-of-care nurses and all activities related to the nursing practice as well as overseeing patient care in their respective units [17]. In China,

unit nurse managers are familiar with clinical practice as they are all nurses with rich clinical nursing experiences [17]. One survey of 1300 nurse managers revealed that unit nurse managers communicated quite frequently with patients and their families to understand patients' conditions [16]. They also influenced physicians' support of nursing practice in multiple ways, such as coordinating nurse-physician relationships [16]. In addition, the Chinese work culture emphasizes respect for hierarchy and harmony with others [18]. Leaders in formal management positions in China often have the authority and perceived superiority to command obedience and loyalty of subordinates within hierarchical working environments [17]. Specifically, according to Wu et al. [19], leaders may assert their authority over subordinates and expect obedience. In summary, unit nurse managers in China hold essential leadership positions that can initiate and facilitate EBP implementation as they are familiar with current nursing practice and have perceived authority to directly influence nurses' implementation of EBP and other key stakeholders in the process.

A scoping review found that leadership support is the strongest facilitator to implement EBP in the Chinese nursing context [2]. However, the results of several studies revealed that nurse managers lack the knowledge and skills necessary to lead EBP implementation [17, 20, 21]. Thus, interventions are needed to develop nursing managers' implementation leadership competencies. In 2016, a group of international scholars developed a theory-informed leadership intervention to implement evidence-based pain management practices in Shanghai, China [22]. To date, this is the only intervention in China that focuses on the role of nursing leadership in promoting EBP implementation. The intervention focused on the leadership behaviours in the O-MILe. However, the researchers did not explore whether the

implementation leadership behaviours specified in the O-MILe were essential for Chinese nurse managers, or whether the Chinese culture and nursing context influenced managers' implementation leadership practices. Specifically, it is unknown whether the hierarchical Chinese work environment or the formal authority and position of nurse managers influences the types of leadership behaviours required to implement EBP. Also, the actions that managers need to take to lead EBP implementation in China remain to be determined. Therefore, there is a need to identify leadership behaviours that are essential for nurse managers to promote implementation of EBP in China, and to develop interventions that strengthen the competencies required for nursing managers to enact implementation leadership behaviours.

Leadership competencies refer to the leadership knowledge, skills and abilities required to influence staff towards achieving particular organisational goals [23]. Leadership knowledge is the theoretical or practical understanding of leadership that's acquired through experience or education, skills refer to the use of this knowledge in execution or performance, and ability is inherent or developed quality that enable a person to perform leadership tasks effectively [24–26]. Leadership behaviours refer to a leader's observable methods of facilitating the achievement of organisational goals and includes the ways in which a leader interacts with others [27]. Actions refer to the specific steps taken by a leader that demonstrates specific behaviours. For example, to show recognition for staff's efforts to change (behaviour), leaders may publicly praise their staff or provide salary raises (actions).

The overarching aim of this study was to describe the development process of a prototype for a training program to enhance the implementation leadership competencies and

behaviours of unit nurse managers in the Chinese nursing context. We aimed to answer the following research questions:

1) What leadership behaviours do Chinese nurse managers believe are critical to facilitate implementation of EBP?

2) What modifications are needed to ensure the leadership behaviours accessible to Chinese nurse managers?

3) What actions are required to operationalize each behaviour?

4) What competencies are needed to develop these behaviours?

5) What strategies are suitable to deliver the implementation leadership training program to unit nurse managers in China?

3.2 Methods

3.2.1 Design

Using an integrated knowledge translation (IKT) approach [28], we incorporated a descriptive qualitative research design to answer the research questions and develop the training program prototype [29, 30]. We chose the qualitative descriptive design to acquire an in-depth understanding of the development of the content (i.e., implementation leadership behaviours, actions and competencies) and delivery strategies of the training program prototype from the perspective of knowledge users. Recognizing that IKT can involve knowledge users in all aspects of a research study from developing the research question to determining the methodology and methods, the knowledge users in this study were only involved in co-developing the

training program prototype. The knowledge users included nursing managers from various leadership levels in a Chinese hospital who have knowledge of and understand Chinese culture, the nursing context and have the potential for implementing the training program. Using an IKT approach allowed us to 1) develop a training program prototype that is compatible with the hospital context in China, 2) integrate Chinese cultural values into the prototype and 3) ensure outputs meet the intended users' needs [28]. We reported the study methods and findings following the Guidance for reporting intervention development studies in health research [31] (See Appendix 3.1), and Consolidated Criteria for Reporting Qualitative Research [32] (see Appendix 3.2).

3.2.2 The Ottawa Model of Implementation Leadership (O-MILe)

The O-MILe (see Figure 3.1) is a theoretical model illustrating the knowledge and skills required for leaders to practice change-oriented, task-oriented and relations-oriented leadership behaviours to facilitate implementation of EBP for high-quality healthcare delivery and positive patient, provider and system outcomes [14]. The embedded mechanisms of O-MILe indicate that successful implementation requires leaders to understand site-specific evidence–practice gaps, implementation strategies, and how leadership influences planned change processes [14]. Leaders must also have the skills to prioritise change, set target goals and encourage staff to practice evidence-based care for improved outcomes [12]. The O-MILe framework informed the development of the training program prototype in the present study (see section 3.2.4 for details), described how leadership influences the implementation of EBP.

<Figure 3.1>

3.2.3 Settings and knowledge users

The participating hospital is in Changsha, the capital and most populous city of Hunan Province in South-Central China. The tertiary hospital is responsible for providing specialized health services, medical education and research. It has 2200 beds and 2400 health professionals that serves over 60 million people province wide. The hospital's leadership at the top of the management system consists of one dean and five vice deans, all of whom are physicians. One vice dean oversees the nursing department, which is responsible for the overall management of the nursing staff. The nursing department consists of one nursing director (registered nurse) and two associate nursing directors (registered nurses). The associate nursing directors oversee six sector nurse managers (registered nurses) who are responsible for six nursing sectors, namely surgical, internal medicine, emergency and critical care, outpatient, operation room, and maternal and childcare sectors. Each of these has around 10 nursing units, totalling 62 nursing units (54 general wards and eight intensive care units), with 73 unit nurse managers (including associate nurse managers) and 1,470 nurses. See Appendix 3.3 for the hospital's management structure.

The proposed training program targeted implementation leadership competencies and behaviours of unit nurse managers. For feasibility reasons and to optimise the diversity of the knowledge and experience of knowledge users, we used purposeful sampling. Seven managers in different nursing leadership roles and practice areas were invited and all agreed to participate in the study, including: associate director (n = 1), middle-level managers (n = 2), and unit-level managers (n = 4). The eligible criteria included individuals with: 1) formal managerial role at the time of recruitment (e.g. nurse director, sector nurse manager, unit nurse manager),

2) worked full-time at the hospital at the time of recruitment, 3) had over ten years of clinical nursing and at least five years of nursing management experience, 4) had previous experience conducting or participating in EBP implementation projects, and 5) were able to speak, read and write in Chinese, willing to join the study, and able to give informed consent. The nursing director in the hospital distributed information about the study to all eligible nurse managers and asked them to contact the primary researcher (WC) if they were interested in participating. Demographics of the seven participants are given in Table 3.1.

<Table 3.1>

3.2.4 Training program development process

From November 2021 to March 2022, the primary researcher who is fluent in Chinese worked with the managers (n = 7) to codevelop the training program prototype. The development process encompassed four phases that involved group discussions (n=4) and three rounds of individual interviews with each manager (n=21 interviews). The managers were interviewed in between the group discussions to obtain in-depth reflections on developing content (i.e. behaviours, actions and competencies) and delivery strategies of training program, which were then summarised and discussed in the subsequent discussions. An open non-hierarchical format was used during the discussions so the managers and researcher could share power for making decisions regarding the training program design. Each discussion lasted 30–90 min, and the interview duration was 20–70 min. All the materials provided to the managers were translated into Chinese from their original format in English. The primary researcher and a professional translator with a health science background translated the materials together and

compared the Chinese and English version multiple times to ensure accuracy. The 4-phase development process is described below (also see Table 3.2). The evidence sources and development process of each element of the training program prototype are available in Appendix 3.4.

<Table 3.2>

3.2.4.1 Phase 1: Study introduction and preparation

In the first group discussion, the researcher introduced the purpose of the training program, the managers' roles in the development process and the importance of leadership in implementing EBP in clinical settings. The aim was to engage the managers in the training program development process, and ensure they understand the purpose of the co-development process. Then, managers discussed and listed the actions that unit nurse managers may take to promote the implementation of EBP. A scenario was provided to help them identify these actions. After that, the researcher introduced definitions of O-MILe and implementation leadership behaviours. Finally, the researcher presented the plan for developing the training program prototype to the managers and discussed it with them to refine it.

3.2.4.2 Phase 2: Training program content development

In the first round of interviews, the managers shared their perceptions and reasons for believing that the O-MILe leadership behaviours promote EBP implementation in the Chinese nursing context. A general five-point Likert scale was applied for knowledge users to rate the importance of each behaviour (1=not at all important and 5=very important). To ensure the O-

MILe behaviours were applicable in China, managers were then asked if they had any suggestions for modifying them. Following this, the researcher presented a table containing examples of leadership actions (see Additional file 3.1) and asked the managers to select, add or modify them to correspond to the O-MILe behaviours. Examples were based on suggestions given by the managers in the first discussion group and previous O-MILe interventions [12, 33].

In the second group discussion, the researcher presented an analysis of the first round of interviews with the managers. All seven managers discussed and then determined: 1) leadership behaviours critical for facilitating EBP implementation in the Chinese nursing context, 2) modifications required to those behaviours by Chinese nurse managers, and 3) actions that correspond to each leadership behaviour. Disagreements, ambiguities, and discrepancies were resolved through discussion.

After determining the actions that corresponded to each of the O-MILe leadership behaviours, managers participated in a second interview to understand the specific competencies they needed to operationalize each behaviour. The researcher introduced the modified leadership behaviours, their corresponding actions, and examples of competencies required to enact the behaviours. Examples of leadership competencies (see Additional file 3.2) were summarised according to the O-MILe [14], and previous O-MILe-based interventions [12, 33]. Managers then identified the competencies needed for unit managers to perform the leadership behaviours and activities.

During the third discussion, the researcher presented the analysis from the second round of interviews and managers confirmed the competencies required for operationalizing

implementation leadership. The competency items proposed by the managers were incorporated into tables.

3.2.4.3 Phase 3: Training program delivery strategy development

Following suggestions by the participating managers, the researcher drafted a template of the key elements and delivery strategies of the training program before the third interviews (see Additional file 3.3). The prototype was based on a recent systematic review of leadership interventions for nursing managers [34], the Template for Intervention Description and Replication (TIDieR) Checklist (see Additional file 3.4), and the content from Phase 2 of this study (i.e. leadership behaviours, actions and competencies). TIDieR is a 12-item checklist of intervention reporting elements [35]. Following the TIDieR checklist, the researcher drafted the elements in the template to describe: 1) the deliverers and participants of the training program (who); 2) materials and procedures (what); 3) modes of delivery, for example face to face, online, telephone (how); 4) locations for the training program to occur (where); and 5) duration and frequency of the modules (when and how much). In the template, content for each element was derived from the systematic review [34], the O-MILe [14], and previous O-MILe-based interventions [12, 33]. During the interviews, the researcher introduced the training program content and the drafted template; managers then selected or proposed suitable delivery strategies or activities to be incorporated into the training.

3.2.4.4 Phase 4: Training program prototype development

In the fourth discussion, the researcher presented the training program prototype with managers' ideas and reflections incorporated into it, and the prototype was further modified.

Any disagreements, ambiguities or discrepancies among the researcher and managers were discussed until consensus was reached.

3.2.5 Data analysis

Discussions and interviews were all in Chinese and audio-recorded and transcribed by two doctoral students whose first language is Chinese and who are fluent in English (WC and JZ). We analysed the importance rating of the leadership behaviours with the Software Package Statistical Analysis (SPSS) Version 22.0 [36]. NVivo [37] was used to organise the data and facilitate analysis of qualitative data [38]. The data from the discussions and rounds of interviews were analysed immediately after each round, and the analysis results were sent to the participants for member checking [39, 40]. Analyses were conducted based on the thematic analysis approach described by Braun and Clarke [41]. First, WC and JZ reviewed the transcripts several times to familiarise themselves with the data. Then, meaningful units of the transcribed text, such as paragraphs, sentences, and words, were inductively extracted to codes. Any differences in coding were discussed, and final codes were agreed upon and formed a codebook. WC and JZ coded the managers' responses independently and then compared. After all the data were coded, WC and JZ discussed and sorted the codes into potential themes and/or subthemes inductively, and collated the relevant data extracts. During this process, each new transcript was used to confirm or refute previously written codes and summary statements. Finally, WC and JZ reviewed and refined all themes together. The transcripts were analysed in Chinese, and the results were translated into English to be presented and discussed with the research team. JH (a research team member fluent in both Chinese and English) read

the transcripts to confirm the accuracy of the Chinese codes and interpretations. WC and the professional English translator translated the results together.

3.2.6 Researcher positionality statement

The primary researcher (WC) is a PhD candidate majored in nursing. WC's experience in two research projects related to the professional activities of unit nurse managers in China inspired the development of the study that specifically targeted unit nurse managers. WC's PhD study experience in implementation leadership and integrative knowledge translation further informed the focus and methods of the study.

3.2.7 Trustworthiness

We utilized different strategies to ensure the trustworthiness (credibility, transferability, dependability, and confirmability) of study results [40, 42]. To enhance the credibility of the results, we applied purposive sampling to recruit nurse managers who possessed extensive clinical nursing, nursing management, and EBP implementation experience. Two independent researchers (WC and JZ) conducted data analysis and discussed the findings to ensure the accuracy of the data analyzed. A third researcher (JH) reviewed the analysis process to maintain credibility. The primary researchers explicitly revealed his predispositions and maintained a codebook to ensure the dependability of the analysis process.

To ensure transferability and confirmability of the study findings, we provided detailed descriptions of study purpose, design, participants recruitment, prototype development, data collection and analysis methods, and the time period for each interview. This ensured that the study findings could be transferred to other settings or populations with similar characteristics.

We also maintained detailed documentation to facilitate an external audit of our findings and to ensure confirmability.

3.2.8 Ethical considerations

Ethical approval was obtained from the University of Ottawa Health Sciences and Sciences Research Ethics Board (No. H-01-20-5355) and the Institute Research Board of the participating hospital in China (No. 2019-S552). All seven participating managers provided their signed informed consent before participating in the development process.

3.3 Results

3.3.1 Perceived importance of implementation leadership behaviours in O-MILe

The managers perceived all the O-MILe behaviours were needed to lead implementation of EBP in the Chinese nursing context (see Table 3.3). Twelve of the 14 behaviours were perceived as very important and the other two as important. Specifically, all the managers perceived the four change-oriented behaviours as very important because they would enable managers to address any doubts and gain the support of nurses, physicians and patients while developing implementation plans, creating supportive environments, and engaging nurses in the implementation process. For example, managers believed that nurses would become actively involved in the process of changing their practice based on evidence once they recognised the goals or potential benefits such as better patient outcomes from implementing EBP. In addition, Manager 4 stated that '*nurses, physicians or patients may question the implementation of EBP when they do not see any visible effects, especially at the beginning of implementation'* and

managers need to show their determination to *'break their doubts and keep the implementation going'*.

Similarly, the majority of managers believed that the relations-oriented behaviours (n = 4) were very important for boosting nurses' confidence, understanding, and addressing nurses' concerns and obstacles in addition to engaging nurses in EBP implementation and gaining recognition and support from interprofessional staff. Manager 6 claimed that '*unlike nurses of our generation who received more setback education (deliberately introduce a series of setbacks for trainees to encounter, to prepare them better to deal with these situations later in life), the young nurses nowadays need more recognition and encouragement'*, with Manager 2 recognizing '*the more they were encouraged, the better they performed*'. Manager 1 pointed out that communication mechanisms are critical to '*understand nurses' feelings or difficulties in the implementation process'* and adjust the implementation plans accordingly.

Among the six task-oriented behaviours, most managers viewed clarifying roles, monitoring operations and performance, modifying nursing procedures and efficiently using resources as very important behaviours. By doing so, they could monitor the implementation process and make adjustments when needed, encourage individuals to accomplish tasks in the implementation team and seek more support (e.g. resources and policies) and guidance.

Two behaviours were rated as important (as opposed to very important) by six of the managers; these behaviours were: 'provide reminders' and 'conduct regular leadership meetings to plan'. Managers admitted that providing reminders could encourage nurses and decrease the risk of forgetting to implement EBP, while '*once the EBP was embedded in the*

nursing procedures and nurses were fully engaged in implementing it, reminders would be like adding icing on the cake' (Manager 5) because *'nurses are capable of completing any nursing work (without reminder)'* (Manager 7). While managers confirmed that team meetings were important to reflect on and plan the implementation process, manager 7 stated that they '*should not have too many meetings because nurses and managers are already extremely busy in their daily work*'.

<Table 3.3>

3.3.2 Modifications in the O-MILe implementation leadership behaviours

As shown in Table 3.4, knowledge users confirmed that 10 of the 14 O-MILe behaviours were easily understandable and did not need modifications while two needed to be modified by adding clarifications, and the other one needed adapting to be culturally relevant. First, Manager 4 argued that due to hospital regulations, *'nurses are not allowed to implement any EBP or innovation without the permission of unit nurse managers'*. The managers emphasized that before initiating change, it is critical that managers encourage nurses to express their ideas and engage them in future EBP implementation processes. While subtle, to make this explicit, managers modified the behaviour from 'Recognize efforts to change' to 'Recognize *ideas or actions* to change'. Second, managers stated that the communication process should be bi-directional, in other words, leaders should communicate with nurses about the EBP being implemented and also ask for their advice about the implementation. Accordingly, 'seek advice' was added to the behaviour 'Communicate with staff about practice'. Third, managers stated they conduct nursing team meetings to plan for the EBP implementation. Therefore, the O-

MILe behaviour 'to conduct regular *leadership* meetings' was changed to 'conduct regular *implementation team* meetings'. Lastly, the O-MILe behaviour 'Support change visibly and symbolically', was changed to 'Support change *substantively'* as symbolic support in Chinese was understood to mean there was no concrete substantive support.

<Table 3.4>

3.3.3 Actions corresponding to implementation leadership behaviours

3.3.3.1 Actions for change-oriented behaviours

As shown in Table 3.6, participants suggested that unit nurse managers take the following actions to demonstrate their commitment to change: set goals, highlight the importance of EBP implementation, integrate EBP in nursing procedures, and report and analyse adverse events encountered in the implementation process. In addition, participants expressed the need for managers to participate in EBP implementation, discuss EBP implementation cases with nurses to identify barriers, and develop targeted implementation strategies. Explaining the short- and long-term benefits of EBP implementation was considered necessary to reinforce the vision and goals of the process. Showing nurses that the leadership supports EBP implementation at the hospital or nursing department level would also reinforce a vision. Managers also emphasized they could advocate for EBP implementation among patients, nurses, physicians and other interprofessional, hospital and nursing department-level leaders as well as external entities (e.g. nursing associations) via ways such as presenting the benefits of EBP implementation, and providing evidence-based health education. Publishing journal papers or presenting data on EBP at academic conferences were suggested as critical approaches to advocate for EBP

implementation. Manager 4 stated, '*After I presented the outcome of 120 cases (patients) that experienced FTS (Fast Track Surgery, evidence-based perioperative interventions) in three national academic conferences, our director (physician) recognised the effect of FTS in facilitating postoperative recovery and asked all physicians to support the application of FTS*'.

3.3.3.2 Actions for relations-oriented behaviours

Unit nurse managers can recognise nurses' ideas or actions to change by providing verbal praise or material rewards, assisting nurses in their career development, and professionally empowering nurses. To this end, participants reported that they could help nurses identify their career goals and provide training opportunities to achieve them. The behaviour 'Support change substantively' included introducing EBP-related resources before implementation, and creating a supportive environment for nurses after initiating the implementation process. To facilitate interprofessional consensus, participants felt it was important to reveal the benefits of EBP implementation and gain senior leadership support. Involving interprofessional staff and increasing their understanding of the EBP implementation process was another way to reach a consensus identified by the managers. They considered communicating with nurses to include explaining the significance and benefits of EBP implementation as well as asking them for feedback.

3.3.3.3 Actions for task-oriented behaviours

Managers suggested that actions in the task-oriented behaviours involve building and training the EBP implementation team, adding EBP to nursing procedures and developing audit forms, providing training opportunities for EBP implementation, acquiring human and physical

resources, seeking policy support from inside and outside the hospital that advance EBP implementation, monitoring the implementation process, setting up reward and punishment regulations, providing reminders to nurses and patients and conducting meetings to discuss, plan and adjust the implementation process. Notably, managers emphasised that the documents used should be refined when integrating EBP implementation into the existing nursing procedures. Manager 2 said '*the documents used such as audit form should be simple and applicable to clinical practice to avoid increasing nurses' burden*'.

3.3.4 Competencies that nurse managers need to perform leadership behaviours

Participants stated that unit nurse managers should have three categories of general competencies to develop the required implementation leadership behaviours: 1) knowledge of EBP in clinical nursing, and skills to identify clinical problems and EBP solutions such as searching, assessing and selecting evidence; 2) professional nursing knowledge and skills (e.g. clinical specialty, communication); 3) knowledge of implementation leadership (see Table 3.5). Specific competencies for developing different behaviours were also identified (see Table 3.6). For example, to develop change-oriented behaviours, managers need to have skills to set goals, identify barriers and develop implementation strategies, embed EBP in nursing procedures, and develop indicators to assess implementation, as well as knowledge of potential benefits of EBP and skills to interpret and communicate benefits, including academic outputs (e.g. journal papers). For relations-oriented behaviours, nurse managers noted that managers need to be familiar with current nursing practices and EBP, and be equipped with the skills and abilities needed to motivate others (e.g. assist career development), build an implementation team, resolve conflicts, and promote collaborations among team members. To develop task-oriented

behaviours, they suggested that managers need skills to train the EBP implementation team, organise evidence-informed activities (e.g. health education and meetings), develop plans, monitor and sustain the implementation process and acquire information (e.g. relevant training opportunities), resources and policy support for advancing EBP implementation.

<Table 3.5>

<Table 3.6>

3.3.5 Strategies to deliver the training program

Participating managers co-developed the strategies to deliver the training program with the researcher (Table 3.7). As suggested, the training sessions would involve twelve unit nurse managers, assigned to one of two groups and delivered by two experienced nurse managers and two researchers. The content would be delivered in-person through five modules in 4 days (total 32 hours). Activities in the modules include lectures, experience sharing, group discussions, plan development, and coaching.

Before the first module, the managers suggested that training participants should choose 1-2 clinical nursing problems they are currently encountering as the focus for each group. Post-module activities included undertaking plans, coaching, and a final presentation of their implementation. All modules would be delivered outside the hospital setting. As Manager 7 said, '*if (being trained) in the working environment, I will feel a sense of constraint … worry about phone calls',* and Manager 3 added, *'I feel relaxed and can concentrate on the training when I'm away from the hospital*'.

Managers proposed several ways to engage participants in the training program: 1) involve managers with high levels of EBP competencies to deliver content; 2) invite managers to participate with previous EBP implementation experience; and 3) provide guidance on writing academic paper, and journal selection for participants who are interested in publishing their EBP implementation. Managers emphasized that academic outputs are important when advocating for EBP implementation and for gaining support both from within and outside the hospital, and it is also one of the requirements for nurses' promotion in management. Support from nursing researchers was described as important because '*few unit nurse managers receive standard research courses or training'* (Manager 1). Therefore, it was suggested that nursing researchers be included as deliverers of the training program with experienced managers to strengthen the content on research and emphasize the importance of EBP implementation.

<Table 3.7>

3.3.6 Prototype of the implementation leadership training program

Based on study findings and evidence-based resources (Additional file 3.1 - 3.3), seven essential aspects of the training program prototype were identified:

1) Clarify the end goal of the training program - to develop competencies to enhance implementation leadership behaviours of unit nurse managers.
2) Deliver the program in two phases: in-person learning modules and post-module activities (i.e. follow up, coaching and final presentation).
3) The five learning modules corresponding to five objectives. Modules 1-3: general competencies (EBP; professional nursing; implementation leadership: see Table 3.5),

Module 4: competencies for developing specific implementation leadership behaviours, Module 5: actions to operationalise each behaviour.

4) Engage nursing researchers (n=2) with academic expertise and in-house managers (n=2) with clinical expertise to co-deliver the program.
5) Include action learning processes for identifying clinical nursing problems; searching for, assessing and selecting evidence; and developing and undertaking a leadership action plan (Additional file 3.5) and EBP implementation plan (Additional file 3.6). A leadership action plan specifies the actions managers need to undertake to support implementation and an implementation plan highlights how the evidence will be implemented on their unit.
6) Develop and conduct individualized development plans for enhancing their implementation leadership behaviours and competencies. The plans specify how to develop the competencies required for each manager to effectively enact implementation leadership behaviours, based on a self-rating of the Implementation Leadership Scale.

3.4 Discussion

In this paper, we described our approach to working with seven nurse managers to co-develop a prototype for a training program based on the O-MILe conceptual framework. The study results indicated that the managers considered all the O-MILe leadership behaviours crucial for EBP implementation in their setting. They believed that most of the O-MILe behaviours were understandable, with only four of the 14 behaviours requiring some modification to add clarifications or cultural relevance. The managers suggested that the behaviours should be

operationalized with actions directed towards nursing practices (e.g. EBP implementation), nurses (e.g. communicate, motivate, support), patients (e.g. educate), interprofessional staff such as physicians (e.g. involve in implementation process), incentives and resources (e.g. conduct EBP training), organization (e.g. pursue support from hospital or nursing department leaders, write EBP into regulations or policies) and external entities (e.g. presence at conferences). Notably, the managers identified the need to demonstrate the benefits of EBP implementation to key stakeholders, including point-of-care nurses, senior leaders, physicians, professional associations, as a crucial action. To enact these behaviours, findings from our study revealed that the managers agreed nurse managers require three types of general competencies 1) EBP, 2) professional nursing, and 3) implementation leadership. In addition, each type of behaviour and action requires specific competencies. Various methods such as involvement of in-house expertise were suggested to engage potential participants in the training program.

