Exploring changes in prescribing patterns for chronic pain in long-term care residents living with dementia near the end of life

Alixe Ménard

Thesis submitted to the University of Ottawa
in partial fulfillment of the requirements for the
Master of Science degree in Interdisciplinary Health Sciences

Interdisciplinary School of Health Sciences
Faculty of Health Sciences
University of Ottawa

Abstract

Chronic pain is undertreated in residents living with dementia. The objectives of this study are to (1) describe the rates of opioid and non-opioid analgesics prescribed to treat chronic severe pain, stratified by dementia status, in LTC residents in their last year of life, and (2) examine differences in the prescription of opioids used to treat chronic severe pain in the last month of life, stratified by their dementia status. Using the Resident Assessment Instrument – Minimum Data Set (RAI-MDS) we stratified the cohort according to resident dementia status and identified all use of opioids and non-opioids in the last year of life. The findings from this study indicate that the rates of opioids or non-opioids prescribed to residents in LTC who experienced chronic severe pain did not differ according to dementia status. Adequate pain management in LTC is a complex task that warrants further investigation.

Résumé

La douleur chronique est sous-traitée chez les résidents atteints de démence. Les objectifs de cette étude sont de (1) décrire les taux d'analgésiques opioïdes par rapport aux analgésiques non opioïdes prescrits pour traiter la douleur chronique sévère, stratifiés selon le statut de démence, chez les résidents des établissements de SLD au cours de leur dernière année de vie, et (2) d'examiner les différences dans la prescription d'opioïdes pour traiter la douleur chronique lors du dernier mois avant la mort, stratifié selon leur état de démence. À l'aide du *Resident Assessment Instrument – Minimum Data Set* (RAI-MDS), nous avons stratifié la cohorte en fonction du statut de démence du résident et identifié toute utilisation d'opioïdes et de non-opioïdes au cours de la dernière année de vie. Les résultats de cette étude indiquent que les taux d'opioïdes et de non-opioïdes prescrits aux résidents des établissements de SLD qui souffraient de douleurs chroniques sévères ne différaient pas selon le statut de démence. La gestion adéquate de la douleur dans les établissements de soins de longue durée est une tâche complexe qui mérite une enquête plus approfondie.

Acknowledgements

The last two years have been dedicated to this research project, and I consider myself to be very privileged to have been given the opportunity to use this time to investigate a topic for which I am extremely passionate. I would be remiss if I did not thank those who made these two years possible. Firstly, I would like to thank my supervisors, **Dr. Amy Hsu** and **Dr. Annie Robitaille.** I would also like to thank my thesis committee members, **Dr. Arne Stinchcombe** and **Dr. Ben Robert**. Thank you for dedicating many hours to me and to this project.

Secondly, I would also like to extend a word of thanks to the Canadian Institutes of Health Research (CIHR) who granted me the Canadian Graduate Scholarship, the Bruyère Research Institute who granted me the Graduate Student Award as well as the LIFE Research Institute who granted me the EntourAGE Scholarship. These scholarships aided in supporting me and my research, and I am very grateful to have been given this honor.

Thirdly, I would like to thank my peers who inspired me every day and shared the many hardships and victories. Notably, I would like to extend a big thank you to **Landry Kalembo** and **Nurasha Fernando** who were my confidants and cheerleaders. I look forward to watching you both achieve greatness. Lastly, I would like to thank my friends and family for their continued support during the entirety of this research project. Your support, **Samuelle Ménard**, **Véronique Mortimer, R&D**, played an integral role in both my pursuit and completion of this project. I am very grateful to have you in my life.

Table of Contents

List of figures and tables

Figures

Tables

Appendices

ABBREVIATIONS & DEFINITIONS

_____

LTC Long-term care

MLR Mixed-effects logistic regression

NSAID Nonsteroidal anti-inflammatory drug

PRN Pro re nata medication

_____

Analgesics: A drug that is used to relieve pain that does not lead to loss of consciousness. (Merriam-Webster, 2022).

Chronic pain: Pain persisting for a minimum of three months. (Government of Canada, 2021).

Dementia: The progressive loss of cognitive functioning that interferes with an individual's everyday life. (National Institute on Aging, n.d.-b)

Deprescribing: A process of medication cessation supervised by a healthcare professional for the purpose of managing polypharmacy. (Reeve et al., 2015).

End-of-life care: Supportive and comprehensive care that focuses on comfort, quality of life and respect for a dying individual and their family. (National Institute on Aging, n.d.-a).

Long-term care: Facilities that provide living accommodation for individuals requiring 24-hour, 7 days week supervised care. (Government of Canada, 2003).

Medication reconciliation: The process of comparing a patient's medication intake with their medication orders. (Barnsteiner, 2008).

Nociception: The sensory nervous system's process of encoding noxious stimuli and triggering an appropriate defense response. (Science Direct, n.d.).

Older adults: A person over the age of 65 years. (Government of Canada, 2016).

Opiate: Natural opioids such as morphine, codeine, and heroin. (CDC, 2022).

Opioid: A synthetic substance that acts on an individual's opioid receptors for the purpose of pain-relief and/or anesthesia. (Rosenblum et al., 2008).

Palliative care: Care provided to an individual with a life-limiting illness at any stage, including at end-of-life. (WHO, n.d.).

Polypharmacy: The associated use of multiple medicines. (Masnoon et al., 2017).

Chapter 1: INTRODUCTION

1.1 INTRODUCTION

Chronic pain

According to the World Health Organization (WHO), chronic pain is defined as pain persisting longer than three months and that severely impacts quality of life by affecting a person's physical, psychological, social and/or spiritual well-being (Gudmannsdottir & Halldorsdottir, 2009). Currently, an estimated 20-30% of the global population live with chronic pain, making it a global health priority (Cohen et al., 2014; Treede et al., 2015). Chronic pain is a common medical condition among older adults and is estimated to affect 25-85% of this population (Stompór et al., 2019). This is an important consideration given the demographic transition in recent decades that has resulted in a significant increase in the aging population (Ali et al., n.d.).

In Canada, many individuals live with chronic pain, which is a widespread health concern that can impact various aspects of their lives (Mailis & Lakha, n.d.). Approximately one in five Canadians live with chronic pain (Jones, n.d.). Of these individuals, it is estimated that over half have lived with chronic pain for ten years or more (Jones, n.d.). This indicates that many Canadians have spent a significant portion of their lives managing severe pain. Chronic pain is one of the most underestimated healthcare problems today, and a cause of reduced quality of life for older adults in Canada (Ramage-Morin, 2008). Chronic pain has been recognized as a major public health problem with sensory, emotional, psychological, and physical implications (Dueñas et al., 2016). Leaving this medical condition untreated can impede on an individual's daily activities and quality of life, while also having repercussions in the workplace and on their social environment

(Dueñas et al., 2016). This condition leads to physical deterioration in approximately 50% of those affected and has demonstrated a bidirectional association with sleep (Dueñas et al., 2016). According to Dueñas et al, poor sleep is followed by increased pain, and intense pain leads to sleep disturbances.

New literature suggests that human pain tolerance decreases with age (Dagnino & Campos, 2022). Moreover, chronic pain is more prevalent among older adults (Schopflocher et al., 2011). Individuals living in long-term care (LTC) show more severe pain than older adults receiving home care (Xu et al., 2018) with pain prevalence rates ranging from 27% to 76% within LTC homes across Canada (Gallant et al., 2020). LTC residents experience varying degrees of pain, although most range from moderate to severe (Knopp-Sihota et al., 2022; van Herk et al., 2009).

LTC homes, also referred to as nursing care facilities, care homes or nursing homes, are defined as establishments offering short- or long-lasting services that aim to meet the needs of individuals who cannot care for themselves and/or are not independent enough to live at home (Sanford et al., 2015). The assessment of chronic pain in older adults receiving care and living in LTC homes is a complex task (Reid et al., 2015).

Pain assessment in LTC

It is important to note that approximately 69% of residents in LTC in Canada have dementia (Edvardsson et al., 2009). Pain often goes undetected and untreated in LTC residents with dementia due to their difficulty self-reporting (Atee et al., n.d.). The specialized assessment of pain for residents with dementia is not a standard component of professional training for health providers in Canada (Gallant et al., 2020). As a result, many providers face difficulties differentiating indications of pain and behavioral symptoms, such as agitation, in residents with dementia (Reid

et al., 2015). Meanwhile, the undertreatment of pain can exacerbate behavioral symptoms of dementia (Gallant et al., 2020). For this reason, there are unique barriers to successful pain assessment in residents with dementia since symptoms such as aggression may be attributed to the disease rather than being treated as an indication of pain (Zwakhalen et al., 2006).