3.4.1 Relevance of implementation leadership behaviours in China

The nurse managers in the study acknowledged the importance of all implementation leadership behaviours in the O-MILe to promote EBP implementation in the Chinese nursing context. They believed that most of the behaviours were applicable in China and did not require any modification. These findings are consistent with a qualitative descriptive study by Cheng et al. [17] which examined the leadership practices of nurse managers in China. The study found that Chinese nurse managers' implementation leadership practices were congruent with those in Western countries such as Canada. In light of the cultural differences between Chinese and Western leadership practices, we propose several possible reasons for this congruency. First,

the three types of implementation leadership behaviours in O-MILe (i.e. relations, change, and task-oriented behaviour) match some ideas of leadership in traditional Chinese culture. For example, the standards and rules emphasized in Legalism are closely linked to task-oriented leadership behaviours that focus on planning, controlling, problem-solving, and monitoring to efficiently achieve goals [14, 43]. This is consistent with Ma et al's [44] study that claimed traditional Chinese philosophies are intertwined with Western leadership literature, and both influenced the current understanding of leadership in China. In addition, many of the principles and concepts underlying effective implementation leadership, such as relationship building, collaboration, and change management, are universally applicable and not limited to specific cultural contexts [17]. All nurse managers who participated in this study had previous experience with EBP implementation and recognized that the goal of EBP implementation is to improve the quality and efficiency of patient care. They understood the significance of exhibiting effective leadership behaviours to achieve this goal. For instance, managers emphasized the importance of relations-oriented leadership behaviours in boosting nurses' confidence, understanding and addressing their concerns and obstacles, and engaging them in EBP implementation. This finding has been described across different countries or cultural contexts [45, 46].

Noteworthy, we found that the managers highlighted that the behaviour to 'Communicate with staff about practice' should be a two-way process, involving managers explaining EBP to point-of-care nurses while seeking advice from those nurses for better implementation. This two-way process seemed to contradict our original assumptions that managers in China have the sole authority to make decisions about EBP and nurses will do as

they are told since they must obey and be loyal to senior authorities [47]. While the Chinese culture does endorse a hierarchical working environment, it also values leaders who listen to the individual needs of followers to promote better task fulfilment and maintain organizational harmony [17]. Listening to individual needs aligns with the principles of Daoism which emphasizes that leaders should create harmony through respect and consideration for followers [19].

3.4.2 Unit nurse managers play multiple roles in EBP implementation

The managers who participated in our study suggested that unit nurse managers can take various actions to facilitate EBP implementation, implying that unit level nurse managers play multiple roles in the implementation process. For instance, participants in the present study proposed that managers could plan EBP implementation by setting implementation goals, identifying barriers, developing targeted solutions and plans, building and training the EBP implementation teams, and embedding EBP into nursing procedures. Similarly, Urquhart and colleagues [48] found that managers should identify the needs for implementation and then plan appropriately to ensure these needs are addressed. Additionally, similar to Boutcher et al. [49] and Giannitrapani et al. [50], managers in our study suggested that nurse managers could provide point-of-care nurses with training opportunities, acquire resources, seek policy support, refine documents used in EBP, and monitor the implementation process. Furthermore, participants proposed that nurse managers have a strong role in facilitating and motivating point-of-care nurses to implement EBP by providing verbal praise or material reward, assisting with career development, promoting self-actualization, communicating with nurses, and addressing inconsistencies or conflicts with EBP implementation. These findings align with

previous studies by Birken et al. [51] and Engle et al. [52] which explicated the role of middle managers in the implementation of EBP. Identifying the roles and actions of unit level nurse managers is critical to better prepare them to lead the EBP implementation.

3.4.3 Managers can showcase the benefits of EBPs implementation.

According to the managers in our study, showcasing the benefits of EBPs was the most frequent suggested action across different behaviours to facilitate the implementation process. Similarly, Birken et al. [6] revealed that showing the benefits to staff is an important way to encourage their participation in implementation of EBPs. Findings from our study found that not only is it an important action to influence point-of-care nurses, but also to facilitate interprofessional consensus, gain support from senior leaders at the hospital and external organizations such as professional nursing association. In our study, managers reported that they were frequently asked about the value of EBP by nurses and physicians when initiating implementation. Despite the increasing number of healthcare professionals in China who believe in the idea of establishing evidence-based clinical practices [2], many still worry that this approach may cause unnecessary changes in routine procedures, take up extra time, increase their workloads, be unacceptable to patients, or lead to no improvements or worsen patient outcomes [21, 53]. The managers in our study proposed alternative ways to showcase the benefits such as presenting effectiveness data, sharing clinical cases (e.g. nurses' or patients' experience of involving in EBPs implementation), and conducting evidence-informed education sessions. This findings is consistent across various contexts and highlights the need for unit nurse managers to act as knowledge broker to convince others of the importance and benefit of the EBP implementation [48, 49, 52].

3.5 Strengths and limitations

Strengths of this study included the engagement of experienced unit level managers in the co-development process to develop the implementation leadership training program prototype. In addition, a detailed description of the prototype development process was provided, including the evidence resources used for content and delivery strategy development, which allows for future replication by researchers.

Our study also has some limitations. First, the height of the COVID-19 pandemic was occurring at the time of data collection and it prolonged the engagement and data collection process and limited the number of knowledge users we could involved in the interviews or discussions, we were not able to determine the saturation of the data. However, because of our purposeful sampling strategy, we were able to engage with a diversity of participants. Further assessment of other managers' acceptability of the content and delivery strategies proposed in the prototype would be of benefit to confirm the key themes (e.g. leadership actions or competencies) and essential elements of the training program. Second, the researcher participated in the discussions was also responsible for data analysis (WC), which was valuable in terms of the training program development, but may provide a source of bias. We therefore include another researcher (JZ) to perform the independent data analysis. Third, although a professional translator was involved in translating the development materials and study results, there is still a possibility of inaccurate translation, which could result in an incorrect interpretation of the findings.

3.6 Conclusions

We developed a training program prototype to enhance the implementation leadership behaviours of Chinese unit nurse managers, with the aim of promoting the implementation of EBP. Nurse managers identified all O-MILe leadership behaviours as essential for unit nurse managers to lead EBP implementation in China. This study revealed various leadership actions unit nurse managers can take to perform implementation leadership behaviour, as well as general and specific competencies required for developing these behaviours. Participating nurse managers also proposed strategies and activities that could be utilized to develop implementation leadership behaviours and competencies of unit nurse managers and facilitate EBP implementation in China. Further studies are necessary to evaluate the acceptability of this prototype before assessing its impact in improving implementation leadership behaviours among unit nurse managers.

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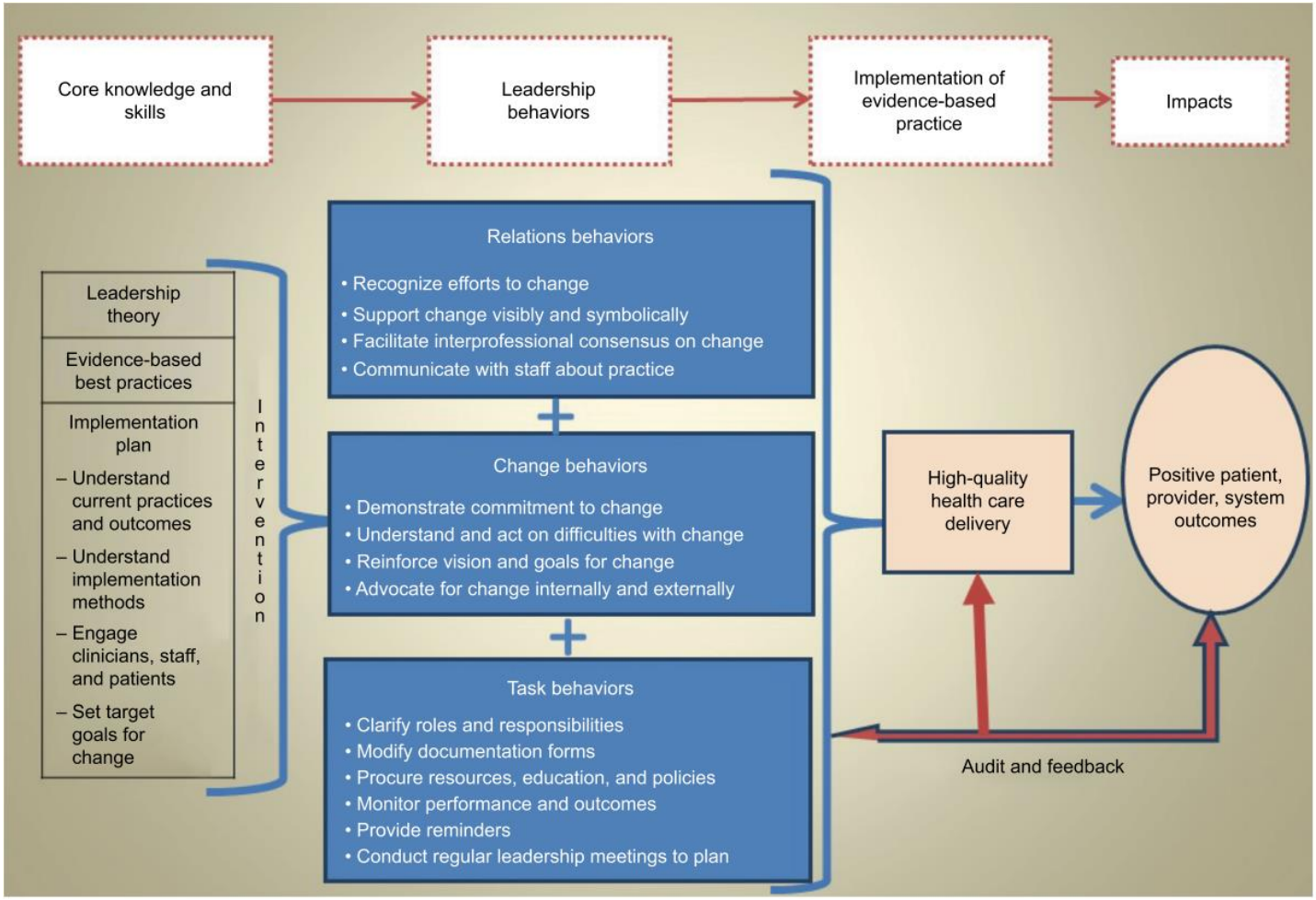
Figures and tables

Figure 3.1 Ottawa Model of Implementation Leadership



Note: 'Journal of Healthcare Leadership 2017 9 15-23' Originally published by and used with permission from Dove Medical Press Ltd.

Table 3.1 Demographic information of unit nurse managers (n=7)

	Age	Current position	Education	Years of clinical nursing practice	Years of nursing management
1	44	Associate nursing director	Doctoral Degree	26	15
2	47	Middle-level manager	Master's degree	26	17
3	43	Middle-level manager	Master's degree	26	10
4	47	Unit nurse manager	Master's degree	28	15
5	42	Unit nurse manager	Master's degree	22	5
6	44	Unit nurse manager	Master's degree	26	14
7	45	Unit nurse manager	Master's degree	27	18

Table 3.2 Implementation leadership training program prototype development process and activities

Training program development process (Duration: 5 months)		Development activities
Phase 1: Study introduction and preparation	**Discussion I**	• Introduction of the study. • Discussion on what leadership actions nurse managers need take to facilitate evidence-based practices (EBP) implementation. • Described Ottawa Model of Implementation Leadership (O-MILe) and implementation leadership behaviours.
Phase 2: Training program content development	**Interview I**	• Explored importance of leadership behaviours in O-MILe to implement EBP in Chinese nursing context. • Revised behaviours to be understandable in Chinese nursing context. • Selected actions corresponding to each leadership behaviour.
	Discussion II	• Presented the aggregate feedback from interview I. • Discussed and determine the importance rating and revisions of leadership behaviours. • Discussed and determine actions corresponding to each leadership behaviour.
	Interview II	• Presented and introduced tables of leadership behaviours, actions and examples of competencies. • Explored competencies need to perform leadership behaviours and corresponded actions.
	Discussion III	• Presented the aggregate feedback from interview II. • Discussed and determined competencies need to perform each behaviour and action.
Drafted template of the training program prototype		
Phase 3: Training program delivery strategies development	**Interview III**	• Introduced the content and the drafted training program prototype. • Selected and proposed suitable delivery strategies or activities of training program.
Modify the training program prototype		
Phase 4:	**Discussion IV**	• Presented the new draft of training program prototype • Discussed and modified the training program prototype.

Training program prototype development		

- **Note:** EBP, evidence-based practice; O-MILe, Ottawa Model of Implementation Leadership.

Table 3.3 Importance of leadership behaviours in O-MILe to facilitate the EBP implementation in Chinese nursing context n (%)

	Leadership behaviours	Not at all important	Slightly Important	Moderately Important	Important	Very Important	Reasons
Manager Change Behaviours	Demonstrate commitment to change					7 (100%)	• Breaking doubts • Gaining support • Promoting involvement of nurses
	Understand and act on difficulties with change					7 (100%)	• Developing feasible plans • Promoting success implementation of EBP
	Reinforce vision and goals for change					7 (100%)	• Starting point for implementation of EBP • Being consistent • Motivating nurses • Improving work efficiency
	Advocate for change internally and externally					7 (100%)	• Creating supportive environment
Manager Relation Behaviours	Recognize efforts to change					7 (100%)	• Increasing nurses' confidence • Promoting involvement of nurses
	Support change visibly and symbolically				1 (14%)	6 (86%)	• Addressing implementation barriers • Promoting involvement of nurses
	Facilitate interprofessional consensus on change				1 (14%)	6 (86%)	• Gaining recognition and supporting
	Communicate with staff about practice					7 (100%)	• Understanding concerns and difficulties • Promoting involvement of nurses • Developing feasible plans
Manager Task Behaviours	Clarify roles and responsibilities					7 (100%)	• Promoting duty execution
	Modify documentation forms				2 (29%)	5 (71%)	• Providing guidance
	Procure resources, education, and policies					7 (100%)	• Providing support
	Monitor performance and outcomes					7 (100%)	• Understanding implementation process • Making timely adjustment

	Provide reminders				6 (86%)	1 (14%)	• Promoting implementation of EBP • Decreasing wrongdoings
	Conduct regular leadership meetings to plan				6 (86%)	1 (14%)	• Providing guidance

Note: EBP, evidence-based practice

Table 3.4 Modification of leadership behaviours in O-MILe

	Original version	Modified version	Reasons for modification
Manager Change behaviours	Demonstrate commitment to change	No modification	/
	Understand and act on difficulties with change	No modification	/
	Reinforce vision and goals for change	No modification	/
	Advocate for change internally and externally	No modification	/
Manager Relation behaviours	Recognize efforts to change	Recognize ideas or actions to change	• Add clarification
	Support change visibly and symbolically	Support change substantively	• Cultural relevance
	Facilitate interprofessional consensus on change	No modification	/
	Communicate with staff about practice	Communicate with staff about practice and seek advice	• Add clarification
Manager Task behaviours	Clarify roles and responsibilities	No modification	/
	Modify documentation forms	No modification	/
	Procure resources, education, and policies	No modification	/
	Monitor performance and outcomes	No modification	/
	Provide reminders	No modification	/
	Conduct regular leadership meetings to plan	Conduct regular implementation team meetings to plan	• Add clarification

Note: Modifications were highlighted in YELLOW

Table 3.5 General competencies to develop implementation leadership behaviours

1. Basic knowledge and skills related to evidence-based practices (EBP) • Knowledge of EBP: definition, significance and values in clinical practice of nursing. • Knowledge of and skills to: 1) Identify existing clinical problems. 2) Search, screen, and assess quality of evidence. 3) Assess the feasibility, appropriateness, meaningfulness, effectiveness of the evidence. 4) Select/tailor evidence to be implemented in clinical context.
2. Professional knowledge and skills • Professional knowledge (e.g., knowledge of specific clinical specialty, hospital procedures, quality management standards) and skills (e.g., skills of clinical specialty). • Skills to communicate, organize, and coordinate (e.g., patients, nurses, superiors, interprofessional and interdepartmental professionals, nursing societies). • Ability to execute and supervise. • Ability to sustain improvement. • Ability to make decisions in crisis and uncertainty. • Ability to Innovate.
3. Knowledge of implementation leadership • Knowledge of implementation leadership: definition and role in EBP implementation. • Knowledge of implementation leadership behaviours: definitions and importance. • Knowledge of nursing managers' roles and responsibilities in EBP implementation.

Note: EBP, evidence-based practice

Table 3.6 Competencies to develop specific implementation leadership behaviours and corresponding actions

Leadership behaviours in O-MILe		Actions corresponding to each behaviour	Competencies nurse managers need to perform each behaviour
Change behaviours	**Demonstrate commitment to change**	1. **Set goals** for the EBP implementation. 2. **Highlight importance of EBP implementation** during routine meetings and **push the implementation**. 3. **Embed EBP into nursing procedures**, and nursing quality control standards, develop audit standards, establish reward and punishment regulations, clarify individual responsibilities for EBP implementation, etc. 4. **Report and analyses adverse events** and develop strategies for improvement.	1. Skills to set goals for EBP implementation. 2. Skills/abilities to integrate EBP implementation into unit procedures. 3. Skills to sustain the EBP implementation.
	Understand and act on difficulties with change	1. **Identify barriers to EBP implementation in multiple ways:** 1) Participate in EBP implementation, supervise and monitor nurses' practice to identify factors that affect the implementation. 2) Communicate and get feedback from nurses (e.g., difficulties, reasons for unwilling to implement EBP, etc.). 3) Discuss typical cases with implementation team. 4) Identify barriers from multiple levels (e.g., evidence, organization, patients, nurses). 2. **Develop targeted solutions for barriers and plans for EBP implementation**.	1. Skills to identify barriers and facilitators to EBP implementation. 2. Skills to develop implementation strategies.
	Reinforce vision and goals for change	1. **State explicitly the leadership support** from hospital administrators, director of nursing department or unit. 2. **Implement EBP on small scales to reveal**	1. Knowledge of potential benefits and outcomes of EBP implementation. 2. Abilities to develop indicators to

		direct/short-term benefits. 3. **Explain the potential long-term benefits** (e.g., patients, nurses, hospital or society level) **of EBP implementation** using real clinical cases.	measure effectiveness of EBP implementation.
	Advocate for change internally and externally	1. **Advocate EBP implementation externally:** 1) Present clinical cases of EBP implementation to hospital administrators or directors of the nursing department. 2) Present effectiveness data of EBP implementation in national/provincial nursing professional associations (e.g., annual meetings). 3) Present academic achievements (e.g., papers, keynote presentation). **2. Advocate EBP implementation among nurses:** 1) Explain the significance and urgency of EBP implementation. 2) Encourage new technologies or patents application, and academic papers writing in nursing team. 3) Conduct new technology competitions at the nursing department or unit level. 3. **Advocate EBP implementation among patients:** conduct evidence-informed patient health education lectures (online or in-person), workshops, scenario simulations, peer support meetings.	1. Skills to interpret and communicate direct benefits of EBP implementation 2. Abilities to translate EBP implementation data into academic outputs. 3. Skills to nurture EBP implementation atmosphere. 4. Skills to conduct evidence-informed health education. 5. Abilities to organize EBP-relevant activities (e.g., seminar).
Relation Behaviours	**Recognize ideas or actions to change**	1. **Provide verbal praise or material reward:** 1) Provide individual encouragement, public praise, merit pay increase, etc. 2) Convey patients' appreciation or praise to	1. Knowledge of and skills to motivate nurses (e.g., value display, praise or reward). 2. Skills to empower others.

		nurses. 3) Reimburse nurses' expenses for the EBP implementation, relevant academic conference attendance, trainings, etc. 2. **Assist with career development:** 1) Assist nurses set career development goals and plans. 2) Provide opportunities for study/training in the hospital, countrywide or abroad. 3. **Promote self-actualization:** 1) Set EBP implementation champions as role models. 2) Empower nurses to lead the EBP implementation. 3) Give nurses opportunities to teach or present in academic conferences. 4) Promote the uptake of EBP led by nurses that showed better outcomes.	3. Knowledge of nurses' career development approaches. 4. Skills to assist career development.
	Support change substantively	1. **Before EBP implementation:** 1) Communicate with nurses to understand their attitude towards EBP. 2) Recommend EBP-related resources (e.g., databases, papers, guidelines) to nurses. 2. **During EBP implementation:** Create supportive environment by 1) Actively implementing EBP to set examples. 2) Setting flexible work schedule to give nurses time to participate in EBP implementation or related activities (e.g., meetings, training). 3) Encouraging nurses to talk about the obstacles or concerns for EBP implementation and	1. Skills to resolve conflicts. 2. Abilities to promote cooperation and improve team cohesion.

		providing support. 4) Coordinating or addressing inconsistencies or conflicts in EBP implementation.	
	Facilitate interprofessional consensus on change	1. **Show the validity of the evidence**: 1) Present effectiveness data of EBP implementation. 2) Present clinical cases of EBP implementation. 3) Present academic achievements (e.g., papers, keynote presentation). 2. **Get support from leaders:** 1) Submit request to the hospital committee to obtain hospital or nursing department level leadership support for interdisciplinary collaboration. 2) Request support directly from the leaders of relevant departments such as unit physician directors and nurse managers. 3. **Involve interdisciplinary professionals in the EBP implementation process:** 1) Invite interdisciplinary professionals to the implementation team or the development of implementation plan. 2) Provide trainings on the EBP implementation.	1. Skills to interpret and communicate direct benefits of EBP implementation. 2. Skills to build EBP implementation team. 3. Abilities to improve team execution.

	Communicate with staff about practice and seek advice	1. **Explain the significance and potential benefits of EBP implementation.** 2. **Encourage nurses comment on current nursing practices and the evidence:** 1. Ask for nurses' suggestions on implementation plan development. 2. Communicate about problems nurses encounter (via private chat, meetings, WeChat messaging) during the implementation process, discuss and update implementation strategies accordingly.	1. Knowledge of current practice 2. Knowledge of potential benefits of EBP implementation.
Task behaviours	**Clarify roles and responsibilities**	**1. Build the EBP implementation team:** 1) Build the EBP implementation team and choose nurses whose interested in and capable (e.g., have experience of implementing EBP) of leading the implementation as team leaders. 2) Distribute work according to nurses' ability, interests and make sure each task being assigned to one specific individual. 2. **Organize standard training for implementation team** to inform them about implementation goals, plans, and responsibilities of team members.	1. Skills to build EBP implementation team 2. Skills and abilities to organize training
	Modify documentation forms	1. **Embed EBP into nursing procedures:** 1) Develop EBP implementation procedure (e.g., standard operation procedure), evidence-informed clinical path and practice requirements. 2) Develop eligibility criteria for involving patients in the EBP implementation. **2. Prepare EBP implementation audit forms:** 1) Develop work distribution form and timetable. 2) Modify crisis management plan.	1. Knowledge of indicators to measure the effectiveness of EBP implementation 2. Abilities to distribute task and supervise

		3) Develop implementation record and evaluation sheet. 4) Develop nursing quality audit sheet.	
	Procure resources, education, and policies	1. **Provide education/training resources:** 1) Provide nurses with training opportunities in EBP. 2) Support nurses to obtain professional qualification certificates (e.g., nutritionist certificate, Peripherally Inserted Central Catheter (PICC) certificate). 2. **Procure human resources and physical resources:** 1) Procure professional EBP implementation guidance for nurses. 2) Procure instruments/equipment needed for EBP implementation. 3. **Seek policy support:** 1) Seek policy support (e.g., nursing practice regulations) from the hospital administrators and nursing department. 2) Seek policy support (e.g., policy for guideline development and implementation, opening nursing clinics, medical insurance policies) from professional associations (e.g., professional committees of nursing societies, medical insurance departments).	1. Abilities to acquire information (e.g., education/training opportunities). 2. Abilities to seek policy support.
	Monitor performance and outcomes	**1. Monitor implementation process:** 1) Ask EBP implementation team leaders report the implementation progress (e.g., achievements, obstacles). 2) Supervise and give feedback on sustaining the implementation.	1. Knowledge of indicators to measure the effectiveness of EBP implementation. 2. Skills to audit and track the EBP implementation process and outcomes

		2. **Set up reward** (e.g., hospital/unit wide praise, merit pay increase) **and punishment** (e.g., reminders, warnings, and merit pay deductions) regulations.	3. Skills to sustain the EBP implementation.
	Provide reminders	**1. Nurse level:** 1) Use oral reminder. 2) Use reminder cards. 3) Develop task schedule. **2. Patient level:** 1) Perform on-one-on education. 2) Use reminder cards. 3) Use graphic education manuals or videos. 5) Use health education account (e.g., in WeChat). 6) Conduct patient education meetings. 7) Provide telephone reminders. 8) Involve family members.	1. Knowledge of and skills to conduct evidence-informed health education. 2. Ability to learn and use new media
	Conduct regular implementation team meetings to plan	**1. Conduct weekly/monthly implementation team meetings** to discuss, develop, and modify implementation plans.	1. Ability to organize meetings 2. Ability to develop plans.

Note: EBP, evidence-based practice

Table 3.7 Strategies to deliver the training program

Elements of training program prototype	Delivery strategies or activities
Target recipients	• Units nurse managers (n=12)
Goals	• To enhance implementation leadership behaviours of unit nurse managers and related knowledge, skills and abilities via facilitating implementation of EBP.
Objectives	1. To increase basic knowledge and skills related to EBP. 2. To discuss and develop essential nursing professional knowledge, skills and abilities needed for EBP implementation. 3. To understand the importance of leadership in EBP implementation and the effective implementation leadership behaviours as described in OMILe. 4. To improve knowledge, skills and abilities for developing each implementation leadership behaviour in OMILe. 5. To be able to take actions for each leadership behaviour to facilitate EBP implementation.
Modules	1. What should we know about EBP? 2. What are the essential professional knowledge, skills and abilities needed for EBP implementation? 3. Why leadership matters in EBP implementation and what are the effective implementation leadership behaviours? 4. What leadership knowledge, skills and abilities I need to develop for each implementation leadership behaviour?