The assessment of pain is a critical step in the provision of good pain management (Wells et al., 2008). Despite pain being more common than any other chronic condition in LTC (Ferrell, 1995), it is routinely underassessed and undermanaged in this population (Gallant et al., 2020). While practical approaches to and clinical guidelines for pain assessment have been made widely available (e.g., assessing pain pre- and post-analgesic trial; consulting residents' families), such protocols have yet to be widely implemented in LTC (Gallant et al., 2020). The lack of uptake in these approaches can be attributed to excessive demands placed on LTC staff combined with a lack of resources available to them (Gallant et al., 2020).

The presence and prevalence of pain in LTC home residents is often recorded using the Resident Assessment Instrument-Minimum Data Set (RAI-MDS), which is a standardized clinical assessment and collection tool, within the Continuing Care Reporting System (CCRS) containing over 500 indicators of health permitting health providers to identify and report changes in the health statuses of patients (CIHI, n.d.c). This tool is used in many LTC homes across Canadian provinces and territories, with the exception of Quebec, Nunavut, the Northwest Territories, and Prince Edward Island (Hirdes et al., 2013). The RAI-MDS summarizes residents' experiences of pain into a composite pain scale based on reported intensity and frequency of pain (Hutchinson et al., 2010). However, it is discouraged to exclusively rely on the RAI-MDS to assess pain as this undermines personal support worker (PSW) and caregiver testimonies and does not capture the subjective nature of pain (Kontos et al., 2010).

Pain treatment in LTC

Chronic pain is considered a disease with treatment and psychological implications and high rates of pain acceptance (i.e., seeking to live with pain rather than actively treat it) (Cohen et al., 2014; McCracken et al., 2020). Many approaches exist for the treatment of chronic pain in older adults, such as physical rehabilitation, pharmaceutical interventions, and procedural interventions that seek to break the cycle of pain (Schwan et al., 2019). Pharmaceutical interventions are common for treating chronic pain in older adults, especially for those living with dementia (Moyle et al., 2017). However, the introduction and use of pharmacological treatments in this population need careful assessment, given the high prevalence and concerns associated with polypharmacy and the complexities of multiple comorbidities in the older adult population (Cooper et al., 2015). For example, pain therapies, such as the use of opioid analgesics, are associated with side effects such as respiratory depression, addiction and falls (Borsheski & Johnson, 2014). Moreover, undertreated pain has been linked to patient outcomes such as cognitive decline, depression, increased rates of delirium, functional impairment, falls, and sleep disturbances (Ali et al., n.d.; Feldt, 2004). Clinical guidelines for treating chronic pain in older adults posit that pain should be routinely assessed to inform environmental, behavioral and psychological interventions (Schofield et al., 2022). These guidelines also caution that non-pharmacological strategies be considered first to reduce the need for medicines given the incidence of side effects related to drug therapy (Schofield et al., 2022). When drug therapy is deemed necessary, severe pain should be treated with rapidly acting formulations with shorter half-lives, combined with regular analgesia in the case of continuous pain (Schofield et al., 2022). According to a recent systematic review, analgesic drug interventions have positive treatment effects especially when combination therapy is used (Knopp-Sihota et al., 2022). Complementary and

synergistic effects allow for greater pain relief (Schofield et al., 2022). However, practitioners must balance the anticipated benefits of pain management and the risks associated with treatment with pharmaceutical interventions (Domenichiello & Ramsden, 2019). Non-biomedical treatments of chronic pain also exist but are limited to acupuncture, cognitive behavioral therapy, or customized exercise plans which are not suitable to most residents in LTC (Boulanger et al., 2007). Conventional biomedical treatments include prescription analgesics and surgical interventions although these are not recommended as first-line treatment therapies especially in the case of mild to moderate chronic pain (Jones, n.d.).