		5. What leadership actions I can apply to facilitate EBP implementation?
Training program deliverers	**Type, number & expertise**	• Four deliverers in total, including nursing researchers (n=2), and nurse managers (n=2). Nursing researchers should have research experience in nursing leadership and EBP implementation. Nurse managers should be those 1) co-developed the prototype, 2) have over 20 years of clinical nursing experience, and 3) over five years of nursing management experience, 4) have experience of conducting or participating in EBP implementation.
	Role	• Role of deliverers: 1. Provide reading materials to recipients before each module. 2. Give lectures, share experience, and facilitate discussions during each module. 3. Involve in the whole training process and provide (online/in-person) supervising for recipients in or between each module. 4. Follow up and coaching when needed. 5. Provide research guidance (e.g., journal manuscript writing, revision, journal selection or submission) for recipients who are willing to publish the EBP implementation process and results.
	Supplemental support	• Supplemental support from the organizational nursing department, pursue support (e.g., training certificate or continuing education credits) from professional nursing association.
Duration of training program		• Modules: approximately 32 hours of full-time, in-person training in 4 consecutive days. • Post-module activities: TBD

Setting		Places away from the hospital setting.
Pre-modules screening		• Investigate evidence-based practice competencies (Evidence-based Practice Competence Questionnaire) of recipients, invite recipients with high levels of evidence-based practice competencies to give lecture in the Module 1. • Explore recipients' individual needs for intervention content and form, modify training program prototype accordingly
Pre-module preparation		• Each participant prepares 1-2 clinical nursing problems he/she currently encountering.
Arrangement of modules	**Content of modules**	• Implementation leadership competencies, behaviours and actions
	Activities for modules	• lectures, experience sharing, group discussions, plans development, and coaching
Post-module activities		• Plans implementation, follow up, coaching, and final presentation day

Note: EBP, Evidence-based practice; O-MILe, Ottawa Model of Implementation Leadership; TBD, To be determined

Chapter 4: Chinese nurse managers' perceptions of the prospective acceptability of a co-developed prototype for an implementation leadership training program: A qualitative descriptive study

In Chapter III, I developed a prototype for an implementation leadership training program using an IKT approach. The training program aims to enhance the leadership of unit nurse managers to facilitate the implementation of evidence-based practice (EBP) in a Chinese nursing context. In this chapter, I aimed to assess the acceptability of the prototype, prior to program delivery, from the perspectives of potential program participants and deliverers. I plan to submit this manuscript to the Worldview on Evidence-Based Nursing. Please note that, in accordance with the journal's guidelines, I will remove the additional files in this chapter from the submission version to the journal.

Title Page

Chinese nurse managers' perceptions of the prospective acceptability of a co-developed prototype for an implementation leadership training program: A qualitative descriptive study

Running title: Acceptability of implementation leadership training program

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Abstract

Background: Conducting an acceptability assessment of a leadership training program is crucial to gather feedback from both program participants and deliverers, and to identify any potential issues or challenges early in the development process. By addressing these concerns prior to implementing the program, the overall success and effectiveness of the training can be improved.

Aim: To explore the prospective acceptability of an implementation leadership training program prototype for nurse managers in China to implement evidence-based practices, from the perspectives of potential program participants and deliverers.

Methods: A qualitative descriptive study was conducted in Spring 2022 at three tertiary hospitals in Hunan, China. We conducted individual semi-structured interviews with unit-level nurse managers (n=14), including 12 potential participants, and two potential deliverers that have been involved in developing the program prototype. Interview questions and thematic analysis were guided by the Theoretical Framework of Acceptability.

Results: After reviewing the program content, potential participants and deliverers reported that unit nurse managers would benefit from engaging in the program, acknowledging that the program fit with professional nursing values for implementing research evidence. They expressed positive views about being involved in producing academic papers through the training process, and interactive multi-modal training activities such as group work, experience-sharing, and coaching. Seven participants were not very confident about being fully engaged in the training, as they could not navigate the English research literature. Both participants and deliverers highlighted factors that would influence their participation, including time

constraints, the impact of the COVID-19 pandemic, and support from senior organizational leadership.

Linking Evidence to Action: Training programs should align with managers' interests, while also taking into consideration their constraints related to time and capacity. Ongoing support from training deliverers is crucial to help managers implement leadership development plans and overcome any challenges that may arise. Additionally, active support from hospital senior leaders is essential to the success of the training program and its integration into the hospital's culture.

Keywords: Nurse managers, nursing leadership, evidence-based practice, training program, acceptability, qualitative descriptive

4.1 Background

The implementation of evidence-based practices (EBP) has gained increasing attention in China in recent years (Zhao et al., 2018). A scoping review revealed a sharp rise in implementation studies for EBP published in China, with only two published in 2010 to 82 in 2020 (Zhao et al., 2022). In the Chinese nursing context, nurses perceive leadership support by unit nurse managers as the greatest facilitator of EBP implementation (Wang et al., 2013; Zhao et al., 2022). Unit nurse managers are essential to EBP implementation due to their familiarity with current nursing practices (Cheng et al., 2018), and their influence on point-of-care nurses and other key stakeholders such as physicians and senior managers (e.g., nursing directors) (Birken et al., 2018; Chen et al., 2021).

Two surveys involving 2,400 nurses and nurse managers across 64 hospitals in China revealed that unit nurse managers lacked the knowledge and skills necessary to lead EBP implementation (Chen et al., 2020; Hu et al., 2021). The authors of these studies suggested that relevant training programs are needed to enhance managers' leadership behaviours and competencies for implementing EBP (Chen et al., 2020; Hu et al., 2021). In a previous study, we co-developed a context-specific prototype for an implementation leadership training program, with the aim of promoting EBP implementation in China (Chen, et al., 2022). Implementation leadership is 'a multidimensional process of influence to enable staff to use research evidence in clinical practice, and includes behaviours and activities of leaders that exert direct and indirect influence on individuals, their environment, and organizational infrastructures' (Gifford et al., 2007, p 128). The training program prototype was co-developed with nurse managers through four focus group discussions (n=7 managers/focus group) and three rounds of

individual interviews with seven nursing managers (n = 21 interviews) over five months (Chen, et al., 2022).

As newly developed training programs, it is important to explore their acceptability before full implementation and evaluation. Acceptability is a multi-faceted construct 'that reflects the extent to which people receiving an intervention consider it to be appropriate, based on anticipated or experienced cognitive and emotional responses to the intervention' (Sekhon et al., 2017, p.1). Training programs in healthcare contexts are complex in nature and can have several interacting components, including delivery at different levels of a healthcare organisation (Skivington et al., 2021). Program developers are faced with the challenge of designing training programs that can achieve the desired outcomes with the resources available (Sekhon et al., 2017). Successful delivery of a training program can be dependent on the acceptability of the program, both to program participants and deliverers (Ndejjo et al., 2020; Perski & Short, 2021; Sekhon et al., 2017). Sekhon (2017) suggests that acceptability can be measured prior to (prospective), during (concurrent), and/or after (retrospective) the intervention's delivery. By exploring prospective acceptability, a development team can identify the problematic aspects to be addressed before full delivery (Sekhon et al., 2021).

According to Sekhon et al. (2017), the increasing complexity of interventions renders it important for researchers to explore interventions' acceptability as a multi-faceted construct rather than focusing on a single component or variable. This approach can provide a comprehensive understanding of a program or intervention's design and delivery. In a recent overview of 132 reviews that synthesized the acceptability of interventions in healthcare settings, Klaic et al. (2022) found that three quarter of those reviews assessed acceptability

using a single variable, the reminders measured two or more variables such as participants' dropouts, adherence, and adverse events. Klaic et al. (2022) also found that most studies in their review explored acceptability retrospectively rather than prospectively. As stated above, it is important to assess the multi-faceted construct acceptability of a program or intervention prospectively to unveil and address participants' refusal to participate, and their frustration or dissatisfaction with the program or intervention. This approach ensures that deliverers' time and resources are not wasted (Fox et al., 2022; Klaic et al., 2022).

Therefore, in this study, we explored the prospective acceptability of a prototype for an implementation leadership training program that was co-developed with nurse managers in Hunan province China. The research question was: To what extent is the prototype acceptable to unit nurse managers in Hunan, China?

4.2 Methods

4.2.1 Design

We used a qualitative descriptive study design, as it allowed for developing a descriptive summary of the information in our data set (Sandelowski, 2010). We chose this design to acquire an in-depth understanding of managers' perception of the acceptability of the program as well as their perceptions of how it meets their implementation leadership training needs to inform modification to the training program prior to launching it. We use the Consolidated Criteria for Reporting Qualitative Research to guide study reporting (Tong et al., 2007) (see Appendix 4.1).

4.2.2 Setting and sampling

Unit nurse managers were recruited from three tertiary level hospitals with similar personnel structures and departments for providing specialized health services, medical education and research in Changsha, the capital city of Hunan Province, China. One of the hospitals is the site where the training program prototype was developed (Chen, et al., 2022). These hospitals were chosen as they have expressed interest in administrating the training program in the future.

We employed purposeful sampling to recruit a diverse group of unit nurse managers. Our aim was to optimize diversity and feasibility, so we recruited two nurse managers who had prior experience in EBP implementation program delivery, were involved in developing the training program, and expressed commitment to future delivery of the program (referred to as potential deliverers). Additionally, we recruited other unit nurse managers who expressed an interest in participating in the training program (referred to as potential participants). To be eligible to participate in the study, they must have been working in a full-time capacity at one of the three hospitals at the time of recruitment. They had to speak, read and write Chinese and provide informed consent. The nursing directors of the three hospitals distributed study information to all unit nurse managers and asked them to contact the primary researcher (WC) if they were interested in participating. Participation was completely voluntary, and participants could withdraw from the study at any point.

We determined the sample size of potential participants based on several factors, including data coding, data saturation, and feasibility of the study. This helped us to ensure that we had sufficient data to address our research question, while also taking into account practical considerations such as time constraints (Hennink et al., 2017).

4.2.3 Prototype training program and materials

The details of the development process and content of the leadership training program has been described elsewhere (Chen, et al., 2022). Descriptions of the program elements and their arrangement are presented in Additional file 4.1 and 4.2. Briefly, the goal of the program is to enhance the implementation leadership behaviours of unit nurse managers to promote EBP amongst nurses. We used the Ottawa Model of Implementation Leadership (O-MILe) to guide the development of the leadership training program. The O-MILe is a theoretical model illustrating the knowledge and skills required by leaders to practice change-oriented, task-oriented and relations-oriented leadership behaviours to facilitate EBP implementation (Gifford et al., 2017). Key aspects of the prototype are:

1) Two phases involving: in-person learning modules and post-module activities (e.g. coaching and final presentation).
2) Five modules that correspond to five learning objectives. In the first three modules, general competencies (Additional file 4.3) are introduced. The fourth module focuses the competencies needed to develop specific implementation leadership behaviours and the fifth module on actions to operationalize the behaviours (Additional file 4.4).
3) Multimodal learning activities such as lectures, experience-sharing, group discussions, presentations, plan development and undertaking, and coaching.
4) Action learning processes to identify clinical nursing problems; search for, assess and select evidence; and develop a leadership action plan that specifies the actions managers need to undertake to support implementation, and an implementation plan that highlights how the evidence will be implemented on their unit.

5) Creation of an individual development plan, based on a self-rating of the Implementation Leadership Scale, that specifies how to develop the competencies required to effectively enact implementation leadership.

4.2.4 Data collection

Data were collected through in-person semi-structured interviews between April and May 2022 by the primary researcher. We chose the semi-structured interview approach to allow participants to respond freely, illustrate concepts and present individual perspectives that could probe further (Morse & Field, 2018). In this study, data collection and data analysis were conducted iteratively to allow emerging findings from early interviews to inform and improve data collection in later interviews (Streubert & Carpenter, 2022). Information about the training program prototype (Additional file 4.1 and 4.2) and materials were provided to the potential participants and deliverers. They were given 15–30 minutes to review the protype and materials prior to the interview, and the interviewer provided further explanations when needed. We collected sociodemographic characteristics of participants, including age, sex, years of clinical nursing experience, years of nursing management experience, academic degree and specialty. We asked participants to rate the overall acceptability of the training program on a Likert scale, from 1-5 (1- Unacceptable, 2- slightly unacceptable, 3- neutral, 4- slightly acceptable, 5- acceptable). We then asked questions about the acceptability according to the seven constructs of the Theoretical Framework for Acceptability (TFA) of healthcare interventions (Sekhon et al., 2017). The TFA is comprised of seven components: affective attitude, burden, perceived effectiveness, opportunity costs, intervention coherence, self-

efficacy and ethicality (see Appendix 2). The definition of each component is listed in Table 4.1. The interview guide can be found in Appendix 4.3.

<Table 4.1>

4.2.5 Data analysis

Demographic data were summarized using descriptive statistics in the Software Package Statistical Analysis (SPSS) Version 22.0 (IBM Corp., 2013). The interviews were audio-recorded and transcribed in Chinese by 2 doctoral students whose first language is Chinese and are fluent in English (WC and SH). NVivo (QSR International Pty Ltd., 2020) was used to organize the data and facilitate data analysis (Merriam & Tisdell, 2016). We conducted thematic analysis to synthesis data acquired (Braun & Clarke, 2006; Sandelowski, 2010). After reviewing the transcripts multiple times, WC and SH used an inductive approach to identify meaningful units and patterns across the data, such as paragraphs, sentences, and words. They independently assigned codes to these units and developed a codebook for the analysis. Later, they discussed the codes, unified them, and deductively grouped them into sub-themes under the TFA constructs. Finally, WC and SH reviewed and refined all sub-themes to ensure accuracy. The analysis results were sent to five managers for member checking (Birt et al., 2016). The results were translated into English to be presented to and discussed with the research team members. JH, a research team member fluent in both Chinese and English, read the transcripts to verify the Chinese codes and interpretations. WC and a professional English translator translated the results into English together.

4.2.6 Researcher positionality statement

The primary researcher (WC) is a PhD candidate majored in nursing. WC brought nursing research experience on the daily work of unit nurse managers in China as a Masters of Science in Nursing (MScN) graduate. Additionally, WC gained insights through learning about implementation science and nursing leadership during his PhD studies. These experiences have greatly influenced the research topic and methods applied in this study, emphasizing the need to understand the perceptions of knowledge users, such as nurse managers, in the development of effective implementation leadership training programs.

4.2.7 Trustworthiness

We employed various strategies to ensure the trustworthiness of the study (Guba & Lincoln, 1994; Nowell et al., 2017). To increase the study's credibility, we gathered perspectives from both potential training program participants and deliverers, allowing us to triangulate their responses. Furthermore, member checking was performed by five nurse managers who participated in the interview, ensuring the accuracy of the data. To ensure transferability and confirmability, we provided detailed descriptions of the data collection and analysis process, including information on the researchers, hospitals, number of participants, data collection and analysis methods, and time period for each interview. Additionally, the primary researcher disclosed his predispositions and maintained a codebook to ensure the dependability of the analysis process.

4.2.8 Ethical considerations

We obtained ethical approval from the University of Ottawa Health Sciences and Sciences Research Ethics Board, and the Institute Research Board of each participating hospital in China.

Ethical principles of informed consent, anonymity and the right to withdraw were maintained throughout the study. WC and each manager reviewed the written information about the study together, and all managers provided signed informed consent before the interviews.

4.3 Results

4.3.1 Participant characteristics

Twelve potential participants and two potential deliverers took part in semi-structured interviews that were conducted in each manager's office and lasted 20-40 minutes. All managers (n = 14) were female, whose median age was 42 years (range 32–48 years), and median number of years of clinical nursing experience was 23 (range 10–28). Their management experience varied from 3 to 19 years (median = 12 years). Thirteen of the 14 managers held a master's degree. They worked in various departments, such as the surgical or medical departments (i.e., internal, surgical, Gynaecology, n=6), specialized care departments (i.e., neuropsychiatry, intensive care, n=3), and support services departments (n=2). See Table 4.2 for demographic information of the managers.

Overall, participants and deliverers perceived the intervention prototype as acceptable (n = 9; 7 participants and 2 deliverers) or slightly acceptable (n = 5 participants). Fourteen subthemes related to dimensions of the TFA were identified that describe the acceptability of the training program prototype (see Table 4.3 for details). Detailed descriptions of the subthemes and the relationships between them are outlined below.

<Table 4.2>

<Table 4.3>

4.3.2 Affective attitude

Affective attitude was represented by three subthemes: overall positive perception of the training program design, perceived appropriateness of training program delivery strategies, willingness to engage in the training program to fulfill self-worth and development needs. Managers conveyed that the training program was well-designed overall, as it was comprehensive, and the action learning process would enable participants to explore evidence-based approaches to solve clinical problems they faced in daily practice. As Participant 12 stated, '*This training program is comprehensive … it involves various activities such as lectures, experience sharing, group discussions, presentations, plan development and implementation.*'

Managers also expressed their appreciation of the delivery strategies, as they anticipated that the strategies would engage participants in the process, encourage peer learning and secure long-term, individualized support. Participant 10 said, *'(If I participated in the training program) As I get more and more familiar with [the training] deliverers through coaching, I will talk [to them] more about problems I have during the training'.*

Managers expressed that they were willing to engage in the training program because they perceived it as fulfilling their professional and developmental needs. Specifically, potential participants were interested in topics on implementation leadership, acknowledging the critical role the unit nurse managers have in leading EBP implementation and wanted to learn how to take actions in the process. By participating in the training program, they also hoped to gain the competencies required to implement EBP as well as professional skills such as communication

and the ability to sustain improvements. They wanted to enhance their implementation leadership behaviours and write academic research papers on the EBP implementation process. Participant 1 stated, '*I know very well about the clinical problems in my unit, and I looking (sic) forward to learn how to solve the problems use evidence … and if you tell me by participating in the training program, I can write up [a paper about] the process of EBP implementation and get it published, I will be more than happy to participate.*' The training program deliverers were ready to share their experience and expected to give lectures on professional knowledge skills (Module 2) and implementation leadership (Module 3-5). As Deliverer 2 said *'I have been a nurse manager for almost 20 years, while I have never systematically studied implementation leadership, after I learned about it (through the co-development process), I would like to challenge myself by giving lectures on this topic in which I will also integrate my own experience.'* Moreover, the deliverers viewed it as an opportunity to leverage their professional expertise as experienced managers, and fulfill their obligation to impart their knowledge and experience on EBP implementation to the younger generation of managers.

4.3.3 Burden

There was one subtheme related to burden. Specifically, the potential participants deemed that support from professional nursing associations, the directors (physicians) of medical units and point-of-care nurses were needed to promote managers' participation in the training. Some participants stated that it would be difficult to obtain support from interprofessional staff, such as physicians, or received financial support for applying their EBP implementation plans. For instance, Participant 9 stated, '*Some physicians get used to nurses performing their orders … they do not expect nurses to implement EBP … it's hard to get their support.*' Both the

participants and deliverers believed the support from the director of the nursing department would be essential to promote their involvement in the training. Participant 12 stated, '*If the director, XX (last name), supports the training program, I would be interested in joining if I have the time when the training starts'*. Deliverer 1 said, '*I would love to deliver the training, but I need the approval from the director (of the nursing department)*'.

4.3.4 Ethicality

Both the potential participants and deliverers perceived the training program to fit their value system on nursing and evidence-based patient care very well (subtheme). The training program participants emphasized the importance of a paradigm shift from experience-based to evidence-based decision-making. Participant 1 stated, *'In the past, our nursing practices were more based on the previous experiences; now the idea of evidence-based practice is gradually being accepted by nurses … we would like to do so (implement EBP) … especially as the managers … while I don't know what exactly should I do … seems like this training program could teach me how to find evidence and promote nurses to use it.'* Participant 4 said, "*I will be more confident to make the decision when I know it is supported by previous research.*" The managers also agreed with the focus of the training program being the critical role of nurse managers in facilitating EBP implementation. Deliverer 2 said, *'I think nurse managers are so important in promoting the application of any new technology, including the EBP implementation we are talking now … the nurse manager could influence whether the EBP could be successfully used in a unit.'* The managers also believed that problem-based approach and coaching process would be accepted by other managers. In this regard, Participant 3 said, *'I will be more interested if, as you said, the training program will focus on finding solutions and make*

plans for solving my clinical problems.' Participant 4 added, '*I expected to have someone to ask when I have any problems … especially when I'm implementing the evidence.*'

4.3.5 Intervention coherence

Intervention coherence includes two subthemes: Understanding the training program procedure, and lack of understanding implementation leadership. Most of the training program participants and deliverers understood that the training program would involve identifying clinical nursing problems, searching for, assessing and selecting evidence, and developing and undertaking plans. Some participants, however, were unclear about how and which implementation leadership behaviours would promote EBP implementation. As Participant 10 said, '*After reading the prototype and tables (of leadership competencies, behaviours, actions and plans), I understand that [after participating in the training program] we will need to search and select research evidence for a certain clinical problem we are facing, and make plans for the evidence implementation … I still don't understand how these leadership behaviours influence point-of-care nurses implementing EBP.*' Participant 2 stated, *'I heard about the three types of behaviours (relations-, change- and task-oriented behaviours) before, but I don't know how I can use them together in facilitating evidence implementation.'*

4.3.6 Opportunity costs

Two subthemes related to opportunity costs emerged. The first is linked to a lack of time to participate in the training program activities. The training program participants expressed concerns about taking four consecutive days off (as outlined in the training program prototype) to participate in the training modules. They felt that more time would be necessary to fully

comprehend the contents of each module and to arrange training for the EBP implementation team. This would, in turn, create additional work for managers and point-of-care nurses, further complicating the situation. Participant 3 said, '*The content of the five modules is interesting but also too much for me to fully understand in only four days.'* Participant 12 added, '*We are short of nursing staff now, and nurses are already overloaded with daily work. The implementation of new stuff (innovations) would need more training and extra energy to integrate into nursing practice. I'm afraid it will make the current situation even worse (increase workload).'* The main concern for deliverers is that they lacked time and energy to learn about the EBP implementation and nursing leadership, and engage fulling in lectures, discussions and coaching.

The second subtheme related to the COVID-19 pandemic. According to the hospital's regulations, nurses are responsible for the prevention and management of COVID-19 in each unit. As Participant 6 stated, '*During the four-day training modules, once there are suspicious cases or confirmed cases [of COVID-19 infection] in the area [around the hospital], I would want to quit the training and come to hospital everyday in case any new situation happens.*'

4.3.7 Perceived effectiveness

Perceived effectiveness comprised of three subthemes: anticipation of achieving the training program's intended goal, concern about fidelity, and suggestions to improve the training program to better achieve its goal. The participants and deliverers expressed the view that the training program would achieve its intended goal of enhancing the implementation leadership competencies and behaviours of unit nurse managers through EBP. This would be possible,

according to Participant 9, *'if the training program is facilitated as planned.'* Participant 6 attributed it to being 'co-*developed by researchers and nurse managers in different specialties with rich clinical nursing and management experiences*' based on previous research (e.g., systematic reviews, O-MILe) and being well-designed, with the application of multimodal activities and problem-based training and coaching and the involvement of both researchers and nurse managers. However, some participants had experienced unsatisfactory training programs in the past and were concerned that this one would not be delivered as planned and have no impact on the intended goals. Participant 4 stated, *'I participated in several EBP training programs before, and they (the trainers) left after the training, and no one cared about how our plans [developed in the training] were implemented.'* Participant 7 added, *'To be honest, I'm not sure if this training program will be implemented as planned or ended the same as previous trainings.'*

Participants further suggested several ways to improve the training program. First, they suggested assigning managers from the same clinical nursing specialty to work in a single group. Participant 5 stated, *'It would be easier for managers from the same specialty to find a common clinical problem that interests everyone in the group … it would be more likely to involve them in the plan development and undertaking.'* The second suggestion was to build a platform that would increase managers' access to getting guidance and support on delivery of their leadership plans. Participant 7 said, '*When you have a platform, people (managers) will see this training program as a long-term program and take it more serious … at the same time, it provides an easier way to get support and resources.'* Lastly, participants suggested that, during the recruitment stage and the first module, the visible outputs of participating in the training

program should be highlighted; including receiving training certification, writing up and publishing research papers, and developing and leading EBP implementation programs. They stated they would more actively participate in the training program upon seeing what could be achieved through doing so. Furthermore, training program deliverers suggested inviting key nursing personnel from participants' units to act as champions and join the training as *'they could learn how to lead EBP implementation to help the manager facilitate EBP implementation in their unit'* (Deliverer 1), and *'they could provide suggestions for implementation plan development from point-of-care nurses' perspective'* (Deliverer 1).

4.3.8 Self-efficacy

Half of the managers (n=7), including five training program participants and two deliverers, reported being confident they would do the training (subtheme). The training program participants attributed their confidence to their commitment to lead EBP implementation. They expected to set an example for nurses by leading implementation, thus guiding nurses toward solving clinical problems through evidence-based approaches. They also believed that a change from experience-based nursing practices (which was suggested to predominate in the clinical areas) to evidence-based ones would increase the value of nursing as a healthcare profession. In this regard, Participant 9 stated, '*I hope to learn the scientific ways to lead evidence-based nursing practice in my unit, and show them (physicians) that nursing is more than just performing their prescription.*'

Participants also felt confident because they expected to receive professional, individualized supervision and coaching to identify clinical problems, find evidence, develop and

undertake EBP implementation plans. Participant 7 said, *'I understand the importance of EBP implementation for clinical nursing … I believe it is well-needed to learn the evidence-based ways to solve problems in my unit.'* Training program deliverers were confident also because they were determined to facilitate the training program, and they believed they are familiar with the program as they *'co-developed the training program'* (Deliverer 2).

The other seven participants lacked confidence in participating in the training program as they have insufficient background knowledge (subtheme). Specifically, they had poor English reading abilities, which would hinder their ability to search for and comprehend English articles. This, in turn, affected their participation in evidence-searching processes and group discussions, as they felt they would not be able to contribute effectively since the majority of research in nursing is published in English.

4.4 Discussion

We evaluated the acceptability of a prototype of an implementation leadership training program for unit nurse managers from the perspective of potential participants and deliverers. Using a qualitative approach, we found that both groups found the program acceptable, with positive feedback regarding its alignment with nursing professionalism and evidence-based care, facilitation of academic outputs, and inclusion of interactive multi-modal training activities. However, some participants expressed concerns about navigating the research literature as it is predominately in English, which would limit their ability to fully engage with the program. Additionally, managers highlighted various factors that would influence their participation, including time constraints, the impact of the COVID-19 pandemic, and support

from senior leadership. To improve the prototype, managers suggested changes to module arrangement, participant recruitment, research guidance accessibility, and output visibility.

4.4.1 Nurse managers accepted the idea of the training program.

The results of this study revealed that the idea of developing unit nurse managers' competencies and behaviours to lead implementation of EBP was acceptable. Introduced early in 2001, China has embraced evidence-based nursing for more than 20 years (Lai et al., 2022), although operationalizing EBP in clinical practice has been slow and intermittent (Gifford, et al., 2018). The nurse managers that participated in our study acknowledged the value of integrating research evidence into nursing practice decision-making, a finding that aligns with Lai et al. (2022) who report that nurse managers have positive attitudes toward EBP implementation. Studies around the globe have revealed that point-of-care nurses perceive the support provided by unit nurse managers as one of the greatest facilitators of EBP implementation (Gifford, et al., 2018; Zhao et al., 2022). The managers in the present study understood that they have critical leadership positions that impact patient care and their behaviours can greatly influence the implementation process for EBP. However, they were unfamiliar with implementation leadership behaviours, which was evident by their curiosity about the types of behaviours to lead EBP implementation. Managers also expressed desires to pursue self-development and be examples for clinical nurses in the implementation process. They were willing to adopt the behaviours and actions required to lead EBP implementation, as well as enhance their professional skills and abilities. This is in line with Cheng et al.'s (2018) study, in which nurse managers stated that knowledge about the methods for conducting evidence-based nursing practice, as well as communication and coordination skills are needed to

facilitate the implementation process. Despite not having received training, managers recognized the value of EBP implementation and the important role they have in leading implementation. They were committed to enhancing their implementation leadership competencies and behaviours to ensure the best care for patients, which was an internal motivators for managers to be engaged in EBP implementation (Damschroder et al., 2022).

4.4.2 Acceptability of the multimodal nature of the training program.

When examining the prototype of the implementation leadership program, participants felt the multimodal aspects of the training activities were a positive attribute. As outlined in the prototype, managers were asked to immerse themselves in the training program through group discussions, reflections and the development of different training plans. These type of activities provided opportunities for managers to communicate with other managers who face similar clinical issues, find and develop action plans together for evidence-based solutions (Chen et al., 2022). Interactive activities have been shown to enable managers to realize that they are not alone in facing clinical and leadership challenges, generating a sense of community and belonging which, in turn, enhances their engagement (Galuska, 2014). Notably, managers' self-awareness of their role within the organization and implementation activities is fundamental for the development of their implementation leadership behaviours (Hackworth et al., 2018). Nurse managers in this study recognized that they are in critical positions to promote and implement EBP, but were unsure what they should do. Gifford et al. (2019) found that interactive action-based learning activities such as group discussions, reflections and plans development processes help develop managers' self-awareness of EBP implementation. They allowed managers to explore and apply evidence-based solutions to the real problems they

face, perform implementation leadership behaviours and reflect on their roles in the process (Frich et al., 2015).

Managers in this study expressed their interest in receiving joint coaching from external researchers and internal hospital managers with prior experience in leading or participating in EBP implementation. As described above, several studies have shown the importance of research coaching for managers and clinicians who wish to conduct research-related activities (Morrison et al., 2022; Paget et al., 2017). In addition, researchers can ensure that the implementation process is rigorously conducted (Graham & Tetroe, 2007). However, as outsiders to the hospital, researchers may not be familiar with the hospital context in which the implementation is taking place. Hence, adaptations by clinicians may be required. Inviting managers who have previously been involved in implementing EBP would help the development of context-oriented implementation plans to be applied in hospitals and integrate in-house expertise into the coaching process (Gormley & van Nieuwerburgh, 2014; Kueny et al., 2015). As supported by Rycroft-Malone et al. (2016), the collaboration of researchers with expertise in research methodology and nurse managers with expertise of the hospital context can help facilitate EBP implementation and improve effectiveness.

4.4.3 Delivering the training program as planned.

Managers in our study anticipated that the training program would improve unit nurse managers' implementation leadership behaviours and competencies if delivered as planned. However, one of the potential challenges they expressed concerns was to do with language barriers. As nursing research is primarily published in English, managers feared that they would

face difficulties in searching, screening, and selecting relevant research evidence. These issues are not unique to their context, as similar findings have been reported in other non-English-speaking countries, such as Korea and Japan (Márquez & Porras, 2020). English is the predominant language of scientific communication, particularly in the healthcare context (Gordin, 2015). More than 80% of medical journals, databases, online resources, and international academic conferences are in English (Zhang et al., 2020). However, only a small percentage of Chinese nurses (less than 10%) are proficient in the language (Wang et al., 2016). To address this issue, researchers with experience in English database searching would be required to work with managers in the training program to search for and select appropriate evidence from English-language databases and then translate it to Chinese as needed. This collaborative approach is consistent with the recommendations of Chen et al. (2022), who suggested that researchers can assist with time-consuming tasks associated with evidence-based practice, such as identifying available resources and appraising and synthesizing evidence.

Furthermore, nurse managers in the present study were concerned they would need to withdraw from the training program in response to COVID-19-related variations in their schedules. At the time of data collection, China had some of the most restrictive policies against COVID-19, including mass testing in places where cases have been reported (Song, 2022), and nurses were deployed to different communities or other cities to conduct testing and care (Ding et al., 2022). Nurse managers were required to be present to lead their unit's response to a potential COVID-19 outbreak (Wang et al., 2021). The COVID-19-related variations in the nurse managers' schedules highlighted the need for flexibility in the training program. To address this

challenge, the program could be designed with flexibility in mind. For instance, the five training modules could be offered over extended periods of time, allowing participants to complete the modules on a flexible schedule to accommodate unpredictable demands such as those experienced during the pandemic.

4.5 Modifications of the training program prototype

Based on the study findings, we modified the training program prototype to meet nurse managers' needs as highlighted below:

1) Hold the five modules across five weeks (8 hours/module) instead of four consecutive days. Focus on one module per week to give more time and flexibility for managers to absorb content and plan the EBP implementation in their units.

2) Assign managers in the same clinical specialty to the same group, making it more likely to find a common clinical problem that interests everyone in the group.

3) Ask nurse managers to invite at least one clinical nurse from their unit to participate in the training program with them. This would enable them to co-develop the implementation plan considering the viewpoint of clinical nurses and build a mass of implementation champions. Clinical nurses can then assist in leading EBP implementation in their unit.

4) Clearly determine the potential outputs for participating in the first module of the training program, including receiving training certification, writing up and publishing research papers and developing and leading EBP implementation programs.

5) Set up a WeChat Official Account (WOA) to provide nurse managers with easy and immediate access to guidance during and after the training program. WeChat is the most frequently used social media mobile app in China with over 1 billion users; it provides free public instant messaging, chatting, voice and video calling, information posting options and more (Zhang et al., 2017). As a lightweight app launched on WeChat in 2012, the WOA broadens the public's access to information and services (Sun et al., 2021). It would allow training program deliverers to receive text, pictures, and videos from each subscriber (e.g., managers participating in the program), and then reply to messages and send regular individual or collective notifications or updates. WOAs have been widely used in nurse-patient communication and education and shown to be effective in health promotion with the following advantages: convenience, economical, easy access, and provision of different types of messages in a timely manner (She et al., 2022).

4.6 Strengths and limitations

There are strengths in our study. First, we collected feedback from both potential training program participants and deliverers, which allowed us to customize the training program to meet the specific needs and expectations of both groups. This approach could increase enrollment in the program by making it more appealing to potential participants and deliverers. Second, we used the TFA to thoroughly assess all essential aspects of acceptability during the modification phase of the program prototype. By doing so, we increased the likelihood of successfully delivering the training program.

There are limitations to the present study. First, the unit nurse managers may not have had a comprehensive understanding of the training program content, as they only reviewed the prototype and materials for 15–30 minutes, which could have led to potential misperceptions about the program and influenced the accuracy of the findings. Second, there was a risk of receiving socially desirable responses from managers during the interviews, where their answers reflected an anticipated social norm, which could have also affected the accuracy of the findings.

4.7 Linking evidence to action

1) To motivate managers to participate in training programs, it is essential to design programs that align with their professional needs and interests.
2) When developing leadership training programs, consider managers' constraints related to time and capacity while planning the training.
3) Ongoing support and mentorship are important for managers to implement their leadership development plans and overcome challenges that may arise.
4) Hospital senior leaders should actively support the delivery of the training program to ensure its success and facilitate integration into the hospital's culture.

4.8 Conclusions

The prototype for an implementation leadership training program was perceived to be highly useful and acceptable by unit nurse managers in three large tertiary hospitals in Changsha China. Managers recognized the purpose and significance of the training program for developing leadership competencies and behaviours for implementing EBP in clinical nursing

practice. The multimodal training activities were considered a strength and managers expressed an interest in writing academic papers about their implementation processes. Support from senior hospital leaders and program deliverers was identified as critical to the training program's success. The program now needs to be evaluated to determine its impact in training unit nurse managers to facilitate implementation of EBP in China.

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Tables

Table 4.1 Definitions of the seven components in the Theoretical Framework for Acceptability*

Component	Definition
Affective attitude	How an individual feels about (taking part in) the intervention
Burden	The perceived amount of effort required to participate in an intervention
Ethicality	The extent to which an intervention has a good fit with an individual's value system
Intervention coherence	The extent to which a participant understands the intervention and how it works
Opportunity costs	The extent to which benefits, profits or values must be given up to engage in an intervention
Perceived effectiveness	The extent to which an intervention is perceived as likely to achieve its purpose
Self-efficacy	A participant's confidence that they can perform the behaviour(s) required to participate in an intervention

Note: * Constructs of Sekhon et al.'s (2017) Theoretical Framework for Acceptability (TFA) of healthcare interventions

Table 4.2 Demographic characteristics of training program participants and deliverers (n=14)

Characteristic		Participants and deliverers
Sex	Female	14
	Male	0
Age, median (min-max)		42 (32-48)
Years in nursing, median (min-max)		23 (10-28)
Years in nursing management, median (min-max)		12 (3-19)
Academic degree	Bachelor	1
	Master	13
Department	Medical/ Surgical	9
	Specialized care	3
	Support services	2

Table 4.3 Acceptability of a prototype for an implementation leadership training program based on the Theoretical Framework of Acceptability *

TFA construct/ theme**	Subtheme	Evaluation Summary	
		Potential program participants (n=12)	Potential program deliverers (n=2)
1. Affective attitude	1.1 Overall positive perception of the training program design	• Comprehensive enough • Action-based learning approach	•
	1.2 Perceived appropriateness of training program delivery strategies	• Group work could increase managers' level of engagement. • Experience-sharing sessions would provide opportunities to learn from peers. • One-on-one coaching would provide individualized support.	•
	1.3 Willingness to engage in the training program to fulfill self-worth and development needs	• Interested in implementation leadership. • Expected to learn how to conduct EBP implementation. • Expected to enhance critical professional skills: 1) Communication 2) Decision-making in crises and uncertainty 3) Sustaining improvement 4) Innovation • Expected to write up scientific research papers.	• Willing to share nursing leadership and EBP implementation experience • Expected to give lectures on: 1) Professional knowledge and skills 2) Implementation leadership • Expected to enhance self-worth and responsibility
2. Burden	2.1 Support at different levels	• Support from 1) Professional nursing associations 2) Directors of the medical units 3) Physicians 4) Point-of-care nurses • Support from Director of the nursing department	•
3. Ethicality	3.1 Fit with nurse managers' value system	• Change experience-based decision-making to evidence-based. • Focus on the critical role of nurse managers. • Establish a problem-based learning and coaching process.	

TFA construct/ theme**	Subtheme	Evaluation Summary	
		Potential program participants (n=12)	Potential program deliverers (n=2)
4. Intervention coherence	4.1 Understanding of the training program	• Understood that the training program involves the following: 1) Selecting clinical problems 2) Searching for suitable research evidence 3) Explaining nurse managers' role and work in leading EBP implementation • Developing and delivering plans for managers' implementation leadership development and EBP implementation	
	4.2 Lack an understanding of implementation leadership	• Unsure about how and which implementation leadership behaviours promote EBP implementation	
5. Opportunity costs	5.1 Time needed to participate in training program activities	• Participate in modules. • Conduct team training. • Increase workload.	• Spend time to learn and prepare for training program
	5.2 Response to variations arising from the COVID-19 pandemic	• Potential withdraws from the training program.	
6. Perceived effectiveness	6.1 Anticipation of achieving the training program's intended goal	• Rigorous and evidence-based development process • Overall well-designed	
	6.2 Concern about the fidelity of the training program	• Dissatisfaction with previous training experiences	
	6.3 Suggestions to improve the training program	• Recruit and assign managers from the same clinical nursing specialty to the same group. • Build a platform for access to guidance. • Highlight visible outputs: 1) Training certification 2) Research papers 3) Development and delivery of EBP implementation programs	• Include key nursing personnel
7. Self efficacy	7.1 Confident to participate in training	• Determination to lead EBP implementation: 1) Hope to serve as examples for nurses. 2) Hope to solve clinical problems.	• Determination to facilitate the training program • Familiar with the training program

TFA construct/ theme**	Subtheme	Evaluation Summary	
		Potential program participants (n=12)	Potential program deliverers (n=2)
		3) Hope to Increase the value of nursing as a healthcare profession. • Expectation of receiving continuous, professional and individualized supervision	
	7.2 Lack confidence-Insufficient background knowledge	• Lack of English language capabilities	•

Note: * TFA: Theoretical Framework of Acceptability; ** Constructs of Sekhon et al.'s (2017) Theoretical Framework for Acceptability (TFA) of healthcare interventions

Chapter 5: Integrated Discussion

The dissertation focused on developing a prototype for an implementation leadership training program and assessing the prospective acceptability of the prototype among unit nurse managers in China. The training program aims to enhance the leadership of unit nurse managers to facilitate the implementation of evidence-based practice (EBP) in the Chinese nursing context. The body of the thesis is comprised of three inter-related studies written up as journal articles: 1) a systematic review of leadership development interventions for managers supervising nurses (Chapter 2), 2) the development of an implementation leadership training program prototype (Chapter 3), and 3) the acceptability assessment of the prototype (Chapter 4). The purpose of this integrated discussion chapter is to briefly summarize the key findings of the three studies and provide an integrated discussion of the findings in further detail. The discussion is followed by implications for nursing leadership, education and research, strengths and limitations of the dissertation, and the conclusion.

5.1 Summary of dissertation findings

5.1.1 A systematic review of leadership development interventions for managers supervising nurses (Chapter 2 published in Journal of Nursing Management).

A mixed-methods systematic review was conducted to synthesize the research evidence on interventions to improve the leadership of managers supervising nurses. A total of 69 studies evaluating 68 interventions were included, of which 35 were quantitative, 22 were mixed-methods, and 12 were qualitative. The results revealed that the most frequently used approaches in leadership development interventions were in-person course-based lectures and

group formats. Most interventions were reported to have positive influences on leadership outcomes, with over two-thirds of the quantitative data from both quantitative and mixed-methods studies reporting statistically significant positive effects. Interventions that used multimodal activities, such as lectures, group work, and mentoring, generally had positive effects on enhancing leadership competencies, such as supporting, developing, and recognizing nurses. Managers predominately viewed the interventions favourably and were satisfied with their participation in them. However, understaffing, insufficient time, and a lack of support from supervisors influenced managers' use of the leadership competencies in practice. The findings from this study were used to inform the development of the delivery strategy for the implementation training program prototype in the next chapter.

5.1.2 Prototype development of the implementation leadership training program. (Chapter 3 drafted for Journal of Nursing Management)

Using an integrated knowledge translation (IKT) approach, the study co-developed a prototype of an implementation leadership training program for Chinese unit nurse managers in collaboration with knowledge users, including nurse managers (n=7) from a tertiary hospital in Changsha, China. A descriptive qualitative study was conducted to capture nurse managers' understanding of the training program content and the delivery strategies. The Ottawa Model of Implementation Leadership (O-MILe) was used to inform the content of the training program. The development of the delivery strategies was informed by the systematic review described above and guided by the Template for Intervention Description and Replication (TIDieR) Checklist. The co-development process encompassed four phases: 1) Study

introduction and preparation, 2) Training program content development, 3) Training program delivery strategy development and 4) Training program prototype development.

The study results showed that all O-MILe leadership behaviours were considered essential for unit nurse managers to lead EBP implementation in the hospital context in China. Managers believed that most O-MILe behaviours were understandable, with only four of the 14 behaviours requiring some modifications to provide clarification or cultural relevance. The behaviours were operationalized with leadership actions directed toward nursing practices (e.g. EBP implementation), nurses (e.g. communicate, motivate, support), patients (e.g. educate), interprofessional staff such as physicians (e.g. involve in implementation process), incentives and resources (e.g. conduct training), organization (e.g. pursue support from hospital or nursing department leaders, write EBP into regulations or policies) and external entities (e.g. presence at conferences). Nurse managers deemed that producing academic outputs was crucial to promote EBP implementation and gain support from stakeholders within and outside the hospital. To enact these behaviours, managers required competencies in three general areas: 1) EBP, 2) nursing profession and 3) implementation leadership. In addition, specific competencies were identified for each behaviour and action. The proposed training program prototype included five interactive learning modules, pre-module preparation and post-module activities. The delivery strategies include a variety of multimodal forms, such as lectures, experience-sharing sessions, group discussions, plan development and undertaking, and coaching.

5.1.3 Acceptability of the implementation leadership training program prototype. (Chapter 4 written for Worldview on Evidence-Based Nursing)

I conducted a qualitative descriptive study of 14 unit nurse managers from three tertiary hospital in Changsha, China. The study aimed to explore the prospective acceptability of the implementation leadership training program prototype among potential participants (n=12) and deliverers (n=2) of the program. The study was guided by the Theoretical Framework of Acceptability. The results showed that the prototype was generally acceptable to the unit managers. They believed it would be beneficial to participate in the training program, were committed to implementing research evidence and perceived the program fit with their professional nursing values. All participants emphasized that the proposed interactive multimodal training activities such as group work, experience sharing, and coaching were a strength of the program. In addition, expectations for self-development and producing academic outputs such as published papers would be internal motivators for their participation. They reported that support from senior leaders (e.g. nursing directors) would be critical to the program's success. The foremost concerns for the nurse managers were the time and capacity needed to participate and the influence of the COVID-19 pandemic on their capacity. The prototype was modified based on study findings.

5.2 Integrated discussion

Drawing on the existing literature, in this section I discuss my dissertation findings in three aspects that were considered crucial for the development and future implementation of the training program for developing implementation leadership in nurse managers: 1) the importance of using an IKT approach to develop an acceptable training program prototype (methodological level), 2) senior leadership support for developing and implementing the training program prototype (organizational level), and 3) opportunities for professional

development and tangible outputs as an incentive for undertaking the training program (individual level).

5.2.1 The importance of using an IKT approach to develop an acceptable training program prototype.

The development of the training program prototype through the IKT approach was approached by incorporating various perspectives and sensitivities to context, promoting equitable contributions and ongoing communication. First, various perspectives contributed to the co-development of the training program prototype. In the context of Chinese culture, where there is a strong emphasis on respecting authority figures and hierarchy, implementing an IKT approach that amplifies the voices of end-users can be challenging (Ma et al., 2023). Traditionally, leadership training programs in China are developed based on literature review and expert consultation, such as Delphi surveys, with senior leaders being the primary consultants (Chu et al., 2018; Zhang et al., 2013, 2014). This can make it difficult for end-users to feel comfortable providing feedback or questioning the decisions of those in positions of authority (Cheng et al., 2018; Fu et al., 2007). However, in the present study, nurse managers who co-developed the prototype had diverse nursing practice backgrounds and held leadership positions at different levels, allowing them to provide valuable insights based on their prior leadership experiences. They had also participated in EBP implementation projects previously, which gave them a basic understanding of the implementation process. The IKT approach was able to amplify the voices of these nurse managers, leading to the integration of diverse viewpoints in the design of the prototype, which is different from the common practice of developing leadership training programs that are based solely on expert consultation. The

nurse managers involved in co-developing the prototype were able to suggest various types of concrete actions to operationalize relations, change and task-oriented leadership behaviours that they believed would be suitable in their context, and these suggestions were incorporated into the final version of the prototype. Plamondon et al. (2022) claims that when various perspectives are considered, co-development processes lead to better decision-making and more effective solutions to meet the needs of knowledge users.

Second, co-developers paid attention to the sensitivity of the prototype in the Chinese nursing context and hospital setting. In Chapter three, the O-MILe framework that informed the development of the training program content (i.e. implementation leadership behaviours, actions and competencies) was developed within a Western healthcare context (Gifford et al., 2017). In addition, findings of the systematic review that informed the development of the delivery strategies were based on the synthesis of studies conducted in Western healthcare settings such as acute care hospitals, nursing homes and long-term care facilities (Chen et al., 2022). However, the present study was conducted in an acute care hospital in China. To ensure that the leadership training program was relevant to the Chinese nursing context, it was essential to involve nursing managers in the development process (Tsait, 2011). Recognizing the existence of adaptations frameworks such as the Framework for Reporting Adaptations and Modifications-Expanded (FRAME), the Model for Adaptation Design and Impact (MADI), involving nurse managers through the IKT approach helped to tailor the training program to meet the specific needs of the participants and the organization, taking into account factors such as management structure and nursing staffing (Cooke et al., 2022; Tsait, 2011). As discovered in the co-development process, managers identified four implementation leadership

behaviours that required modification or culture adaptation. Also, managers refined them to make sure these behaviours were easily comprehensible in the Chinse hospital setting, ensuring that the program was context sensitive, and increased its acceptability by the nurse managers in the hospital context (Cooke et al., 2022). The acceptability assessment revealed that nurse managers who would participate in the training perceived that the training program prototype was acceptable overall.

Third, measures were taken to ensure equitable contributions. As Langley et al. (2018) stated, co-development should be equal, power-sharing, and inclusive to give each co-developer an opportunity to develop and express their knowledge. To promote equity during the co-development process, I encouraged co-developers to “open-up” by asking everyone’s opinions and resolving disputes through anonymous votes during the discussions. This is supported by Collins et al. (2018) that found open communication, and anonymous voting can be effective in promoting equitable contribution in the co-development process. Realizing that managers at different leadership levels were invited, I also interviewed managers between the discussions to obtain their in-depth reflections that might not be revealed during the group discussions. Equitable co-development ensures that all stakeholders benefit from the process, making it more likely to be sustainable in the long term (Plamondon et al., 2022).

Fourth, the co-developers maintained ongoing communication on the prototype development. Within the five-month co-development process, I had ongoing communication with the participating nurse managers through discussions and interviews. This communication helped build a solid relationship among the co-developers and promoted their understanding of the goals, timeline, and expectations of the co-development (Heaton et al., 2016). It was also an

iterative process during which any part of the prototype was changed in response to co-developers' thoughts. For example, leadership actions were added or modified multiple times during the discussions and interviews in co-developing the training program prototype. Langley et al. (2022) stated that iteration reflects humility in working between researchers and knowledge users, a recognition that understanding of one side is incomplete without the intelligence of the other, that making sense of what each person brings and how all these pieces of knowledge "fit together" takes time and commitment to learning.

The results of the acceptability assessment showed that nurse managers perceived that the co-developed training program prototype aligned with their professional values and was relevant to their job responsibilities. Specifically, I found that nurse managers were in favor of the design and ideas of the training program because it aligned with the values they held as nursing managers. As shown in the acceptability assessment, managers viewed the implementation of EBP as important, recognizing the need for a paradigm shift from experience-based to evidence-based decision-making to improve patient care. They also showed interest in interactive multimodal activities and action learning processes. These findings are similar to results of the systematic review of leadership development interventions, which revealed that managers perceived interactions with peers and networking were important (Chen et al., 2022). The same review also highlighted that group-based activities can create a safe and trusting atmosphere for sharing knowledge and learning from peers (Chen et al., 2022). Furthermore, the systematic review found that interventions using multimodal activities generally had positive effects on enhancing leadership competencies (Chen et al., 2022).

Regarding the relevance of implementation leadership to managers' job responsibilities, the IKT process helped to reinforce to managers that it is their responsibility to lead point-of-care nurses to implement EBP (Kueny et al., 2015). Through the co-development process, the training program was tailored to nurse managers' specific job responsibilities and the day-to-day tasks they carry out. For example, all leadership actions were tailored specifically for unit nurse managers to lead the EBP implementation. During the acceptability assessment, managers reported that they found the content of the training program was relevant to their jobs as it was co-developed by nurse managers with rich clinical nursing and management experiences in the context in which it is intended to be used. Building upon attributes of IKT discussed previously, the involvement of nurses could be expanded in the next studies and implementation phases. This could include their active participation in co-developing research questions, designing the implementation strategies for the program, and selecting the evaluation methods to examine impact.