Pain relief for LTC residents at end of life

Despite the lack of established and formalized palliative programs and services in LTC homes in Canada, consensus has been reached regarding the importance of comfort and pain relief for residents at the end of life (Cloutier et al., 2021; Coelho et al., 2016). In 2015, only one in twenty residents who died in LTC received palliative care (Canadian Institute for Health Information, 2021). End-of-life care, a component of palliative care, can be defined as the medical care and support provided during the time surrounding an individual's death (Wang et al., 2016). Palliative care experts believe that end-of-life care should focus on pain relief and comfort without the fear of causing drug dependence or drug abuse (Bausewein et al., 2022). For residents living with dementia, providing end-of-life care can be difficult due to cognitive, communication, functional and/or behavioral symptoms (Sachs et al., 2004). Opioids (e.g., hydromorphone, fentanyl, methadone, oxycodone) are mainstay medications in end-of-life care thanks to their effectiveness in managing pain (Lau et al., 2022). Some residents may require adjuvant drugs in the treatment of pain including corticosteroids, anticonvulsants, and benzodiazepines (Peralta et al., 2022). Opiates, such as morphine and codeine, may be used to treat severe pain and shortness

of breath at the end of life (National Institute on Aging, n.d.-a). Non-opioids can also be prescribed to treat chronic pain, and typically include tricyclic antidepressants, anticonvulsants, synthetic cannabinoids, and nonsteroidal anticonvulsants (Krebs et al., 2018). This said, prescribing safe and effective medications for older adults with multiple morbidities is currently one of the most significant challenges in LTC (Dorfman et al., 2020). In Canadian LTC homes, approximately 60% of residents currently take ten or more medications concurrently (Dorfman et al., 2020). This causes many concerns since LTC residents are at an increased risk of experiencing adverse effects such as falls and cognitive impairment as a result of polypharmacy (i.e., use of multiple medicines) (Cooper et al., 2015; Dorfman et al., 2020). Concerns exist for the overmedication of residents in LTC with inappropriate psychotropic medications (Stockwell, 2018). This said, a way to remedy polypharmacy and overmedication in LTC is to practice medication reconciliation (i.e., ensuring residents have up-to-date medication lists) and to establish resident care priorities such as the treatment of pain (Grissinger, 2016; Wells et al., 2008).

This thesis will fill an important knowledge gap with regards to LTC delivery within Ontario and will help raise awareness of the disease burden related to untreated chronic pain. This work will also provide a better understanding of differences in prescribing patterns, by resident characteristics and dementia status, that could shed light on whether there are gaps in care, such as a potential under-treatment of chronic pain in certain sub-populations of LTC residents. It has been established that pain increases from a resident's admission in LTC to their end of life (Cheung et al., 2018). Given that pharmaceuticals are the primary course of treatment for pain at end of life, it is important to assess the clinical appropriateness of medications being prescribed and ensure that residents living with dementia are adequately treated for pain. This said, a 2019 systematic review by Anderson et al. revealed that there are currently no validated approaches to establishing

active LTC medication lists in the literature (Anderson et al., 2019). Of the 30 studies from eight various countries retained for the review, none evaluated medication use on a monthly basis (Anderson et al., 2019). To my knowledge, no studies have evaluated the rate of opioid and non-opioid prescriptions for chronic pain management in LTC residents living with dementia, compared to residents without dementia in Canada. Studies in this area have primarily been conducted in the Netherlands, Norway, Germany, Denmark, and Australia, although none have used drug dispensing data that can be compared on a monthly basis over the last twelve months of life (Achterberg et al., 2010; Jensen-Dahm et al., 2015; Liu et al., 2019).

This thesis will attempt to fill the gap in literature by describing the use of pharmacological treatments for pain at end of life in LTC according to dementia status. Research outcomes of this study can have important implications for end-of-life care, more specifically pain management for LTC residents with and without dementia. This work may also lead to recommendations for the improvement of the CCRS and thus the RAI-MDS data to better serve our dementia population in LTC. These data may encourage other researchers to investigate differences in prescribing patterns at a facility-level depending on its characteristics (i.e., for-profit, public). Due to the fact that CCRS does not have an explicit chronic pain variable, I will henceforth refer to chronic pain as chronic moderate to severe pain. The definition of "chronic severe pain" as used in this thesis is provided in Chapter 3.

1.2 RATIONALE & PURPOSE STATEMENT

The purpose of this thesis research is to describe the use of pharmacological treatments for pain, specifically opioids and non-opioids, in LTC residents experiencing chronic moderate to severe pain in the last twelve months of life, and to provide insight into differences in pharmacological pain treatment depending on dementia status. Specific objectives include:

1. Describing the rates of opioid and non-opioid analgesics prescribed to treat chronic moderate to severe pain, stratified by dementia status, in LTC residents who are in their last year of life.
2. Examining differences in the prescription of opioids used to treat chronic moderate to severe pain in the last month of life, stratified by their dementia status.

1.3 THESIS STRUCTURE

This thesis is structured into six chapters, including one article intended for publication in a peer-reviewed journal. Chapter 1 explains the rationale behind this thesis and provides context for the importance of this work. Chapter 2 describes the in-depth literature review that was conducted for the purpose of this thesis and research paper. Chapter 3 details the research methods employed to answer the research questions, including the study sample, various data sources and data analysis. Chapter 4 presents the article intended for publication. Chapter 5 is a lengthy discussion regarding this thesis including important implications in pain research and lessons learned. Lastly, Chapter 6 presents the conclusion to the thesis and describes the contribution of this research to the broader context of pain literature and presents areas for future research.

Chapter 2: LITERATURE REVIEW

2.1 MANAGING CHRONIC MODERATE TO SEVERE PAIN IN LONG-TERM CARE

Older adults residing in LTC report a prevalence of pain that is approximately 11% higher than their community-dwelling counterparts (Mailis & Lakha, n.d.; Ramage-Morin, 2008). However, pain is often underreported by LTC residents, under-recognized by LTC staff and ultimately inadequately treated (Pringle et al., 2021). In LTC in Canada (except for Quebec,

Nunavut, the Northwest territories, and Prince Edward Island), pain management is reliant on the measurement of pain using the RAI-MDS standardized pain scale and clinical assessment tool, as well as caregiver testimonies and non-verbal pain cues identified by nurses and PSWs (Gallant et al., 2020). The RAI-MDS includes items related to pain intensity and frequency, both with scores ranging from 0-3, wherein higher scores indicate more frequent and severe pain (Hutchinson et al., 2010). These two items can be used to create a pain scale that summarizes both the presence and intensity of pain. The RAI-MDS requires nurses to code for the highest level of pain experienced by the resident in the last seven days (Hutchinson et al., 2010). Pain frequency includes options "No pain", "pain less than daily", and "pain daily". Pain intensity refers to "mild pain", "moderate pain" or "times when pain is horrible or excruciating". This said, many PSWs, nurses and physicians assess pain more frequently by interacting with residents and care partners and noting non-verbal pain cues (Monroe et al., 2015). It is important to note that the RAI-MDS is meant to be used as a reporting tool for the quality of care and not for the study of clinical outcomes (Hutchinson et al., 2010). Experts have articulated the need for accessible clinical guidelines for the assessment of pain in LTC:

"(1) all LTC residents must be assessed for pain on admission and at least once a week thereafter with some residents requiring more frequent assessments; (2) a treatment plan must be documented within 24 hours of pain problem identification with reassessment of outcomes and side effects within another 24 hours; and (3) these assessments must involve a well-validated standardized assessment tool and, for residents unable to self-report pain, observational tools should be used" (Gallant et al., 2020).

While assessment is the first step in pain management, it is important to note the results of these assessments and evaluate how this translates to pain treatment for residents. A 2022

systematic review and meta-analysis conducted by Knopp-Sihota et al., pooled data from 42 studies aimed at evaluating the effectiveness of pain intervention approaches. These studies were categorized as (1) treatment based (i.e., analgesic drugs, non-analgesic drugs, and alternative therapies), (2) education programs or (3) system modifications (i.e., quality improvement or efforts to improve care delivery) (Knopp-Sihota et al., 2022). A total of two studies were treatment based and used an analgesic intervention to treat chronic pain in LTC (Corsinovi et al., 2009; van Dam et al., 2020). Of these studies, nine used combined interventions (analgesic + system modification; analgesic drug, non-analgesic drug, non-drug alternative therapy, and system modification) (Knopp-Sihota et al., 2022). One study used acetaminophen combined with oxycodone or codeine; and another used paracetamol, oral morphine, a buprenorphine transdermal patch, and pregabalin (Knopp-Sihota et al., 2022). One of these two studies looked at populations living with dementia (van Dam et al., 2020). Both studies showed that chronic pain treatment for residents with and without dementia resulted in improved pain scores. This systematic review also found analgesic drug interventions to have the largest treatment effects when compared to non-drug alternative therapy interventions while non-analgesic drugs and system modification interventions proved to be the least effective of all pain interventions (Knopp-Sihota et al., 2022). A similar 2016 meta-analysis by this same research group, found seven studies on chronic pain interventions in LTC reporting non-analgesic treatments and four studies reporting analgesic treatments (dementia diagnoses were not specified) (Knopp-Sihota et al., 2016). Non-analgesic treatment interventions revealed no statistical differences between treatment and control groups at study completion, while analgesic treatment interventions revealed statistically significant improvements in pain scores by study completion (Knopp-Sihota et al., 2016). This said, these studies were pain interventions and did not consider the differing rates of analgesics prescribed to LTC residents living with chronic