5.2.2 Senior leadership support for developing and implementing the training program prototype

Senior leadership support was critical for the development and implementation of the training program prototype. Senior leaders' support was needed for the co-development process to occur in the participating hospital where the management structure was quite hierarchical. However, a hierarchical management structure could act as either a facilitator or barrier to co-developing and/or implementing a training program, depending on whether the leaders favoured EBP implementation or not (Cheng et al., 2017; Hu et al., 2020). In Chinese hospitals, the directors of nursing departments are responsible for all nursing-related activities and, as

Kam and Wong (2010) state, have the power to authorize and provide necessary resources, support, and funding for nursing practice and conducting nursing studies. In my study, the nursing directors supported the development process for the implementation leadership training program by approving nurse managers recruitment and providing locations for the group discussions to take place, and one nursing director was involved in the co-development process. Hartviksen et al. (2019) found that senior leaders can ensure that design of leadership programs align with organization's goals and objectives, providing a higher chance of successful implementation. In addition, the study by Hadi-Moghaddam et al. (2021) showed that involving senior leaders in the development process of leadership program could increase the credibility and perceived value of the program among the nurse managers.

Continued senior leadership support will be crucial to implementing the implementation leadership training program. The nursing directors in this dissertation were interested in offering the training program in their organization. This, in turn, was reported by the nurse managers during the acceptability assessment to increase their willingness to participate in the training, a finding that is consistent with Birken et al. (2015) that found when senior leaders support training programs, they demonstrated their commitment to success, which can send positive messages to managers about the importance of the training program to organizational goals. These messages can enhance employees' perception of the program's significant and worth, leading to higher levels of participation (Birken et al., 2015; Hajizadeh et al., 2021). In addition, findings revealed that time constraints would impede implementation of the training program. During acceptability assessment, both managers who could deliver the training program and those who could participate in it were concerned that they would not have

enough time to engage in the training activities, an issue that is commonly reported by participants of leadership development interventions (Hughes, 2017). Nurse managers often have demanding schedules and are given limited time for additional training, making it difficult for them to fully participate in training programs. Similar to Sveinsdóttir et al. (2018), managers that participated in the acceptability assessment of this dissertation suggested that nursing directors could allocate resources to ensure that managers have the time and support needed to attend the training. For example, allowing nurse managers to distribute non-critical responsibilities to other team members could free up time to attend training (Sveinsdóttir et al., 2018).

Finally, findings from the systematic review and the co-development process showed that senior leadership support could also help nurse managers apply implementation leadership competencies and behaviours they learned during the training program. Birken et al. (2015) revealed that senior leaders could positively influence managers' commitment to EBP implementation by setting EBP as an organizational priority, providing policy support and human resources, training and funding opportunities. Similarly, managers who participated in the co-development process suggested that senior leadership support would be needed to reinforce the vision and goals of implementation, integrate EBP into hospital procedures and drive the process, findings that are consistent with a systematic review of implementation leadership (Gifford et al., 2018). In addition, providing rewards and recognition was another way participants suggested to encourage EBP implementation in China, as findings in the co-development and acceptability assessment stages showed that nurse managers highly valued the recognition from senior leaders. Furthermore, findings from the co-development process

highlighted that nursing directors could encourage and foster collaboration between nurse managers and interdisciplinary teams. This is particularly critical when interprofessional or interdepartmental collaborations and support are needed to facilitate the integration of EBPs into the clinical practice (Green & Johnson, 2015).

5.2.3 Opportunities for professional development and tangible outputs as an incentive for undertaking the training program

Findings from the acceptability assessment indicated that professional self-improvement and tangible outcomes were motivating factors for nurse managers to engage in the training program. The managers wanted to improve their implementation leadership competencies and lead EBP implementation to meet patient expectations of best care, which motivated them to want to participate in the training. Similarly, Kinsella et al. (2018) found that nurses predominantly endorsed professional improvement and development as reasons for enrolling in hospital-based training courses. Moreover, managers that participated in this dissertation believed that highlighting tangible outputs such as solving clinical problems, receiving training certification, developing and leading EBP implementation programs, and writing and publishing research papers could also increase their motivation and willingness to participate. This is consistent with findings of Forman et al. (2009) who expressed that the tangible outputs of training programs was viewed as a critical factor for the engagement of participants.

In the acceptability assessment of the developed prototype, nurse managers were interested in writing academic papers for publication, which was consistent with what participants said at the co-development stage where nurse managers expressed a strong

interest in writing up the implementation process for publication. I propose several possible reasons for it. First, by publishing research papers, managers can advocate for EBP implementation, gain validation and support for the need for EBP from both within and outside the hospital, which is well-needed as senior leadership, organizational structure, and resources are necessary to ensure the successful implementation of EBP (Kueny et al., 2015). As shown in the training program prototype, the managers participated in the co-development process proposed that producing academic outputs is critical for nurses to advocate for change.

Second, participants believed that writing and publishing academic papers about the process of solving clinical problems would help them gain recognition, a finding consistent with Scala et al. (2019). Specifically, I found in the co-development process that by disseminating their implementation experiences through academic publications, conference presentations, and other means, managers' work would be recognized by peers, other healthcare professionals, and senior leaders. This recognition would serve to underscore the importance of profession nursing, as it demonstrates the value and impact that nurses can have on improving patient care and outcomes (Liu et al., 2021).

Third, hospital administrators that participated in the co-development process stated they valued the production of academic outputs and managers confirmed that publishing academic papers was a requirement for nurses' promotion in management. These findings were consistent with a study by Wu et al. (2019) that revealed the opportunity for promotion motivated managers to publish research papers. Many hospitals in China, especially those at the tertiary level, encouraged academic output so intensively that they provide incentives (e.g., bonuses) for journal publications and grant applications (Zhang et al., 2020).

Lastly, writing academic papers would provide managers with opportunities to reflect on the development of their implementation leadership behaviours and better comprehend the implementation process (Koshy et al., 2017). Specifically, in the writing process, nurse managers believed that they would be able to reflect on their role within the organization and implementation activities, which benefit the development of their implementation leadership behaviours. Also, managers could think through what has been achieved and what could be done differently and provide recommendations for future EBP implementation when writing up papers (Duff et al., 2020; Koshy et al., 2017).

5.3 Implications for nursing

Based on the findings of the systematic review (Chapter 2), the prototype co-development (Chapter 3), and prospective acceptability assessment (Chapter 4) in this dissertation research, the following implications for nursing leadership, education, and research are offered.

5.3.1 Implications for nursing leadership

There are four implications for nursing leadership. First, the training program prototype offers a toolkit and a roadmap for nurse managers to lead the implementation of EBP in China. According to the prototype, unit nurse managers can take specific behaviours and actions to lead the implementation, engage key stakeholders, and improve patient outcomes within the hospital context in China.

Second, senior leaders, especially nursing directors, should provide support for the undertaking of training programs for nurse managers. Nursing directors could provide resources, such as time for nurse managers to participate in leadership training programs. In

addition, they could support managers leading EBP implementation by reinforcing the vision and goals of implementation, integrating EBP into hospital procedures, providing rewards and recognition to nurses, and requesting interprofessional collaboration on EBP implementation.

Third, senior leaders should develop processes and mechanisms for point-of-care nurses to identify, report, and address clinical problems through EBP. Through this managers and point-of-care nurses can report on the goals and plans for implementing EBP and request support, such as funding and assistance with evidence searching, from the hospital and external entities such as nursing associations. The establishment of a reporting process and supporting mechanism can potentially increase organizational support and coordination for EBP implementation in the nursing context (Sharplin et al., 2019).

Forth, external leadership support is critical for the undertaking of leadership training programs. As presented in the prototype, the managers perceived that external organizations, such as professional associations and health commissions, could provide support by endorsing the training program, sharing resources such as guidelines or national/provincial level training, and offering recognition for completion, such as training certifications and opportunities for conference presentations. External leadership recognition, as perceived by nurse managers in the co-development process, can also increase managers' credibility in implementing evidence and their reputation within the hospital.

5.3.2 Implications for nursing education

There are three implications for nursing education. First, it is necessary to provide nurse managers with adequate training and resources to lead the implementation of EBP in their

units. The leadership training program prototype has the potential to serve as a model for nursing education programs in China and beyond, providing a foundation for the development of similar programs in other settings. Specifically, the prototype outlines alternative leadership actions that operationalized implementation leadership behaviours, and identifies competencies for developing each behaviour. It also features interactive multimodal activities that were derived from a systematic review (Chen et al., 2022). The prototype could serve as a useful reference for developing implementation leadership training programs for individuals in various leadership roles, across different healthcare disciplines in various healthcare contexts.

Second, more collaborations between clinical professionals and nursing researchers should be encouraged to benefit the leadership training program development and implementation. As previously mentioned, the collaboration between researchers and nurse managers played a key role in creating the training program prototype. Through working together, researchers and managers integrated research evidence and clinical expertise into the prototype's development. Additionally, in the prototype, I identified multiple ways in which implementation researchers and managers could collaborate during the implementation process, such as identifying and understanding clinical problems; identifying evidence; developing and applying implementation plans. The combination of academic nursing expertise and clinical nursing interests could help identified high quality and suitable evidence and develop feasible EBP implementation plans (Shayan et al., 2019).

Lastly, studies in this dissertation revealed a desire among nurse managers to publish academic papers, yet they also expressed a need for systematic research skills training. Hence, there is a clear requirement for additional training opportunities of this nature.

5.3.3 Implications for nursing research

Mixed-methods studies in real-world settings is needed to evaluate the impact of the implementation leadership training program in Chinese hospitals. This way, researchers can investigate the effectiveness of the training on developing the implementation leadership competencies and behaviours among nurse managers and gain a deeper understanding of the experiences and perspectives of both the participants and deliverers involved in the training. It also offers researchers the opportunity to identify the challenges and enablers that shape the implementation of the training program in Chinese contexts.

Second, I recommend that an IKT approach be used to adapt leadership training programs for nursing professionals to different contexts. IKT approaches are participatory and can enhance nursing research by facilitating communication between researchers, clinical nurses, and nurse managers. It enables researchers to identify relevant research questions and carry out studies that are closely aligned with clinical practice, producing evidence that is directly applicable to the nursing practice (Chen et al., 2022).

5.4 Strengths and limitations of the dissertation

5.4.1 Strengths

The first strength of my dissertation is that it explored and integrated up-to-date research evidence, context-specific knowledge in an under-researched area (i.e. implementation leadership development in China), and clinical expertise into the development of the prototype of the implementation leadership training program. This integration allowed for a comprehensive approach that balanced the latest scientific findings with practical knowledge

and experience from clinical settings. It ensures that the prototype is relevant to the needs of nurse managers in the hospital context in China.

The second strength is the deliberate involvement of nurse managers in the co-development and acceptability assessment of the prototype. The engagement of nurse managers helped build key partnerships with the hospitals, ensured that the program had the buy-in and support of senior leaders and the key stakeholders who would either deliver the program or take part in it.

The third strength of my research is the utilization of various strategies to ensure methodological rigor. Purposive sampling, independent data analysis, and the involvement of experienced clinical nursing and nursing management managers, as well as member checking, all contributed to the credibility of the study. To ensure dependability of the analysis process, I disclosed my predispositions and maintained a codebook. Additionally, I provided a detailed description of the study context, methods, participants, data collection and analysis process, and findings to improve transferability. Detailed documentation was also maintained to facilitate external audit and ensure confirmability of our findings.

5.4.2 Limitations

There are three noteworthy limitations to this dissertation research. First, the COVID-19 pandemic posted challenges in establishing relationships with nurse managers prior to the study. The strict zero-COVID-19-case policy in place in the hospital for an extended period kept nurse managers occupied with their work, making it difficult for me to build relationship with them before initiating the co-development process. This resulted in a need for time for co-

developers to become familiar with each other and the research topic during the first group discussion, leading to limited discussion on co-development during the initial session, such as identifying leadership actions that promote the implementation of EBP.

Second, the pandemic has had an impact on nurse managers' engagement in the co-development and acceptability assessment stages. This impact may have influenced the validity of the findings, as the feedback from nurse managers regarding the development of the training program prototype and their perception of its acceptability may not have been fully captured.

Third, while managers who participated in the co-development process and acceptability assessment displayed a high level of adherence to the study protocols, there is a potential for social desirability bias, which could lead to over-reporting of acceptability and adherence levels. Social desirability biases may be influenced by cultural factors, such as the emphasis on obedience and conformity in Chinese culture, and could potentially result in biased data.

5.5 Conclusions

This dissertation provided valuable insights into the development and future implementation of a leadership training program prototype for unit-level nurse managers. I identified in the systematic review that leadership development interventions, particularly those that use multimodal activities such as lectures, group work, and mentoring, have positive effects on enhancing leadership competencies. However, understaffing, insufficient time and lack of support from supervisors can influence managers' use of leadership competencies in practice.

I developed the prototype of the implementation leadership training program using an IKT approach. Nurse managers co-developed the prototype and perceived the implementation leadership behaviours in O-MILe as essential and understandable in the hospital context in China. Specific actions and competencies corresponding to each behaviour were identified. The training program prototype included five modules and multimodal forms of delivery, such as lectures, experience-sharing sessions, group discussions, presentations, plan development and undertaking, and coaching.

I found in the prospective acceptability assessment that the prototype was overall acceptable to the unit nurse managers, who emphasized the interactive multimodal training activities as a strength of the program. Managers were expected to enhance professional self-development and produce academic outputs such as published papers via participating in the training program. The main concerns for the nurse managers were the time and capacity needed to participate, as well as the influence of the COVID-19 pandemic on their capacity. I modified the prototype based on the study findings.

In conclusion, the findings of this dissertation highlight the importance of considering factors such as development approaches, senior leadership support, and individual professional expectations when designing a leadership training program and planning its future implementation. Further research is needed to assess the impact of the training program on implementation leadership competencies and behaviours, and subsequent changes in clinical practice outcomes.

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Appendices

Appendix 2.1 Searching Strategies and Results in Medline(Ovid)

Database: Ovid MEDLINE(R) ALL <1946 to January 15, 2020>
Search Strategy:

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1 Leadership/ and (organizational objectives/ or professional competence/ or education, continuing/ or education, professional/) (4745)
2 (leadership adj3 (knowledge or skill* or behavio* or competenc* or capabilit* or development or program*)).tw. (5341)
3 1 or 2 (9452)
4 (leader or leaders).tw. (45320)
5 manager$.tw. (51448)
6 ((senior adj1 manag$) or (head adj1 nurs*) or (charge adj1 nurs*) or (ward adj1 sister*) or (chief adj1 nurs*)).tw. (3793)
7 (middle adj1 manag$).tw. (526)
8 (executi$ adj1 manag$).tw. (299)
9 (manag$ adj1 team$).tw. (2632)
10 (manag$ adj1 group$).tw. (2370)
11 Nursing, Supervisory/ (8336)
12 Nurse Administrators/ (13120)
13 (nurs$ adj1 manag$).tw. (8317)
14 (nurs$ adj1 leader$).tw. (4249)
15 or/4-14 (119549)
16 exp Nurses/ (86749)
17 exp Nursing Staff/ (65307)
18 Allied Health Personnel/ (11588)
19 nurs$.tw. (441905)
20 (health adj1 care adj1 provider$).tw. (33837)
21 (healthcare adj1 provider$).tw. (20177)
22 or/16-21 (552996)
23 mentoring/ or exp teaching/ (85209)
24 exp Learning/ (376236)
25 (intervention* or mentor* or coach* or training* or workshop* or advis* or pedagogy or learning or seminar* or teach* or development or program*).tw. (4082355)
26 ((role adj2 play*) or (gold adj2 technique*) or (360* adj2 feedback*) or reflection* or lecture*).tw. (347009)
27 ((virtual adj2 network*) or (online adj2 community adj2 practic*)).tw. (377)
28 or/23-27 (4586697)
29 3 and 15 and 22 and 28 (1183)

Searching Update on Jun 28, 2022

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30 limit 29 to yr="2021-Current" (228)

Appendix 2.2 The AIMD framework

Component	Description	Definition and considerations
Aims	What do you want your intervention to achieve and for whom?	This component relates to the objective and outcome of the intervention. Based on your endpoint, what are you measuring in whom? It could include consideration of proximal and intermediate outcomes, and process outcomes related to implementation.
Ingredients	What comprises the intervention?	These are the observable, replicable, and irreducible aspects of the intervention. To increase the detail specified, other taxonomies could be used in conjunction with the AIMD framework. This might include intervention taxonomies or reporting guidance.
Mechanism	How do you propose the intervention will work?	This refers to the pathways or processes by which it is proposed that an intervention effects change or which change comes into effect. As with ingredients, other taxonomies could be used in conjunction with AIMD to add detail. The proposed mechanism could be based on either theory or empirical evidence, and be made specific to the setting. The use of mechanism may change depending on if the framework is used for reporting or designing: why was the ingredient selected (design) and what is the pathway in which it worked (reporting).
Delivery	How will you deliver the intervention?	This encompasses logistical and practical information pertaining to intervention delivery, including mode (e.g. video, brochure); level (e.g. individual, team, population); dose, frequency, intensity; who's delivering; and size of target group.

Appendix 2.3 Hierarchical taxonomy of leadership behaviours and detailed descriptions †

Leadership domains	Leadership behaviours
Relations-Oriented Behaviours: Leaders use relations-oriented behaviours to enhance member skills, the leader–member relationship, identification with the work unit or organization, and commitment to the mission.	**Supporting** Leaders use supporting to show positive regard, build cooperative relationships, and help people cope with stressful situations.
	Developing Leaders use developing to increase the skills and confidence of work-unit members and to facilitate their career advancement.
	Recognizing Leaders use praise and other forms of recognition to show appreciation to others for effective performance, significant achievements, and important contributions to the team or organization.
	Empowering Leaders can empower subordinates by giving them more autonomy and influence over decisions about the work.
Task-Oriented Behaviours: The primary purpose of task-oriented behaviours is to ensure that people, equipment, and other resources are used in an efficient way to accomplish the mission of a group or organization.	**Clarifying** Leaders use clarifying to ensure that people understand what to do, how to do it, and the expected results. Includes explaining work responsibilities; assigning tasks; communicating objectives, priorities, and deadlines; setting performance standards; and explaining any relevant rules, policies, and standard procedures.
	Planning Leaders use panning to making decisions about objectives and priorities, organizing work, assigning responsibilities, scheduling activities, and allocating resources among different activities.
	Monitoring Leaders use monitoring to assess whether people are carrying out their assigned tasks, the work is progressing as planned, and tasks are being per- formed adequately.
	Problem solving Leaders use problem solving to deal with disruptions of normal operations and member behaviour that is illegal, destructive, or unsafe.
Change-Oriented Behaviours: Leaders use change-oriented behaviours to increase innovation, collective learning, and adaptation to external changes	**Advocating Change** Explaining why change is urgently needed is a key leadership behaviour in theories of change management

	Envisioning Change An effective way for leaders to build commitment to new strategies and initiatives is to articulate a clear, appealing vision of what can be attained by the work unit or organization.
	Encouraging Innovation There are many ways leaders can encourage, nurture, and facilitate creative ideas and innovation in a team or organization. Other terms that describe aspects of this behaviour include "intellectual stimulation" and "encouraging innovative thinking."
	Facilitating Collective Learning There are many ways leaders can encourage and facilitate collective learning of new knowledge relevant for improving the performance of a group or organization
External Leadership Behaviours: Most leaders can facilitate performance with behaviours that provide relevant information about outside events, get necessary resources and assistance, and promote the reputation and interests of the work unit.	**Networking** It is important for most leaders to build and maintain favorable relationships with peers, superiors, and outsiders who can provide information, resources, and political support
	External Monitoring This external behaviour includes analyzing information about relevant events and changes in the external environment and identifying threats and opportunities for the leader's group or organization.
	Representing Leaders usually represent their team or organization in transactions with superiors, peers, and out- siders (e.g., clients, suppliers, investors, and joint venture partners).

† Referred to descriptions of hierarchical taxonomy of leadership behaviours (Yukl, 2012).

Appendix 2.4 Data collection instruments and descriptions of outcomes

Study (Author, year) Intervention	Data collection instruments	Description of leadership outcomes † (Alignment with leadership competency categories)
Al-Hussami, 2017 *[Leadership guidance program]*	100 multiple-choice leadership knowledge questions	• Statistically significant improvement in leadership knowledge ($p < 0.001$).

Aqtash, 2022 *[Nursing leadership quality improvement training program]*	Management Competency Self-Assessment tool	• Statistically significant improvement in self-assessment overall leadership competency ($P < 0.05$) and dimensions include:
		  • Decision making skills
		  • Change management skills
		  • Time management skills
		  • Problem solving skills
		  • Delegation skills
		  • Motivation skills
		  • Communication skills
		  • People management skills
		  • Creativity skills

Bateman, 2020 *[Blended learning]*	Leadership Practices Inventory	• No change in:
		  • Modelling the way
		  • Encouraging the heart
		  • Enabling others to act
		  • Inspiring a shared vision
		  • Challenge the process

Brown-DeVeaux, 2021 *[Nursing leader mentorship program]*	Leadership Efficacy Questionnaire	• Non-statistically significant increased readiness to seek promotion • Non-statistically significant increased leaders' self-efficacy
Clarke, 2012 *[Take the lead (ttl) program]*	Focus group discussion guide + Interview guide	• Improvement in time management and concentration skills • Better strategic planning • Acknowledged the importance of being role models • Feel valued and empowered • Positive outlook for the future

Cole, 2020 *[Frontline nurse leaders simulation scenarios]*	Self-developed questionnaire	• Non-statistically significant increased confidence perceived in:
		  • Situation management
		  • Managing conflict
		  • Relationship management influencing others and promoting professional development

Study (Author, year) Intervention	Data collection instruments	Description of leadership outcomes † (Alignment with leadership competency categories)

Cooper, 2003 [*Leading an Empowered Organisation (LEO) program]*	Leadership Behaviour Description Questionnaire & Team Excellence version 2	• Statistically significantly improvement in in overall leadership performance (p=0.016) and several dimensions, including:
		  • Articulating the goal and maintaining organizational objectives
		  • Trusting the team
		  • Presenting challenging opportunities
		  • Getting outside support
		• Non-statistically significant improvement in:
		  • Confronting inadequate performance
		  • Supporting team members
		  • Being fair and impartial
		  • Recognizing superior performance
		  • Providing autonomy
		  • Exhibiting personal commitment
		  • Avoiding excess priorities
		  • Being open to new ideas

Crowne, 2017 *[Leading nurses development program]*	Multiple Leadership Questionnaire	• Statistically significant improvement in emotional intelligence (p=0.001) • Statistically significant increased transformational leadership (p<0.05)

Cunningham, 2000 *[RCN Clinical Leadership Development Program]*	Multiple Leadership Questionnaire	• Significant decrease in active management by exception (p<0.05)
		• Became an effective team leader in building, developing and managing team relationships
		• Significant increase (p<0.05) in:
		  • Idealized contribution
		  • Inspiration
		  • Attributed charisma
		• Be aware of health policy changes and strategic involvement in changing process
		• Being able to influence the wider context by internal & external networking
		• Statistically significant increase in effectiveness and satisfaction in leaders' leadership style (p<0.05)

Debono, 2016 *[Take The Lead' program]*	Open-Ended Questions	• Learned much-needed skills, turned more confident in making decisions • Positive changes in overall job performance • Improvement in ability to lead
Dewar, 2019 *[My Home Life Leadership Support program]*	Focus group discussion guide	• Valuing emotionality • Security and belonging • Being curious about others • New ways of initiating conversations

Study (Author, year) Intervention	Data collection instruments	Description of leadership outcomes † (Alignment with leadership competency categories)
		• Opening up and creating genuine ownership of new ideas, taking ideas forward in a collaborative and appreciative way
Dols 2021 *[Charge nurses' education program]*	Charge Nurses Skills Competency Evaluation Tool	• Statistically significant improvement in problem solving, communication, organization, and professional development and team building ($p<0.05$)

Duygulu, 2011 *[Transformational leadership training program]*	Leadership Practices Inventory	• Statistically significant higher self-perception & improvement ($P<0.05$) on:
		  • Modeling the way
		  • Encouraging the heart
		  • Enabling others to act
		  • Inspiring a shared vision
		  • Challenging the process
		  • Overall leadership practices

Eldh, 2018 *[Leadership program]*	FARAX360 + Recording	• Applied relations-, change-, and task-oriented behaviours to some extent

Fennimore, 2011 *[University of Pittsburgh Medical Center (UPMC) Leadership Development for Nursing Middle Managers program]*	Nurse Manager Inventory Tool + Course evaluation	• Non-statistically significant improvement in all leadership competency areas, including:
		  • Finance
		  • Human resources and leadership
		  • Technology strategic management
		  • Clinical practice
		  • Reflective practice referencing behaviours/tenets
		  • Performance improvement
		  • Diversity
		  • Relationship management and influencing behaviours
		  • Career planning
		  • Personal and professional accountability
		  • Shared decision-making
		  • Foundational thinking skills

Flatekval, 2019 *[Leadership development program]*	Nurse Manager Inventory Tool	• Non-statistically significant improvement in self-reported leadership competencies including:
		  • Financial management
		  • Human resource management
		  • Strategic management
		  • Appropriate clinical practice knowledge
		  • Performance improvement
		  • Reflective practice

Study (Author, year) Intervention	Data collection instruments	Description of leadership outcomes † (Alignment with leadership competency categories)
		• Diversity • Relationship management and influencing behaviours • Personal and professional accountability • Career planning • Shared decision making • Foundational thinking skills
Foster, 2018 *[Certificate in leadership and management practice (CLMP) program]*	Focus group discussion guide + Interview guide	• Gained leadership competencies & applied them toward achieving health outcome goals and improvement objectives

Frasier, 2019
[Pilot leadership development program]
	Authentic Leadership Questionnaire	• No change in authentic leadership behaviours including:
		  • Transparency
		  • Balanced processing

Goktepe, 2018
[Nurse Manager Development Program]
	Management Competency Self-Assessment Scale	• Statistically Significant improvement ($P < 0.05$) in management skills and competencies including:
		  • Time management, decision-making, nursing staff scheduling, meeting management
		  • Business management process, outcome monitoring, budgeting, monitoring for budget management, efficient running of daily unit operations
		  • Problem-solving ability, managing complaints
		  • Building teamwork in a work unit, managing conflict, creating a positive work environment
		  • Performance appraisal
		  • Delegation of authority, employee empowerment and continual improvement, empowering communication between manager and employees
		  • Application of total quality management
		  • Employees' motivation
		  • Application to risk management
		  • Knowledge of national health and nursing legislation
		• No change in "staffing" and "efficient running of the unit"

Greenwood, 2002 (part I & part II) *"Clinical Development Unit (CDU) Leadership Preparation Program"*	Focus group discussion guide + Interview guide	• Applied theoretical insights in practice • Increased commitment to become leaders

Hancock, 2006	Interview guide	• Positive influence on:
		  • Problem solving
		  • Communication strategies

Study (Author, year) Intervention	Data collection instruments	Description of leadership outcomes † (Alignment with leadership competency categories)
[*Leading an Empowered Organisation (LEO) program]*		• Empowerment • Risk taking • Competence • Leadership and management styles
Hsu, 2011 *[Leadership Orientation Program]*	Evaluation Sheet of Preceptors' Nursing Competencies	• Non-statistically significant improvement in professional competence, management/ instructional skills, and advanced training credit
Hubley 2022 *[Strengths-Based Nursing and Healthcare Leadership and Management program]*	Self-developed questionnaire & Document review	• Learned leadership knowledge (scored average 4 out of 5) • Shifted from traditional care model toward an approach focus on strengths and relational ways of being a leader.

Hyrkäs, 2005
[Clinical supervision]
	Writing short essays	• Positive effects on leadership competencies including:
		  • Control over various situation
		  • Coping with work pressure
		  • Viewing subordinates as individuals, developing subordinates
		  • Developing communication skills.

Jeon, 2018 *[Ethical leadership program]*	Ethical Leadership at Work questionnaire	• Statistically significant improvement in concern for sustainability (p = 0.002) • Statistically significant improvement in people orientation (p = 0.041) • No change in organizational citizenship behaviour, and commitment to the workplace • No improvement in overall ethical leadership
Johnson, 1991 *[Management training program]*	Leader Effectiveness and Adaptability Description	• Non-statistically significant improvement in perceived leadership effectiveness • No changes in leadership styles

Kabinga-Makukula, 2019
[Instant messaging]
	Document review	• Facilitated social interaction including:
		  • Remaining in close contact with colleagues
		  • Seeking and offering emotional and social support
		  • Sharing stories
		  • Using humor and communication

Kvist, 2014	No description	• Non-statistically significant improvement in developing skills of supporting the staff, setting an example, developing collaboration

Study (Author, year) Intervention	Data collection instruments	Description of leadership outcomes † (Alignment with leadership competency categories)
[Evidence-Based Nursing Leadership (EBNL) training]		• Non-statistically significant better understanding and developing evidence-based decisions
Lalleman, 2017 *[Peer-to-peer shadowing]*	Interview guide	• Learned to observe, ask, receive and give feedback during the shadowing experience
Lankshear, 2010 *[Actively Leading In Virtual Environments (ALIVE) pilot program]*	Self-developed questionnaire + Focus group discussion guide	• Statistically significant higher confidence in understanding the managed care/request for proposal process (P=.045)

Lee, 2015 *[A clinical leadership program]*	Self-developed questionnaire	• Enhanced understanding of:
		  • stakeholder engagement
		  • leadership knowledge
		• Increased self-confidence
		• Identified skills of an effective clinical leader
		• Improvement in leadership style including self-awareness

Luk, 2018 *[Leadership Enhancement Program]*	Servant Leadership + Self-reflective survey	• Statistically significant improvement in ($p < 0.05$) leadership behaviours, including:
		  • Having conceptual skills
		  • Empowering subordinates
		  • Creating value for those outside of the organization
		• No improvement in:
		  • Putting subordinates first
		  • Forming relationships with subordinates
		  • Helping subordinates grow and succeed

Mackoff, 2013 *[Leadership Laboratory (LL)]*	Self-developed questionnaire	• Statistically significant improvement in (P≤.000) and used knowledge and skills of:
		  • Time management
		  • Conflict management
		  • Teamwork

Mackoff, 2017a *[American Organization of Nurse Executives (AONE) Nurse*	Leadership Program Outcomes Measures (14 items) + Open-Ended Questions	• Non-statistically significant improvement in leadership competencies in coaching and communication skills
		• Non-statistically significant improvement in application of knowledge in practice
		• Non-statistically significant increased confidence in:
		  • Global outlook
		  • Recognition of leadership readiness
		  • Leading

Study (Author, year) Intervention		Data collection instruments	Description of leadership outcomes † (Alignment with leadership competency categories)
	Manager Fellowship (NMF)]		• Changed leadership identity and behaviours • Non-statistically significant increased knowledge in leadership competencies

Mackoff, 2017b		Leadership Program Outcomes Measures (30 items) + Open-Ended Questions	• Non-statistically significant increase in application of knowledge in practice
			• Non-statistically significant increased knowledge in all leadership competency areas
			• Change after intervention:
			  • Change in desire and action to nurture, coaching, and mentoring next generation of leaders
			  • Change to empathetic listening
			  • Improvement in capacity to foster collaboration and empower staff
			  • Increased initiative: seek opportunities to lead organizational improvement and innovative projects
			  • Increased translation of content learning into practice: introduced new practices
			  • Increased participation in learning networks: learned from peers and outsiders
			  • Increased system engagement: transformative understanding of the interconnectedness of their unit in their organization.
			  • Increased confidence in lead

MacPhee, 2012 & MacPhee, 2014 *[Nursing Leadership Institute]*		Interview guide + Psychological Empowerment Scale + Leader Empowering Behaviors Scale	• Statistically significant improvement in staff-perceived Structural Empowerment of leaders (P< 0.01) • Statistically significant improvement in leader empowering behaviour and psychological empowerment (P < 0.001) • Increased confidence in finding own leadership style

Marath, 2015 *[Leadership development package]*		Leadership Practices Inventory + Focus group discussion guide + Interview guide	• Statistically significant improvement in leadership practice including: (P＜0.05)
			  • Modeling the way
			  • Encouraging the heart
			  • Enabling others to act
			  • Inspiring a shared vision
			  • Challenging the process
			• Learned how to coordinate care and build up team
			• Gained knowledge and leadership qualities and competencies

Maries-Tillott, 2006 *[Development program for senior nurses]*		No description	• Non-statistically significant improvement in competency in:
			  • Influencing service delivery
			  • Teamwork
			  • Education in practice and research in practice

Study (Author, year) Intervention	Data collection instruments	Description of leadership outcomes † (Alignment with leadership competency categories)
Martin, 2012 & Martin, 2014 *[Clinical Leadership Program (CLP)]*	Leadership Practices Inventory + Interview guide	• No change in modeling the way, encouraging the heart, and enabling others to act • Statistically significant improvement in in inspiring a shared vision and challenging the process ($p<0.05$)
Mcfarlan, 2020 *[Focused didactic educational intervention]*	Nurse Manager Inventory Tool	• Statistically significant improvement in finance competencies ($p<0.05$)

Mcgarity, 2020 *[Evidence-based leadership curriculum]*	Nurse Manager Inventory Tool	• Statistically significant improvement in overall leadership competence level ($p<0.05$) including:
		  • Finance
		  • Human resources
		  • Strategic management
		  • Clinical practice
		  • Reflective practice reference behaviours/tenets
		  • Performance improvement
		  • Diversity
		  • Relationship management and influencing behaviours
		  • Personal and professional accountability
		  • Career planning
		  • Shared decision-making
		  • Foundational thinking skills

McKinney, 2016 *[Experiential learning]*	Nurse Manager Inventory Tool	• Statistically significant improvement in financial management ($p = 0.009$)
McNally, 2006 *[Coaching program]*	No description	• More competent and confident in their roles

Menegaz, 2020 *[Executive coaching]*	Interview guide	• Positive changes:
		  • Set goals
		  • Monitor results
		  • Supervision and organization
		  • Achieve the proper and safe functioning for all sectors
		  • More productivity and resolution in relation to activities
		  • Improvement in the teamwork
		  • Administrative procedures and delegation
		  • Communication
		  • Work processes and development of evidence-based practice
		  • Permanent education

Study (Author, year) Intervention	Data collection instruments	Description of leadership outcomes † (Alignment with leadership competency categories)

Mushtaq, 2021 *[Transformational leadership educational program]*	Transformational Leadership Knowledge related Questionnaire & Multifactor Leadership Questionnaire	• Statistically significant improvement in leadership knowledge of nurse managers (P=0.000).
		• Statistically significant improvement in transformational leadership skills (P=0.000) include:
		  • Idealized influence
		  • Idealized behaviours
		  • Individualized consideration

Nghe, 2020 *[A comprehensive leadership training program for mid-level leaders]*	Self-developed questions	• Non-statistically significant increased confidence in:
		  • Differentiating between leadership and management
		  • Solving challenging situations around accountability
		  • Communication
		  • Change management
		  • Influencing behaviour
		• Non-statistically significant but more comfortable with:
		  • Crucial conversations
		  • Initiating corrective actions, and acting as a change agent after intervention

Ogilvie, 2021 *[Nurse Manager Leadership Development Program]*	Self-developed questionnaire	• Statistically significant positive change in leadership knowledge and skills ($p < 0.01$) including:
		  • Reduce conflicts use interpersonal skills
		  • present challenging opportunities
		  • planning
		  • creating vision (envision change)
		  • help others perform well
		  • listening to others and seek advice
		  • create collaboration environment.

Omoike, 2011 *[Administrative nursing leadership (ANL) certificate program]*	No description	• Statistically significant decreased perceived importance in 'Disturbance' (i.e., negotiation, managing, and mediating conflict) and 'Technical' subscales (P<0.05).
		• Non-statistically significant increase in perceived competencies in implementing activities related to unit and organization, followed by external environment.
		• Statistically significant improvement in competencies in leadership activities including (P < 0.001):
		  • Resources
		  • Strategic assessment
		  • Monitoring
		  • Operations
		  • Interpersonal

Study (Author, year) Intervention	Data collection instruments	Description of leadership outcomes † (Alignment with leadership competency categories)
		• Communication • Entrepreneur • Liaison • Spokesperson • Leader

Patrician, 2018 *[Mapping and Sustaining a Personal Leadership Journey]*	Nurse Manager Inventory Tool + interview guide	• Statistically significant improvement in leadership skills (P≤ 0.05), including:
		  • Financial management
		  • Human resource management
		  • Strategic management
		  • Appropriate clinical practice knowledge
		  • Human resource leadership skills
		  • Performance improvement
		  • Reflective practice reference behaviours/tenets
		  • Diversity
		  • Personal and professional accountability
		  • Career planning
		  • Shared decision making
		  • Informed decision making
		  • Foundational thinking skills
		  • Relationship management and influence behaviours

Pedaline, 2012 [*Mentoring program]*	Leadership Practices Inventory + Interview guide	• Statistically significant improvement in leadership practice including: (P <0.05)
		  • Encouraging the heart
		  • Enabling others to act
		  • Inspiring a shared vision
		  • Challenging the process
		• No improvement in 'modeling the way'
		• Increased awareness, focus and clarity

Penney, 2018 *[My Home Life program]*	Focus group discussion guide	• Helped staff build relationship with residents and their relatives • Developed individually as leaders
Phillips, 2013 *[A leadership program for ward managers]*	No description	• Non-statistically significant greater understanding of using their staff as a resource • Non-statistically significant increased awareness • Non-statistically significant improvement in leadership styles
Platt, 2008	No description	• Positive on empowering • Increased confidence in communication within multidisciplinary team

Study (Author, year) Intervention	Data collection instruments	Description of leadership outcomes † (Alignment with leadership competency categories)
[Charge Nurse Development Program]		• Improvement in leadership skills and coordination ability in care delivery

# 51 Saab, 2019 *[Leaders for Compassionate Care Program]*	Leaders for Compassionate Care Outcomes Evaluation Questionnaire	• Statistically significant developed compassionate leadership capabilities (P ≤0.001) including: 	
		  • Understanding of context
		  • Introduction to skills in quality improvement and management of change
		  • Personal and relational development
		• Statistically significant increased perceived ability (P≤0.001) to:
		  • Managing conflict
		  • Building trust with patients
		  • Supporting peer learning

Seabold, 2020
 	
[2-day training session]
	Chase Nurse Manager Competency Instrument + McCloskey/Mueller Satisfaction Scale	• Non-statistically significant increase in competencies & abilities related to:
		  • Staffing & discipline
		  • Budget & Financial management
		  • Recruitment & Interviewing
		  • Productivity
		  • Performance improvement
		  • Research/ Evidence Based Practice
		• Non-statistically significant increase in satisfaction with relationships with physicians

Shirazi, 2016 *[Supportive leadership training]*	Supportive leadership behaviour questionnaire	• Statistically significant improvement in support for development, integrity, sincerity & recognition (P ＜0.05) • Statistically significant improvement in supportive leadership behaviours (P＜0.05)

Simpson, 2017 *[A leadership development program and administrative assistant (AA) support]*	LPI	• Statistically significant improvement in leadership competencies:
		  • Modeling the way (P = .028)
		  • Inspiring a shared vision (P = .037)
		  • Challenging the process (P = .029)
		• No improvement in enabling others to act and encouraging the heart
		• Statistically significant more likely to recommend nursing leadership as a career choice to others (P = .006).
		• Statistically significant improvement in overall transformational leadership competencies (P = .048).

Sisk 2021 *[Advanced Leadership Program]*	Conditions for Work Effectiveness Questionnaire II,	• Improvement in structured empowerment and dimensions including providing opportunity, support and information (supporting & empowering) • Decrease in provide access to resources

Study (Author, year) Intervention		Data collection instruments	Description of leadership outcomes † (Alignment with leadership competency categories)
		Job Activities Scale & Organizational Relationships Scale	
Skytt, 2011	*[Training Program]*	Leadership and Management Inventory + Interview guide	• Statistically significant improvement in "organizational view and political savvy" (p = 0.017) • No improvement in interpersonal skills and group management, & Achievement orientation
	[Self-development program]		• Statistically significant improvement in "achievement orientation" (P＜0.05) • No improvement in interpersonal skills and group management, & organizational view and political savvy"

Spiva, 2020
[Charge nurse pilot training program]
		Multiple Leadership Questionnaire	• Statistically significant improvement in resiliency (P＜0.05)
			• Non-statistically significant higher effectiveness and ability to motivate
			• Statistically significant improvement in transformational, transactional, and passive avoidant leadership outcomes (P＜0.05)
			• Qualities acquired:
			  • Honesty and integrity
			  • Accountability
			  • Decision-making capabilities
			  • Good communicating
			  • Delegation and empowerment
			  • Creativity and innovation
			  • Being able to inspire others

Spiva 2021
[Nurse leader training and strength-based coaching]
		Multifactor Leadership Questionnaire	• Statistically significant improvement in overall transformational leadership (P＜0.05) and dimensions include:
			  • Idealized attributes
			  • Idealized behaviors
			  • Inspirational motivation
			  • Intellectual stimulation
			  • Individual consideration
			• Statistically significant improvement in overall transitional leadership (P＜0.05) and dimensions include:
			  • Contingent reward
			  • Management by exception-passive
			• Non-statistically significant change in dimensions including management by exception-active, passive avoidant, laissez-faire (P＜0.05).

Study (Author, year) Intervention	Data collection instruments	Description of leadership outcomes † (Alignment with leadership competency categories)

Taylor-Ford, 2015 *[Leadership Practice Circle Program (LPCP)]*	Bradberry and Greaves 360° Refined leadership assessment tool	• Statistically significant improvement in in leadership skill of "developing others" (p=0.0012)
		• Non-statistical significantly greater leadership presence, confidence, intentional communication, sense of team and collective vision
		• No change in other leadership skills including:
		  • Business Acumen
		  • Planning
		  • Decision-Making
		  • Integrity
		  • Values Difference
		  • Lifelong Learning
		  • Communication
		  • Mobilizing Others
		  • Decision Awareness
		  • Information Sharing
		  • Vision
		  • Risk Taking
		  • Social Awareness
		  • Relationship Management
		  • Courage to Lead

Ueda, 2012 *[Leader-training program]*	Self-developed questionnaire	• Statistically significant more frequently performed ($p < 0.05$):
		  • Defining individual objectives
		  • Orienting staff to define objectives
		• No change in performing:
		  • Evaluating staff achievements and results
		  • Conducting personal interviews
		  • Advising staff to think about problem solving
		  • Confirming staff member's activities and giving advice
		  • Positive attitude towards the ideas of staff
		  • Identifying and informing staff about personal changes

Vitello-Cicciu, 2014 *[Leadership development program (LDP)]*	Focus group discussion guide	• Behavioural changes perceived by participants:
		  • Seeking diverse feedback
		  • Being emotionally aware of others
		  • Engaging in active listening
		  • Having crucial conversations

Weston, 2008	No description	• Improvement in leadership skills in the following area: • Time management

Study (Author, year) Intervention	Data collection instruments	Description of leadership outcomes † (Alignment with leadership competency categories)
[Arizona Healthcare Leadership Academy]		• Performance evaluations • Performance measurement • Conflict management • Dealing with difficult people • Negotiating • Team building • Communication • Quality improvement • Complexities of health care

Wilson, 2013
[Nurse unit manager leadership development program (LDP)]
	Interview guide	• Transformed development into actions, including:
		  • Feedback, and reflective practice
		  • Problem-solving
		• Learned more about themselves and others that facilitated beneficial connection between group members
		• Developed a sense of confidence in decisions and challenges

Xie, 2021
[Patient safety leadership program]
	General Self-Efficacy Scale & Hospital Leadership Behavior Assessment Scale	• Statistically significant improvement in self-efficacy ($p<0.01$)
		• Statistically significant improvement in overall leadership behaviours and dimensions include ($p<0.05$):
		  • Efforts to improve the work efficiency and performance of the organization
		  • Efforts to coordinate and maintain the relationships within the organization

†: Detailed descriptions of leadership outcomes in each included study.

Appendix 3.1 GUIDED – a guideline for reporting for intervention development studies

Item description	Explanation	Page in manuscript where item is located	Other*
1.Report the context for which the intervention was developed.	Understanding the context in which an intervention was developed informs readers about the suitability and transferability of the intervention to the context in which they are considering evaluating, adapting or using the intervention. Context here can include place, organisational and wider sociopolitical factors that may influence the development and/or delivery of the intervention (15).	Page 131-132	
2.Report the purpose of the intervention development process.	Clearly describing the purpose of the intervention specifies what it sets out to achieve. The purpose may be informed by research priorities, for example those identified in systematic reviews, evidence gaps set out in practice guidance such as The National Institute for Health and Care Excellence or specific prioritisation exercises such as those undertaken with patients and practitioners through the James Lind Alliance.	Page 129-130	
3. Report the target population for the intervention development process.	The target population is the population that will potentially benefit from the intervention – this may include patients, clinicians, and/or members of the public. If the target population is clearly described then readers will be able to understand the relevance of the intervention to their own research or practice. Health inequalities, gender and ethnicity are features of the target population that may be relevant to intervention development processes.	Page 132-133	
4. Report how any published intervention development approach contributed to the development process	Many formal intervention development approaches exist and are used to guide the intervention development process (e.g. 6Squid (16) or The Person Based Approach to Intervention Development (17)). Where a formal intervention development approach is used, it is helpful to describe the process that was followed, including any deviations. More general approaches to intervention development also exist and have been categorised as follows (3): Target Population-centred intervention development; evidence and theory-based intervention development; partnership intervention development; implementation-based intervention development; efficacybased intervention development; step or phased-based intervention development; and intervention-specific intervention development (3). These approaches do not always have specific guidance that describe their use. Nevertheless, it is helpful	Page 133-136	

Item description	Explanation	Page in manuscript where item is located	Other*
	to give a rich description of how any published approach was operationalised		
5. Report how evidence from different sources informed the intervention development process.	Intervention development is often based on published evidence and/or primary data that has been collected to inform the intervention development process. It is useful to describe and reference all forms of evidence and data that have informed the development of the intervention because evidence bases can change rapidly, and to explain the manner in which the evidence and/or data was used. Understanding what evidence was and was not available at the time of intervention development can help readers to assess transferability to their current situation.	Page 133-136	
6. Report how/if published theory informed the intervention development process.	Reporting whether and how theory informed the intervention development process aids the reader's understanding of the theoretical rationale that underpins the intervention. Though not mentioned in the e-Delphi or consensus meeting, it became increasingly apparent through the development of our guidance that this theory item could relate to either existing published theory or programme theory	Page 131, 133-136	
7. Report any use of components from an existing intervention in the current intervention development process	Some interventions are developed with components that have been adopted from existing interventions. Clearly identifying components that have been adopted or adapted and acknowledging their original source helps the reader to understand and distinguish between the novel and adopted components of the new intervention.	Page 133-136	
8. Report any guiding principles, people or factors that were prioritised when making decisions during the intervention development process.	Reporting any guiding principles that governed the development of the application helps the reader to understand the authors' reasoning behind the decisions that were made. These could include the examples of particular populations who views are being considered when designing the intervention, the modality that is viewed as being most appropriate, design features considered important for the target population, or the potential for the intervention to be scaled up.	Page 133-136	
9. Report how stakeholders	Potential stakeholders can include patient and community representatives, local and national policy makers, health care providers	Page 130, 133	

Item description	Explanation	Page in manuscript where item is located	Other*
contributed to the intervention development process.	and those paying for or commissioning health care. Each of these groups may influence the intervention development process in different ways. Specifying how differing groups of stakeholders contributed to the intervention development process helps the reader to understand how stakeholders were involved and the degree of influence they had on the overall process. Further detail on how to integrate stakeholder contributions within intervention reporting are available (19).		
10. Report how the intervention changed in content and format from the start of the intervention development process.	Intervention development is frequently an iterative process. The conclusion of the initial phase of intervention development does not necessarily mean that all uncertainties have been addressed. It is helpful to list remaining uncertainties such as the intervention intensity, mode of delivery, materials, procedures, or type of location that the intervention is most suitable for. This can guide other researchers to potential future areas of research and practitioners about uncertainties relevant to their healthcare context.	Page 133-136	
11. Report any changes to interventions required or likely to be required for subgroups.	Specifying any changes that the intervention development team perceive are required for the intervention to be delivered or tailored to specific sub groups enables readers to understand the applicability of the intervention to their target population or context. These changes could include changes to personnel delivering the intervention, to the content of the intervention, or to the mode of delivery of the intervention.	Page 141	
12. Report important uncertainties at the end of the intervention development process	Intervention development is frequently an iterative process. The conclusion of the initial phase of intervention development does not necessarily mean that all uncertainties have been addressed. It is helpful to list remaining uncertainties such as the intervention intensity, mode of delivery, materials, procedures, or type of location that the intervention is most suitable for. This can guide other researchers to potential future areas of research and practitioners about uncertainties relevant to their healthcare context.	Page 145	
13. Follow TIDieR guidance when describing the	Interventions have been poorly reported for a number of years. In response to this, internationally recognized guidance has been published to support the high quality reporting of health care?	Page 136	

Item description	Explanation	Page in manuscript where item is located	Other*
developed intervention.	interventions5and public health interventions14. This guidance should therefore be followed when describing a developed intervention.		
14. Report the intervention development process in an open access format.	Unless reports of intervention development are available people considering using an intervention cannot understand the process that was undertaken and make a judgement about its appropriateness to their context. It also limits cumulative learning about intervention development methodology and observed consequences at later evaluation, translation and implementation stages. Reporting intervention development in an open access (Gold or Green) publishing format increases the accessibility and visibility of intervention development research and makes it more likely to be read and used. Potential platforms for open access publication of intervention development include open access journal publications, freely accessible funder reports or a study web-page that details the intervention development process.	/	

*e.g. if item is reported elsewhere, then the location of this information can be stated here.

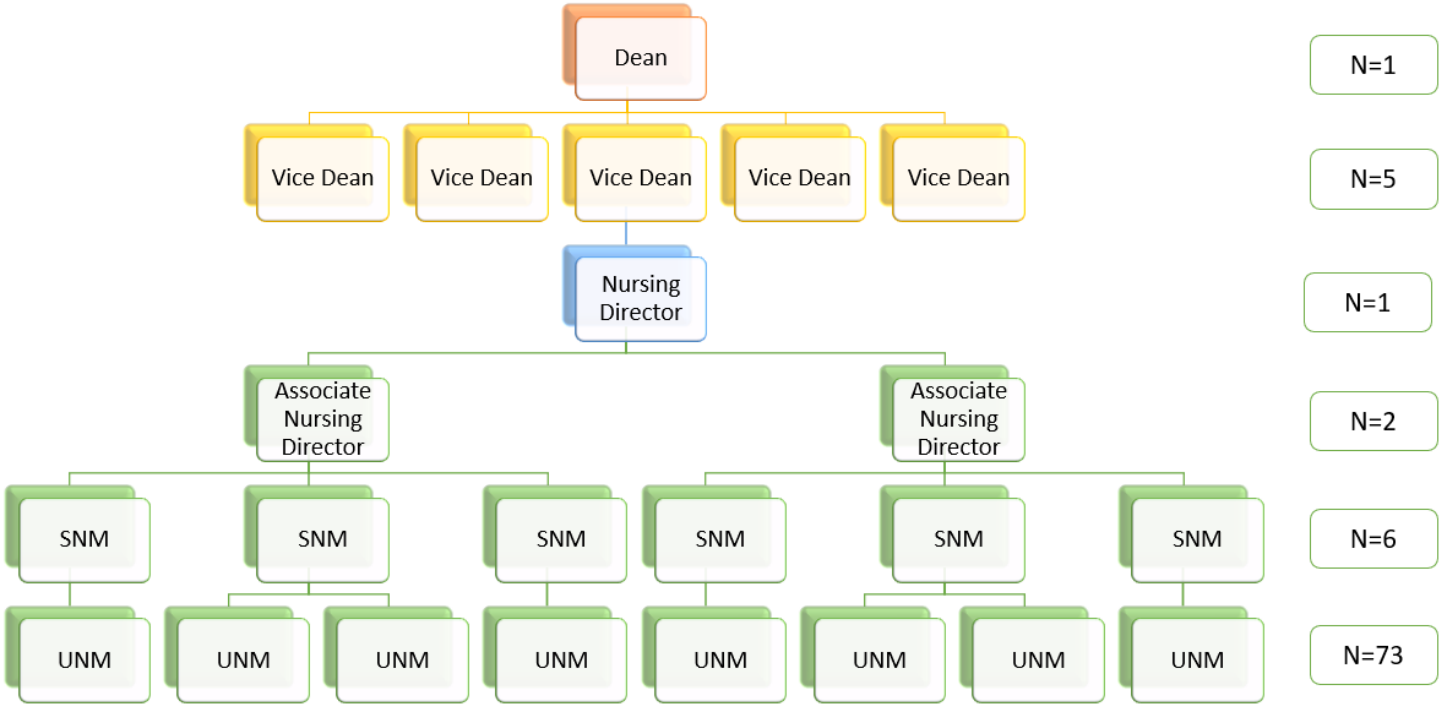
Appendix 3.2 Consolidated criteria for reporting qualitative studies (COREQ): 32-item checklist

No. Item	Guide questions/description	Reported on Page #
Domain 1: Research team and reflexivity		
Personal Characteristics		
1. Interviewer/facilitator	Which author/s conducted the interview or focus group?	Page 133
2. Credentials	What were the researcher's credentials? E.g. PhD, MD	Page 138
3. Occupation	What was their occupation at the time of the study?	Page 138
4. Gender	Was the researcher male or female?	Male, page 133
5. Experience and training	What experience or training did the researcher have?	Page 138
Relationship with participants		
6. Relationship established	Was a relationship established prior to study commencement?	No, page 132
7. Participant knowledge of the interviewer	What did the participants know about the researcher? e.g. personal goals, reasons for doing the research	Page 133
8. Interviewer characteristics	What characteristics were reported about the interviewer/facilitator? e.g. Bias, assumptions, reasons and interests in the research topic	Page 138
Domain 2: study design		
Theoretical framework		
9. Methodological orientation and Theory	What methodological orientation was stated to underpin the study? e.g. grounded theory, discourse analysis, ethnography,	Page 130

	phenomenology, content analysis	
Participant selection		
10. Sampling	How were participants selected? e.g. purposive, convenience, consecutive, snowball	Page 132
11. Method of approach	How were participants approached? e.g. face-to-face, telephone, mail, email	Page 133
12. Sample size	How many participants were in the study?	Page 132
13. Non-participation	How many people refused to participate or dropped out? Reasons?	None
Setting		
14. Setting of data collection	Where was the data collected? e.g. home, clinic, workplace	Page 132 .
15. Presence of non-participants	Was anyone else present besides the participants and researchers?	None
16. Description of sample	What are the important characteristics of the sample? e.g. demographic data, date	Page 133
Data collection		
17. Interview guide	Were questions, prompts, guides provided by the authors? Was it pilot tested?	Yes, page 133-136
18. Repeat interviews	Were repeat interviews carried out? If yes, how many?	No
19. Audio/visual recording	Did the research use audio or visual recording to collect the data?	Page 137
20. Field notes	Were field notes made during and/or after the interview or focus group?	None
21. Duration	What was the duration of the interviews or focus group?	Page 133
22. Data saturation	Was data saturation discussed?	Yes, page 152
23. Transcripts returned	Were transcripts returned to participants for	No

	comment and/or correction?	
Domain 3: analysis and findings		
Data analysis		
24. Number of data coders	How many data coders coded the data?	Page 137
25. Description of the coding tree	Did authors provide a description of the coding tree?	No
26. Derivation of themes	Were themes identified in advance or derived from the data?	Page 137
27. Software	What software, if applicable, was used to manage the data?	Page 137
28. Participant checking	Did participants provide feedback on the findings?	Page 137
Reporting		
29. Quotations presented	Were participant quotations presented to illustrate the themes/findings? Was each quotation identified? e.g. participant number	Yes, page 139-146
30. Data and findings consistent	Was there consistency between the data presented and the findings?	Yes, page 147-148
31. Clarity of major themes	Were major themes clearly presented in the findings?	Yes, page 139-147
32. Clarity of minor themes	Is there a description of diverse cases or discussion of minor themes?	Yes, page 139-147

Appendix 3.3 Hierarchical nursing management structure in the participating hospital



Notes: SNM: Sector Nurse Manager; UNM: Unit Nurse Manager

Appendix 3.4 Evidence sources and development process for elements of training program prototype

Elements of training program prototype		Evidence sources		Development process						
		Systematic review [34]	O-MILe/ Previous O-MILe interventions [12–14, 33]	Phase 1	Phase 2				Phase 3	Phase 4
				Discussion 1	Interview 1	Discussion 2	Interview 2	Discussion 3	Interview 3	discussion 4
Target recipients			√	√					√	√
Goals			√	√					√	√
Objectives & Modules			√		√	√	√	√		
Training program deliverers	Type, number & expertise		√						√	√
	Role	√	√						√	√
	Supplemental support	√							√	√
Duration of the training program			√						√	√
Setting									√	√
Pre-module activities		√	√						√	√
Arrangement of modules	Content of modules		√		√	√	√	√	√	√
	Activities for modules	√	√						√	√
	Duration of modules		√						√	√
Post-module activities		√	√						√	√

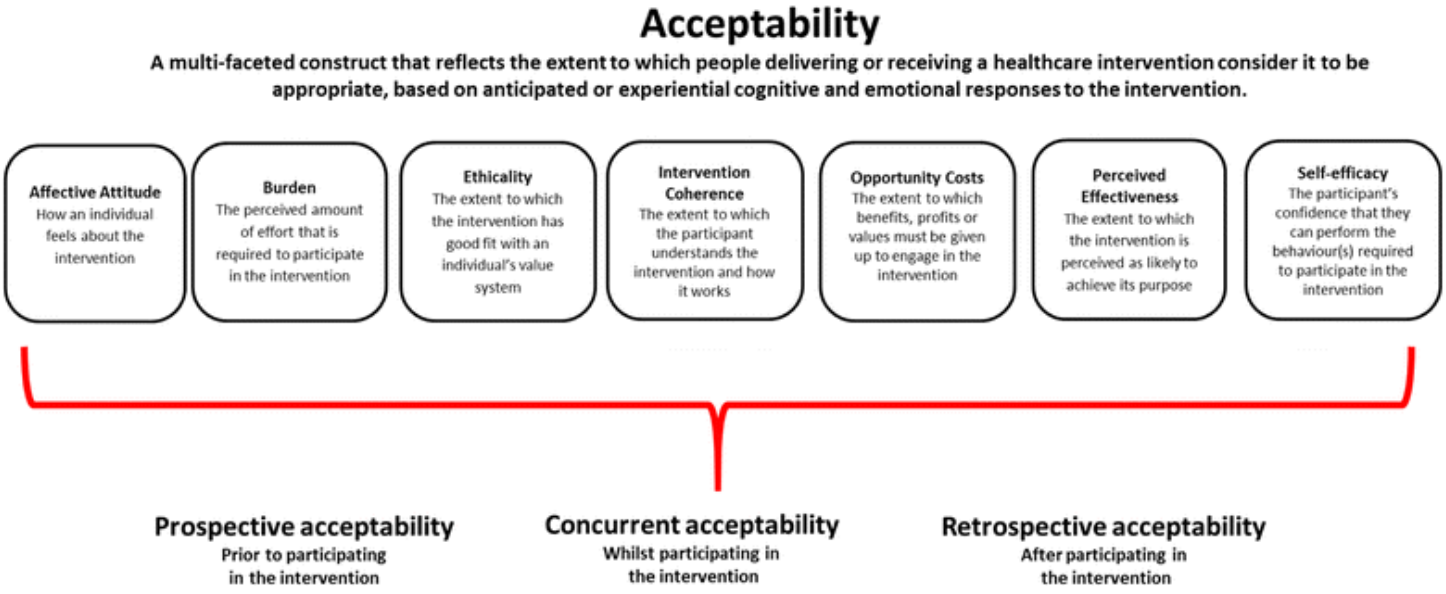
- **Note:** O-MILe, Ottawa Model of Implementation Leadership.

Appendix 4.1 Consolidated criteria for reporting qualitative studies (COREQ): 32-item checklist

No. Item	Guide questions/description	Reported on Page #
Domain 1: Research team and reflexivity		
Personal Characteristics		
1. Interviewer/facilitator	Which author/s conducted the interview or focus group?	Page 186
2. Credentials	What were the researcher's credentials? E.g. PhD, MD	Page 190
3. Occupation	What was their occupation at the time of the study?	Page 190
4. Gender	Was the researcher male or female?	Male, Page 190
5. Experience and training	What experience or training did the researcher have?	Page 190
Relationship with participants		
6. Relationship established	Was a relationship established prior to study commencement?	No, Page 186
7. Participant knowledge of the interviewer	What did the participants know about the researcher? e.g. personal goals, reasons for doing the research	Page 188
8. Interviewer characteristics	What characteristics were reported about the interviewer/facilitator? e.g. Bias, assumptions, reasons and interests in the research topic	Page 190
Domain 2: study design		
Theoretical framework		
9. Methodological orientation and Theory	What methodological orientation was stated to underpin the study? e.g. grounded theory, discourse analysis, ethnography, phenomenology, content analysis	Page 185
Participant selection		
10. Sampling	How were participants selected? e.g. purposive, convenience, consecutive, snowball	Page 186
11. Method of approach	How were participants approached? e.g. face-to-face, telephone, mail, email	Page 186
12. Sample size	How many participants were in the study?	Page 186
13. Non-participation	How many people refused to participate or dropped out? Reasons?	None
Setting		

14. Setting of data collection	Where was the data collected? e.g. home, clinic, workplace	Page 186, 191
15. Presence of non-participants	Was anyone else present besides the participants and researchers?	None, page 188
16. Description of sample	What are the important characteristics of the sample? e.g. demographic data, date	Page 189
Data collection		
17. Interview guide	Were questions, prompts, guides provided by the authors? Was it pilot tested?	Yes, Appendix 4.3 and page 188-189
18. Repeat interviews	Were repeat interviews carried out? If yes, how many?	No
19. Audio/visual recording	Did the research use audio or visual recording to collect the data?	Yes, page 189
20. Field notes	Were field notes made during and/or after the interview or focus group?	No
21. Duration	What was the duration of the interviews or focus group?	Page 191
22. Data saturation	Was data saturation discussed?	Yes, page 186
23. Transcripts returned	Were transcripts returned to participants for comment and/or correction?	No
Domain 3: analysis and findings		
Data analysis		
24. Number of data coders	How many data coders coded the data?	Page 189
25. Description of the coding tree	Did authors provide a description of the coding tree?	Yes, page 189
26. Derivation of themes	Were themes identified in advance or derived from the data?	Page 189
27. Software	What software, if applicable, was used to manage the data?	Yes, page 189
28. Participant checking	Did participants provide feedback on the findings?	Yes, page 189
Reporting		
29. Quotations presented	Were participant quotations presented to illustrate the themes/findings? Was each quotation identified? e.g. participant number	Yes, page 192-199
30. Data and findings consistent	Was there consistency between the data presented and the findings?	Yes, page 199
31. Clarity of major themes	Were major themes clearly presented in the findings?	Yes, Table 4.3 and page 191
32. Clarity of minor themes	Is there a description of diverse cases or discussion of minor themes?	Yes, page 192-199

Appendix 4.2 The Theoretical Framework for Acceptability (TFA)*



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Appendix 4.3 Semi-structured interview guide for prospective acceptability assessment of the implementation leadership training program prototype

Introduction

Thank you for agreeing to participating in an interview to provide feedback on the content and delivery methods of a leadership training program we have developed for managers to facilitate implementation of evidence-based nursing practice. Understanding your perceptions is vital to the further development of the programme, so please answer honestly and feel free to be as frank as you wish. This interview will be semi-structured and allow you to talk about your views on the program. All your comments will remain anonymous and will only be used for the purposes of this research project. This interview should take between 60 and 90 minutes.

Have you returned your signed consent form? (if no, please do so as soon as possible).

Do we have your consent to record this telephone interview?

(If yes), I am recording our conversation to ensure that we have an accurate summary of your opinions.

Prior to the interview, you will have 15-30 minutes to review the content of the training program. At the same time, I will introduce the program in detail.

(After introducing the program and making sure the interviewer gets familiar with the content of the training program)

Now I would like to ask you several questions about the content and delivery of the leadership training program.

I. Interview questions for training program deliverers (unit nurse managers, n=2)

1. To what extent do you find the training program prototype acceptable (overall acceptability)? From 1-5 (Unacceptable, Slightly unacceptable, Neutral, Slightly acceptable, Acceptable), what score will you give? Why?
2. What do you think of the leadership training program in general? Is there anything that you liked about delivering the leadership training program in the future (affective attitude)?

   Prompt: Do you like it? Or not like it? Why/Why not?

   Time dependant: can we walk through each section together?
3. Do you think whether it will be easy for you to deliver the training program? (burden)?
4. What are the barriers you anticipate would stop you from delivering the leadership training program (burden)?
5. Can you please describe how you think the leadership training program will work or not in influencing managers to implement evidence-based practices in nursing? Why do you think it will work or not? Are there any aspects of the program that you feel are difficult to understand (implementation leadership behaviours, activities, knowledge and skills; prototype planning (modules, content, training arrangement, delivery methods) (intervention coherence)?
6. What kind of constraints do you anticipate when delivering the training program (e.g. Inadequate funding/staffing/ time/competing priorities)? (opportunity costs)
7. In your opinion, do you think the leadership training program will be effective in making a difference to develop the implementation leadership of unit nurse managers (perceived effectiveness)?
8. How confident do you anticipate you would be if you were part of the team delivering the leadership training program? please expand (self-efficacy)?

9. Could you comment on how the leadership training program aligns with your ideas about the content and delivery of a leadership training program (ethicality)?

II. Interview questions for training program participants (unit nurse managers, n=12)

1. To what extent do you find the training program prototype acceptable (overall acceptability)? From 1-5 (Unacceptable, Slightly unacceptable, Neutral, Slightly acceptable, Acceptable), what score will you give? Why?
2. What do you think of the leadership training program in general? Is there anything that you liked about being involved in the leadership training program in the future (affective attitude)?

   Prompt: Do you like it? Or not like it? Why/Why not?

   Time dependant: can we walk through each section together?
3. Do you think whether it will be easy for you to participate in the training program? (burden)?
4. What are the barriers you anticipate stop you from participating in the leadership training program (burden)?
5. Can you please describe how you think the leadership training program will work or not in developing implementation leadership of unit nurse managers? Why do you think it will work or not? Are there any aspects of the program that you feel are difficult to understand (implementation leadership behaviours, activities, knowledge and skills; prototype planning (modules, content, training arrangement, delivery methods) (intervention coherence)?
6. What kind of constraints do you anticipate when participating in the training program (e.g. Inadequate funding/staffing/ time/competing priorities)? (opportunity costs)
7. In your opinion, do you think the leadership training program will be effective in making a difference to develop the implementation leadership of unit nurse managers (perceived effectiveness)?
8. How confident do you anticipate you would be if you participate in the leadership training program? please expand (self-efficacy)?
9. Could you comment on how the leadership training program aligns with your ideas about the content and delivery of a leadership training program (ethicality)?

Thank you so much for sharing your views about the implementation leadership training program prototype today.

Additional Files

Additional file 3.1 Examples of actions corresponding to leadership behaviours in Ottawa Model of Implementation Leadership (O-MILe)

Leadership behaviours in O-MILe		**Examples of actions from previous O-MILe-based intervention**			**Examples of actions as suggested in focus group discussion I**
		O-MILe-based intervention on diabetic foot ulcers [13, 33]	**O-MILe-based intervention on fall prevention** [12]	**O-MILe-based intervention on pediatric pain management**	
Manager Change Behaviours	Demonstrate commitment to change	• Identify goals for change • Establish commitment amongst leadership team.	• Set target goals for evidence implementation. • Write EBP into unit practice regulations. • Set goals for EBP implementation in the unit.	• Address concerns communicated by staff related to pain assessment tool, pain assessment process. • Review the care plans and look at the success, help affect changes in the intervention	• Request EBP implementation and highlight its importance during routine meetings.
	Understand and act on difficulties with change	• Identify clinical indicators that showed knowledge-do gaps. • Assess barriers and facilitators for evidence implementation.	• Explore barriers or factors that influence the EBP implementation. • Make plans and take actions to overcome these barriers.	• Delegate someone who has the right approach or ideas to share with those affected by the difficulties. • Communicate with other EBP units and learning good experience from others. • Get in touch with director of nursing department to seek support.	• Identify barriers to EBP implementation. • Develop targeted solutions for barriers and plans for EBPs implementation.
	Reinforce vision and goals for change	• Identify vision and goals for change.	• Express that hospital administrators want this to happen. • Articulate a clear, appealing vision of what can be attained by EBP implementation in the unit or organization. • Explain desirable outcomes that are likely to occur if the EBP being implemented.	• Send out reminders for staff and following up and offering assistance when possible (e.g., use WeChat).	•
	Advocate for change	•	• Explain why EBP implementation is urgently	• Seek opportunities for RNs	• Purse support from

	internally and externally		needed. • Increase staff's awareness of problems without creating an excessive level of distress that causes either denial of the problem or acceptance of easy but ineffective solutions. • Encourage, nurture, and facilitate creative ideas and innovation in a team or organization. • Analyse external information about EBP implementation, identify threats and opportunities for implementing EBP.	where they can grow and be recognized for their. accomplishments in best practices (regular education, make pocket sheets……)	hospital to management level.
Manager Relation Behaviours	Recognize ideas or actions to change	• Recognized staffs' efforts to change.	• Praise staff's work publicly. • Present an award in a meeting. • Recommend for a tangible reward such as a pay increase or bonus.	• Recognize the numerous comments about paediatric pain management from nurses in our unit.	•
	Support change substantively	• Increased visibility of management and clinical leaders.	• Showing concern for the needs and feelings of staff members. • Listening carefully when staff is worried or upset. • Providing support and encouragement when there is a difficult or stressful task. • Expressing confidence that staff can implement EBP. • Encouraging cooperation and mutual trust. • Mediating conflicts among staff when implement EBP.	• During morning shift meeting, recognize the person's accomplishments in the presence of peers (if appropriate).	• Lead by example • Encourage nurses to learn EBPs-relevant knowledge.
	Facilitate interprofessional consensus on change	• Reinforced need for interprofessional collaboration.	• Negotiating, working cooperatively and engaging actively in collaborative activities. • Building coalitions with interprofessional colleagues. • Using relationship-building tactics (e.g., finding common interests, doing favours, using ingratiation).	• Get in touch with medical team and discuss with staff before an interprofessional reunion.	• Use evidence in a small scale and collect data to prove the validity of the evidence. • Communicate with EBM implementation related discipline/department personnel to obtain support for the implementation.
	Communicate with staff about	• Encouraged communication with	• Ask for staff's ideas and suggestions on EBP implementation.	•	• Involve nurses in the development of EBP

	practice and seek advice	nursing specialists.			implementation plans. • Communicate with nurses about problems they encounter in the implementation process and find solutions.
Manager Task Behaviours	Clarify roles and responsibilities	•	• Explain work responsibilities. • Assign tasks. • Communicate objectives, priorities, and deadlines. • Set performance standards. • Explain any relevant rules, policies, and standard procedures.	• Develop empowered roles and define clear expectations for roles' responsibilities with a select few to start with.	• Organize standard knowledge and skills training and examine.
	Modify documentation forms	• Modified care plan and documentation forms.	•	•	• Develop standard. operation procedure • Develop refined and practical. implementation strategies.
	Procure resources, education, and policies	• Advocated for additional resources. • Provided in-service education sessions. • Ordered and provided supplies.	• Secure materials, interprofessional collaboration and other resources needed. • Provide staff with EBP implementation related training opportunity both inside and outside the hospital. • Ensure unit- or even hospital-level of policy support for EBP implementation	• Offer attendance to workshops, leadership development, best practice knowledge development. • Make education materials (video, printed materials……).	• Support nurses to obtain relevant professional. qualification certificates (e.g., nutritionist certificate).
	Monitor performance and outcomes	• Reinforced fit with current practice. • Checked charts for priority indicators and provided feedback about performance.	• Audit and feedback. • Observation. • Practice assessment.	• Random check. • The electronic record on PDA. • Examination on clinical skill.	• **Monitor the EBP implementation**:1) develop the quality control standards for the EBP implementation; 2) nurse manager routinely (or occasionally) supervises and observes the EBP implementation on site, gives feedback and makes rectification; 3) EBP implementation

					team leaders give feedback to nurse managers on the implementation every week. • **Set up reward and punishment regulations**: 1) Nurses or nursing units performed good in EBP implementation will receive hospital wide praise, performance rewards, etc. 2) Nurses or nursing units performed not good will be punished (e.g. reminders, warnings, and performance deductions).
	Provide reminders	• Sent reminders about goals for change.	•	• Send out reminders at first shift and second shift, and create an atmosphere for success. • Set up calendar-monitor what has improved through the use of stats or audits and supportive practice.	• Make patient reminder cards. • Make nurse practice reminder cards.
	Conduct regular implementation team meetings to plan	• Held regular planning meetings and established roles and responsibilities for managers and clinical leaders.	• Schedule activities and assign tasks in a way that will accomplish task objectives and avoid delays, duplication of effort, and wasted resources. • Identify essential action steps and determine an appropriate sequence and schedule for them. • Decide who should do each action step. • Determine what supplies, equipment, and other resources are necessary. • Involve point-of-care nurses, physicians and other allied healthcare professionals when necessary.	• conduct weekly audits. • Modify pain assessment tool. • renew pain assessment electronic system, inserting PDA. • develop paediatric pain management standard.	• Conduct nursing unit weekly meetings. • Conduct implementation team meetings.

Note: O-MILe, Ottawa Model of Implementation Leadership.

Additional file 3.2 Examples of competencies to develop leadership behaviours in Ottawa Model of Implementation Leadership (O-MILe)

O-MILe behaviours		**Examples of knowledge, skills and abilities**	
		O-MILe [14]	**Previous O-MILe-based intervention*** [12, 13, 33]
Manager Change behaviours	Demonstrate commitment to change	• Knowledge of evidence-based best practice • Skills to engages clinicians, staff, and patients	
	Understand and act on difficulties with change	• Knowledge of evidence-based best practice • Knowledge of current practices and outcomes	
	Reinforce vision and goals for change	• Knowledge of current practices and outcomes • Skills to set target goals for change	Knowledge of the organizational vision for change
	Advocate for change internally and externally	• Knowledge of leadership theory • Knowledge of evidence-based best practices • Knowledge of current practices and outcomes • Skills to engage clinicians, staff, and patients	
Manager Relations behaviours	Recognize ideas or actions to change	• Knowledge of leadership theory • Skills to engages clinicians, staff, and patients	• Knowledge of leadership and planned change theory • Knowledge of barriers and facilitators to guideline utilization • Skills to find clinical indicators that showed knowledge-do gaps • Skills to praise others
	Support change substantively	• Skills to engages clinicians, staff, and patients	•
	Facilitate interprofessional consensus on change	• Skills to engages clinicians, staff, and patients	•
	Communicate with staff about practice and seek advice	• Knowledge of leadership theory • Skills to engages clinicians, staff, and patients	• Knowledge of leadership and planned change theory •
Manager Task behaviours	Clarify roles and responsibilities	• Knowledge of leadership theory • Knowledge of evidence-based best practice	• Knowledge of leadership and planned change theory •
	Modify documentation forms	•	•

	Procure resources, education, and policies	• Knowledge of effective implementation methods • Knowledge of current practices and outcomes	• Skills to find clinical indicators that showed knowledge-do gaps
	Monitor performance and outcomes	• Knowledge of effective implementation methods • Knowledge of current practices and outcomes • Skills to find clinical indicators that showed knowledge-do gaps • Knowledge of barriers and facilitators to EBP implementation	• Knowledge of barriers and facilitators to guideline utilization Skills to find clinical indicators that showed knowledge-do gaps
	Provide reminders	• Knowledge of current practices and outcomes	• Skills to find clinical indicators that showed knowledge-do gaps
	Conduct regular implementation team meetings to plan	• Knowledge of evidence-based best practice • Knowledge of current practices and outcomes • Skills to sets target goals for change • Knowledge of how to develop implementation plan	• Find clinical indicators that showed knowledge-do gaps • Knowledge of barriers and facilitators to guideline utilization

Note: O-MILe, Ottawa Model of Implementation Leadership.

* O-MILe intervention on implementing evidence of diabetic foot ulcers [13, 33]; O-MILe intervention on implementing evidence of fall prevention [12]; O-MILe intervention on implementing evidence of pediatric pain management.

Additional file 3.3 Template of the implementation leadership training program prototype

Elements of prototype		Evidence-based delivery strategies or activities		
		Systematic review [34]	**Ottawa Model of Implementation Leadership (O-MILe)** [14]	**Previous O-MILe-based interventions***
Target recipients			• Point-of-care leaders	• Nurse managers and clinical leaders [13] • Formal (e.g., managers) and informal (e.g., nurses and care aid leaders) leaders [12]. • Nurse managers and physicians[1].
Number of recipients			•	• 14 participants [13] • 10 participants [12] • 12 participants[1]
Goals			• O-MILe explicates the knowledge and skills that are necessary for leaders to undertake the behaviors and facilitate implementation	
Objectives & Modules			• O-MILe postulates that for successful implementation, point-of-care leaders require: 1) knowledge of effective leadership practices, site-specific evidence-practice gaps, implementation strategies, and planned change processes, including barriers management; 2) skills to prioritize change, set goals and target outcomes, engage patients and staff, and develop an implementation plan. • The knowledge and skills portrayed in the O-MILe are described as the key components of a leadership intervention for participants to develop relations-, change-, and task-oriented leadership behaviors for implementing EBP in health care settings.	
Training program deliverers	**Type, number & expertise**			• The workshop was facilitated by the investigator (W.G.) and an experienced manager (G.S.) who

				had been involved in preparing the workshop [33]. • Facilitators included one Candidate Registered Nurse and the principal investigator [12]. • Facilitators included one researcher and three experienced nurse managers[1].
	Role	• **Recommendation:** Suggest future leadership interventions for managers should consider incorporating multi-modal activities such as group work, mentoring, and peer support to give opportunities for interaction.		• **Role:** The facilitators' roles were to elicit discussion, self-reflection and interactive problem-solving to identify goals for change and leadership strategies to achieve them, also led the follow-up teleconferences [33].
	Supplemental support	• **Recommendation:** Suggest future leadership interventions pursue the support from supervisors and point-of-care nurses in their respective settings to help managers successfully perform the leadership competencies they learned.		• A senior administrator opened the workshop to emphasize organizational commitment and alignment with strategic goals [33]. • Recognizing the importance of senior leaders' commitment to evidence-based practice, the study principal investigator (WG) pursue support from directors to tailor the intervention strategy to the organizational context [12]. • Nursing director of the participated hospital join the research team to emphasize the organizational commitment[1].
Duration of the training program		•	•	• Three months [13]. • Over four months [12]. • Eight months[1].
Setting		/	/	/

Pre-modules activities		• **Recommendation:** Future leadership interventions must consider the practice environments of managers and pursue the support from supervisors and staff nurses in their respective settings to help managers successfully perform the leadership competencies they learned. • **Recommendation:** Suggest future leadership interventions for managers should consider incorporating multi-modal activities such as group work, mentoring, and peer support to give opportunities for interaction.	•	• **Pre-workshop questions:** Four questions related to barriers and facilitators for participants to explore with staff prior to attending the workshop [33].
Arrangement of modules	**Content of modules**	•	• See Additional file 3.1 and 3.2	
	Activities for modules	• **Results:** We identified nine different ingredients in the interventions: in-person lectures (n=53, 77%), discussion groups (n=46, 67%), coaching or mentoring (n=23, 33%), reading materials (pre-lecture + reading alone) (n=18, 26%), self-reflection, mindfulness or journaling (n=13, 19%), online learning modules (n=13, 19%), peer support (n=9, 13%), and role-playing scenarios (n=8, 12%). • **Recommendation:** Suggest future leadership interventions for managers should consider incorporating multi-modal activities such as group work, mentoring, and peer support to give opportunities for interaction.		• Workshop and follow-up teleconferences, leadership action plan development (provided a framework for leadership teams to operationalize relations-oriented, change-oriented, and task-oriented leadership behaviors while taking into consideration context-specific barriers and supports). [13] • The intervention included three interactive workshops and three individualized coaching sessions, both of which have shown to be effective strategies for developing leadership to address workplace challenges [12]. • The intervention included four workshops and followed by bi-weekly coaching sessions[1]. • **Reading materials:** One week prior the workshop, printed materials were distributed to participants. Materials included readings on leadership and planned change [33].

	Duration of modules			• One full-day interactive workshop [13] • Two 3-h workshops in three months [12] • Four 1.4-h workshops in one month[1]. • The number and duration of the workshops were adapted from the original study plan after meeting with senior administrators to make it easier for hospital administrators to find replacement staff for study participants to attend [12].
Post-module activities		• **Results:** We identified nine different ingredients in the interventions: in-person lectures (n=53, 77%), discussion groups (n=46, 67%), coaching or mentoring (n=23, 33%), reading materials (pre-lecture + reading alone) (n=18, 26%), self-reflection, mindfulness or journaling (n=13, 19%), online learning modules (n=13, 19%), peer support (n=9, 13%), and role-playing scenarios (n=8, 12%). **Recommendation:** Suggest future leadership interventions for managers should consider incorporating multi-modal activities such as group work, mentoring, and peer support to give opportunities for interaction.	•	• Three teleconferences were held for each center after the workshop to facilitate reflection and discussions about operationalizing the leadership behaviors within the action plan. During the teleconference, the leadership behaviors identified in the action plans were revised and adapted based on participants' experiences implementing them [13]. • During the teleconferences, discussed leadership strategies and progress with implementation, updated activities within the leadership action plan [33]. • Teleconferences were scheduled at a time prearranged by unit managers. Each teleconference lasted 10–30 minutes, and one to six participants attended [33]. • Three individualized coaching sessions 2-6 weeks post workshop [12]. • Bi-weekly coaching sessions[1].

Note: O-MILe, Ottawa Model of Implementation Leadership.

* O-MILe intervention on implementing evidence of diabetic foot ulcers [13, 33]; O-MILe intervention on implementing evidence of fall prevention [12]; O-MILe intervention on implementing evidence of pediatric pain management.

1: From the study about O-MILe-based intervention on implementing evidence of pediatric pain management.

Additional file 3.4 The TIDieR (Template for Intervention Description and Replication) Checklist*

Item number	Item
	BRIEF NAME
1.	Provide the name or a phrase that describes the intervention.
	WHY
2.	Describe any rationale, theory, or goal of the elements essential to the intervention.
	WHAT
3.	Materials: Describe any physical or informational materials used in the intervention, including those provided to participants or used in intervention delivery or in training of intervention providers. Provide information on where the materials can be accessed (e.g. online appendix, URL).
4.	Procedures: Describe each of the procedures, activities, and/or processes used in the intervention, including any enabling or support activities.
	WHO PROVIDED
5.	For each category of intervention provider (e.g. psychologist, nursing assistant), describe their expertise, background and any specific training given.
	HOW
6.	Describe the modes of delivery (e.g. face-to-face or by some other mechanism, such as internet or telephone) of the intervention and whether it was provided individually or in a group.
	WHERE
7.	Describe the type(s) of location(s) where the intervention occurred, including any necessary infrastructure or relevant features.

	WHEN and HOW MUCH
8.	Describe the number of times the intervention was delivered and over what period of time including the number of sessions, their schedule, and their duration, intensity or dose.
	TAILORING
9.	If the intervention was planned to be personalised, titrated or adapted, then describe what, why, when, and how.
	MODIFICATIONS
10.‡	If the intervention was modified during the course of the study, describe the changes (what, why, when, and how).
	HOW WELL
11.	Planned: If intervention adherence or fidelity was assessed, describe how and by whom, and if any strategies were used to maintain or improve fidelity, describe them.
12.‡	Actual: If intervention adherence or fidelity was assessed, describe the extent to which the intervention was delivered as planned.

‡ If completing the TIDieR checklist for a protocol, these items are not relevant to the protocol and cannot be described until the study is complete.

* The focus of TIDieR is on reporting details of the intervention elements (and where relevant, comparison elements) of a study. Other elements and methodological features of studies are covered by other reporting statements and checklists and have not been duplicated as part of the TIDieR checklist.

Additional file 3.5 Example of leadership action plan

Goals: Pain assessment (from 40% to 70%)

Relations-Oriented Leadership	Change-Oriented Leadership	Task-Oriented leadership
I will recognize staff's ideas or actions to change by: Recognizing the numerous comments about pediatric pain management from nurses in our unit During morning shift meeting, recognize the person's accomplishments in the presence of peers (if appropriate)	**I will show commitment by:** Addressing concerns communicated by staff re: pain assessment tool, pain assessment process Review the care plans and look at the success, help affect changes in the intervention	**I will plan by:** Doing weekly audits Modifying pain assessment tool renew pain assessment electronic system, inserting PDA Generating pediatric pain management standard ……
I will visibly support change by: Support the RN presentation in their accomplishments on their respective units when they present their data and congratulate/celebrate the step by step improvements (weekly)	**I will understand and act on difficulties with change by:** Delegating someone who has the right approach or ideas to share with those affected by the difficulties Communicating with other EBP units and learning good experience from others Get in touch with director of nursing department to seek support	**I will clarify roles and responsibilities by:** Developing empowered roles and defining clear expectations for roles' responsibilities with a select few to start with
I will communicate with staff about the change by:	**I will reinforce goals for change by:**	**I will provide resources and education by:** Offering attendance to workshops, leadership development, best practice knowledge development

Listening to staff about the pain assessment practice (assessment tool use, the assessment time ……), providing supportive feedback and by doing follow-ups prn	Sending out reminders for staff and following up and offering assistance when possible (e.g. use WeChat)	Making education materials （video, printed materials……）
I will facilitate inter-professional agreement by: Getting in touch with medical team and discuss with staff before an interprofessional reunion	**I will advocate for change internal and external to the organization by:** Seeking opportunities for my RNs where they can grow and be recognized for their accomplishments in best practices (regular education, make pocket sheets……)	**I will monitor practices by:** Random check The electronic record on PDA Examination on clinical skill
		I will provide reminders by Sending out reminders at first shift and second shift, and by creating an atmosphere for success Setting up calendar-monitor what has improved through the use of stats or audits and supportive practice

Additional file 3.6 Example of implementation plan

Strategy	Content	Person responsible
Weekly Workshop	Education: evidence on pediatric pain assessment	nurse educator
	Communicate with staff about the change	Unit nurse managers
	Support the RN presentation in their accomplishments	Unit nurse managers
	Discuss the difficulties with change and figure out the solution	Unit nurse managers
	Provide reminders	Unit nurse managers
Making Education Materials	Making video and printed material on pain assessment	Nurse educator and nurse group leaders
Renew pain assessment electronic system (PDA)	Get in touch with nursing department and information department Design and renew pain assessment electronic system	Unit nurse managers
	Using PDA to record the results of pain assessment and monitoring practice	Charge nurses
Audit and Feedback	Audit and feedback on practice pain assessment at every shift handover	Unit nurse managers and nurse group leaders
	Provide reminders	Unit nurse managers
Setting up calendar-monitor	Use of stats or audits and supportive practice	Unit nurse managers and nurse group leaders

Additional file 4.1 Elements of the training program prototype for enhancing implementation leadership behaviours of unit nurse managers in the Chinese nursing context

Target participants	• Unit nurse managers (n=12)
Goals	• To enhance implementation leadership behaviours of unit nurse managers and related knowledge, skills and abilities, facilitate implementation of EBPs to improve patient outcomes.
Objectives	6. To increase basic knowledge and skills related to EBPs. 7. To discuss and develop essential nursing professional knowledge, skills and abilities needed for EBPs implementation. 8. To understand the importance of leadership in EBP implementation and the effective implementation leadership behaviours as described in OMILe. 9. To improve knowledge, skills and abilities for developing each implementation leadership behaviour in OMILe. 10. To be able to take actions for each leadership behaviours to facilitate EBP implementation.
Modules	6. What should we know about EBPs? 7. What are the essential professional knowledge, skills and abilities needed in EBPs implementation? 8. Why leadership matters in EBPs implementation and what are the effective implementation leadership behaviours? 9. What leadership knowledge, skills and abilities I need to develop each implementation leadership behaviours? 10. What leadership actions I can apply to facilitate EBP implementation?
Training program deliverers	• Four facilitators in total, including nursing researchers (n=2), and clinical experts (n=2). Nursing researchers have research experience in nursing leadership and knowledge translation. Clinical experts are unit nurse managers who 1) co-developed the prototype, 2) have over 20 years of clinical nursing experience, and 3) over five years of nursing management experience, 4) have experience of conducting or participating EBPs implementation. • Role of facilitators:

	6. Provide reading materials to participants before each module. 7. Give lectures, share experience, and facilitate discussions during each module. 8. Involve in the whole training program process and provide (online/in-person) supervising for participants in or between each module. 9. Follow up and coaching when needed. 10. Provide research guidance (e.g., journal manuscript writing, revision, journal selection or submission) for participants who are willing to publish the EBP implementation process and results. • Supplemental support from the organizational nursing department, pursue support (e.g., training certificate or continuing education credits) from professional nursing association.
Duration of modules	• Approximately 32 hours of full-time, in-person training in 4 consecutive days.
Setting	• Places away from the hospital setting.
Pre-module screening:	• Investigate evidence-based practice competencies (Evidence-based Practice Competence Questionnaire) of participants, invite participants with high levels of evidence-based practice competencies to give lecture in the Module 1. • Explore participants' individual needs for training program content and form, modify training program prototype accordingly
Pre-module preparation	• Each participant prepares 1-2 clinical nursing problems he/she currently encountering.

Note: EBPs, Evidence-based practices; O-MILe, Ottawa Model of Implementation Leadership.

Additional file 4.2 Arrangement of modules and post-modules activities in the training program prototype

Modules	Content	Activities	Duration
Module 1: What should we know about the EBP?	• Introduction of the training program. • Self-introduction. • Implementation leadership behaviours evaluation using ILS. • Knowledge of definition of EBP. • Knowledge of the importance and value of EBP in clinical nursing.	• Lectures (given by training program deliverers together with participants invited) • Group discussion (two group, six participants in each group, same for group work in following modules)	2-4 hours
	• Knowledge of and skills to: 1) Identify existing clinical problems 2) Search, screen, and assess quality of evidence 3) Assess the feasibility, appropriateness, meaningfulness, effectiveness of the evidence. 4) Select/tailor evidence to be implemented in clinical context.	• Lectures (given by training program deliverers together with participants invited) • Experience sharing on EBP implementation (clinical experts) • Group work (each group selects 1-2 problems, searching, assessing, and selecting evidence) • Guidance	8 hours
Module 2: What are the essential professional knowledge, skills and abilities needed in EBP implementation?	• Professional knowledge (e.g., knowledge of specific clinical specialty, hospital procedures, quality management standards) and skills (e.g., skills of clinical specialty) • Skills to communicate, organize, and coordinate (e.g., patients, nurses, superiors, interprofessional and interdepartmental professionals, nursing societies). • Ability to execute and supervise. • Ability to sustain improvement. • Ability to make decisions in crisis and uncertainty. • Ability to Innovate.	• Lectures (given by clinical experts) • Experience sharing (clinical experts) • Group discussion on what professional knowledge, skills and abilities are considered important/well-needed for managers to facilitate EBP implementation in your unit? Specific topics including: 1) Professional knowledge and skills 2) Skills to communicate, organize or coordinate 3) Abilities to execute and supervise 4) Ability to sustain improvement 5) Ability to make decisive decisions 6) Innovation abilities • Presentation on the results of group discussion	2-4 hours

Module 3: Why leadership matters in EBP implementation and what are the effective implementation leadership behaviours?	• Knowledge of definition of nursing leadership. • Knowledge of role of nursing leadership in EBP implementation. • Knowledge of definition of implementation leadership • Knowledge of O-MILe and implementation leadership behaviours (definitions and importance). • Knowledge of managers' roles and responsibilities in the EBP implementation.	• Lectures (given by nursing researchers) • Present previous EBP implementation program based on O-MILe • Group discussion & questions • Present the results of ILS evaluation in Module 1 • Self-reflection and group sharing on personal implementation leadership behaviours development based on the ILS evaluation	8 hours
Module 4: What leadership knowledge, skills and abilities I need to develop each leadership behaviours?	• Knowledge, skills, and abilities nurse managers need to perform change leadership behaviours. • Knowledge, skills, and abilities nurse managers need to perform relation leadership behaviours. • Knowledge, skills, and abilities nurse managers need to perform task leadership behaviours. **(Please see Additional file 4.3 and 4.4 for details of leadership behaviours and relevant knowledge, skills and abilities)**	• Lectures (given by nursing researchers) • Develop '**Personal Implementation Leadership Development Plan**' for each participant • One-on-one guidance	8 hours
Module 5: What leadership actions I can take to facilitate EBP implementation?	• Actions corresponding to change leadership behaviours. • Actions corresponding to relation leadership behaviours. • Actions corresponding to task leadership behaviours. **(Please see Additional file 4.4 for details of leadership behaviours and corresponding actions)**	• Lectures (given by nursing researchers) • Present and discuss the '**Personal Implementation Leadership Development Plan'** • Group work on developing '**Leadership Action Plan'** and '**EBP Implementation Plan**' for problems select in **Module 1** • Guidance	8 hours
Post-modules activities			
Follow up and coaching	• Training program deliverers follow up regularly on participants' plans implementation, provide one-on-one/group coaching to discuss existing problems and modify plans accordingly.		To be determined (depend on the plans)
Final presentation day	• Participants present the process and outcomes of their plan implementation. • Group sharing and discussion on the EBP implementation process (e.g., experience, problems encountered and solutions). • Share the experience of participating in the training program.		4-8 hours (Face to face/online)

Note: EBPs, Evidence-based practices; ILS, Implementation Leadership Scale; O-MILe, Ottawa Model of Implementation Leadership

Additional file 4.3 General competencies to develop implementation leadership behaviours

1. Basic knowledge and skills related to evidence-based practices (EBPs) • Knowledge of EBPs: definition, significance and values in clinical practice of nursing. • Knowledge of and skills to: 5) Identify existing clinical problems. 6) Search, screen, and assess quality of evidence. 7) Assess the feasibility, appropriateness, meaningfulness, effectiveness of the evidence. 8) Select/tailor evidence to be implemented in clinical context.
2. Professional knowledge and skills • Professional knowledge (e.g., knowledge of specific clinical specialty, hospital procedures, quality management standards) and skills (e.g., skills of clinical specialty) • Skills to communicate, organize, and coordinate (e.g., patients, nurses, superiors, interprofessional and interdepartmental professionals, nursing societies). • Ability to execute and supervise. • Ability to sustain improvement. • Ability to make decisions in crisis and uncertainty. • Ability to Innovate.
3. Knowledge of Ottawa Model of Implementation Leadership (O-MILe) • Knowledge of implementation leadership: definition and role in EBPs implementation. • Knowledge of O-MILe and implementation leadership behaviours: definitions and importance. • Knowledge of nursing managers' roles and responsibilities in EBPs implementation.

Additional file 4.4 Competencies to develop specific implementation leadership behaviours and corresponding actions

Leadership behaviours in O-MILe		Actions corresponding to each behaviour	Competencies nurse managers need to perform each behaviour
Change behaviours	**Demonstrate commitment to change**	5. **Set goals** for the EBPs implementation. 6. **Highlight importance of EBPs implementation** during routine meetings and **push the implementation**. 7. **Embed EBPs into nursing procedures**, nursing quality control standards, develop audit standards, establish reward and punishment regulations, clarify individual responsibilities for EBPs implementation, etc. 8. **Report and analyses adverse events** and develop strategies for improvement.	4. Skills to set goals for EBPs implementation. 5. Skills/abilities to integrate EBPs implementation into unit procedures. 6. Skills to sustain the EBPs implementation.
	Understand and act on difficulties with change	2. **Identify barriers to EBPs implementation in multiple ways:** 5) Participate in EBPs implementation, supervise and monitor nurses' practice to identify factors that affect the implementation. 6) Communicate and get feedback from nurses (e.g., difficulties, reasons for unwilling to implement EBPs, etc.). 7) Discuss typical cases with implementation team. 8) Identify barriers from multiple levels (e.g., evidence, organization, patients, nurses). 3. **Develop targeted solutions for barriers and plans for EBPs implementation**.	3. Skills to identify barriers and facilitators to EBPs implementation. 4. Skills to develop implementation strategies.
	Reinforce vision and goals for change	4. **State explicitly the leadership support** from hospital administrators, director of nursing department or unit. 5. **Implement EBPs in small scales to reveal**	3. Knowledge of potential benefits and outcomes of EBPs implementation. 4. Abilities to develop indicators to

		direct/short term benefits. 6. **Explain the potential long-term benefits** (e.g., patients, nurses, hospital or society level) **of EBPs implementation** using real clinical cases.	measure effectiveness of EBPs implementation.
	Advocate for change internally and externally	4. **Advocate EBPs implementation externally:** 4) Present clinical cases of EBP implementation to hospital administrators or directors of the nursing department. 5) Present effectiveness data of EBPs implementation in national/provincial nursing professional associations (e.g., annual meetings). 6) Present academic achievements (e.g., papers, keynote presentation). **5. Advocate EBPs implementation among nurses:** 4) Explain the significance and urgency of EBPs implementation. 5) Encourage new technologies or patents application, and academic papers writing in nursing team. 6) Conduct new technology competitions and innovation competitions at the nursing department or unit level. 6. **Advocate EBPs implementation among patients:** conduct evidence-informed patient health education lectures (online or in-person), workshops, scenario simulations, peer support meetings.	6. Skills to interpret and communicate direct benefits of EBPs implementation. 7. Abilities to translate EBPs implementation data into academic outputs. 8. Skills to nurture EBPs implementation atmosphere. 9. Skills to conduct evidence-informed health education. 10. Abilities to organize EBP-relevant activities (e.g., seminar).
Relation Behaviours	**Recognize ideas or actions to change**	4. **Promote realization of self-value:** 2) Set EBPs implementation champions as role models.	5. Knowledge of and skills to motivate nurses (e.g., value display, praise or reward).

		5) Empower nurses to lead the EBPs implementation. 6) Give nurses opportunities to teach or present in academic conferences. 7) Promote the uptake of EBPs led by nurses that showed better outcomes. 5. **Provide verbal praise or material reward:** 4) Provide individual encouragement, public praise, merit pay increase, etc. 5) Convey patients' appreciation or praise to nurses. 6) Reimburse nurses' expenses for the EBPs implementation, relate academic conference attendance, trainings, etc. 6. **Assist with career development:** 3) Assist nurses set career development goals and plans. 4) Provide opportunities for study/training in the hospital, countrywide or abroad.	6. Skills to empower others. 7. Knowledge of nurses' career development approaches. 8. Skills to assist career development.
	Support change substantively	3. **Before EBPs implementation:** 3) Communicate with nurses to understand their attitude towards EBPs. 4) Recommend EBP-related resources (e.g., databases, papers, guidelines) to nurses. 4. **During EBPs implementation:** Create supportive environment by 5) Actively implementing EBPs to set examples. 6) Setting flexible work schedule to give nurses time to participate in EBPs implementation or related activities (e.g., meetings, training). 7) Encouraging nurses to talk about the obstacles	3. Skills to resolve conflicts. 4. Abilities to promote cooperation and improve team cohesion.

		or concerns for EBPs implementation and providing support. 8) Coordinating or addressing inconsistencies or conflicts in EBPs implementation.	
	Facilitate interprofessional consensus on change	4. **Show the validity of the evidence**: 4) Present effectiveness data of EBPs implementation. 5) Present clinical cases of EBPs implementation. 6) Present academic achievements (e.g., papers, keynote presentation). 5. **Get support from leaders:** 3) Submit request to the hospital committee to obtain hospital or nursing department level leadership support for interdisciplinary collaboration. 4) Request support directly from the leaders of relevant departments such as unit physician directors and nurse managers. 6. **Involve interdisciplinary professionals in the EBPs implementation process:** 3) Invite interdisciplinary professionals to the implementation team or the development of implementation plan. 4) Provide trainings on the EBPs implementation.	4. Skills to interpret and communicate direct benefits of EBPs implementation. 5. Skills to build EBPs implementation team. 6. Abilities to improve team execution.

	Communicate with staff about practice and seek advice	3. **Explain the significance and potential benefits of EBPs implementation.** 4. **Encourage nurses comment on current nursing practices and the evidence:** 3. Ask for nurses' suggestions on implementation plan development. 4. Communicate about problems nurses encounter (via private chat, meetings, WeChat messaging) during the implementation process, discuss and update implementation strategies accordingly.	3. Knowledge of current practice. 4. Knowledge of potential benefits of EBPs implementation.
Task behaviours	**Clarify roles and responsibilities**	**3. Build the EBPs implementation team:** 3) Build the EBPs implementation team and choose nurses whose interested in and capable (e.g., have experience of implementing EBPs) of leading the implementation as team leaders. 4) Distribute work according to nurses' ability, interests and make sure each task being assigned to one specific individual. 4. **Organize standard training for implementation team** to inform them about implementation goals, plans, and responsibilities of team members.	3. Skills to build EBPs implementation team. 4. Skills and abilities to organize training.
	Modify documentation forms	3. **Embed EBPs into nursing procedures:** 3) Develop EBPs implementation procedure (e.g., standard operation procedure), evidence-informed clinical path and practice requirements. 4) Develop eligibility criteria for involving patients in the EBPs implementation. **4. Prepare EBPs implementation audit forms:** 5) Develop work distribution form and timetable. 6) Modify crisis management plan.	3. Knowledge of indicators to measure the effectiveness of EBPs implementation. 4. Abilities to distribute task and supervise.

		7) Develop implementation record and evaluation sheet. 8) Develop nursing quality audit sheet.	
	Procure resources, education, and policies	4. **Provide education/training resources:** 3) Provide nurses with training opportunities in EBPs. 4) Support nurses to obtain professional qualification certificates (e.g., nutritionist certificate, Peripherally Inserted Central Catheter (PICC) certificate). 5. **Procure human resources and physical resources:** 3) Procure professional EBPs implementation guidance for nurses. 4) Procure instruments/equipment needed for EBPs implementation. 6. **Seek policy support:** 3) Seek policy support (e.g., nursing practice regulations) from the hospital administrators and nursing department. 4) Seek policy support (e.g., policy for guideline development and implementation, opening nursing clinics, medical insurance policies) from professional associations (e.g., professional committees of nursing societies, medical insurance departments).	3. Abilities to acquire information (e.g., education/training opportunities). 4. Abilities to seek policy support.
	Monitor performance and outcomes	**3. Monitor implementation process:** 1) Ask EBPs implementation team leaders report the implementation progress (e.g., achievements, obstacles). 2) Supervise and give feedback on sustaining the implementation.	4. Knowledge of indicators to measure the effectiveness of EBPs implementation. 5. Skills to audit and track the EBPs implementation process and outcomes.

		4. **Set up reward** (e.g., hospital/unit wide praise, merit pay increase) **and punishment** (e.g., reminders, warnings, and merit pay deductions) regulations.	6. Skills to sustain the EBPs implementation.
	Provide reminders	**3. Nurse level:** 1) Use oral reminder. 2) Use reminder cards. 3) Develop task schedule. **4. Patient level:** 1) Perform on-one-on education. 2) Use reminder cards. 3) Use graphic education manuals or videos. 5) Use health education account (e.g., in WeChat). 6) Conduct patient education meetings. 7) Provide telephone reminders. 8) Involve family members.	3. Knowledge of and skills to conduct evidence-informed health education. 4. Ability to learn and use new media.
	Conduct regular implementation team meetings to plan	**2. Conduct weekly/monthly implementation team meetings** to discuss, develop, and modify implementation plans.	3. Ability to organize meetings. 4. Ability to develop plans.