pain nor did they compare the possible differences in types of analgesics prescribed according to dementia status. Given the high prevalence of disability and comorbidities in LTC, efforts to assess and manage pain are arduous (Reid et al., 2015). Furthermore, many residents in LTC experience sensory deterioration (i.e., visual or hearing loss) and/or cognitive impairment that can lead to confusion, memory loss or dementia, which could interfere with clear communication and the ability to vocalize or self-report their experience of pain (Borsheski & Johnson, 2014).

2.2 CONSEQUENCES OF UNTREATED PAIN IN LTC

Understanding the undertreatment of pain in LTC

While the International Association for the Study of Pain (IASP) characterizes pain as individual and subjective, it asserts that the inability for LTC residents to communicate their pain does not negate the potential presence of pain and the subsequent need for treatment (Pringle et al., 2021). Many hypotheses exist to explain the undertreatment of pain in LTC (King & Fraser, 2013; Moulin et al., n.d.; Przekop et al., 2015; Rosenblum et al., 2008). Notably, many LTC staff and health professionals hold the misconception that pain is a natural consequence of aging (Borsheski & Johnson, 2014). In reality, pain is the most common reason people seek medical care in every age category (King & Fraser, 2013). The embodiment of this stereotype regarding the inevitability of pain may have contributed to its undertreatment in residents in LTC (Thielke et al., 2012). Furthermore, many older adults are expected to be stoic when it comes to their pain and are told to "get used to it" by their practitioners (Gignac et al., 2006; Thielke et al., 2012). However, being stoic about pain has not been proven to diminish the consequences of this pain over time nor help patients better tolerate it (Thielke et al., 2012). Due to this falsehood surrounding stoicism, many older adults who take analgesics to treat pain report seeing it as a sign of weakness, further

stigmatizing the use of analgesics (Thielke et al., 2012). For residents living in LTC, medication is regimented by nurses who follow strict orders with regards to dosage, timing and route of administration (Lin et al., 2007; Thielke et al., 2012). In many cases, residents are even unaware of the type of medication they are taking or being prescribed (Barnsteiner, 2008). For this reason, concerns surrounding medication safety and addiction are not pertinent to the LTC context (Ministry of Long-Term Care, 2021). Many practitioners are also reluctant to treat pain aggressively due to the high prevalence of polypharmacy in LTC, and the complexities of multiple comorbidities in residents (Borsheski & Johnson, 2014).

Outcomes of undertreated pain in LTC

As a result of this reluctance, undertreated pain has been linked to patient outcomes such as cognitive decline, depression, increased rates of delirium, functional impairment, falls, and sleep disturbances (Ali et al., n.d.; Feldt, 2004). Practitioners must balance anticipated benefits of pain management and risks associated with treatment (Domenichiello & Ramsden, 2019). For instance, while pain treatment has many risks that warrant consideration, untreated chronic moderate to severe pain is a risk factor for accelerated cognitive decline and even premature death (Domenichiello & Ramsden, 2019).

2.3 PAIN MEDICATION FOR RESIDENTS LIVING WITH DEMENTIA

Current literature suggests that chronic moderate to severe pain in older adults has been linked to an increased risk of cognitive impairment and dementia in this population, making it an area of great importance in research (Dagnino & Campos, 2022). The treatment and interpretation of pain have been proven to be paradoxical for residents living with dementia in LTC insofar as many dementia-related responsive behaviors may be perceived as pain indicators, thus leading to

unnecessary medication dispensing (Harasym et al., 2020). However, withholding pain medication in the case of true pain can harm residents and lead to immense discomfort (Harasym et al., 2020). This fear of wrongfully treating agitated delirium as pain has led to an increased use of Tylenol for pain control in LTC due to its favorable safety profile (Ali et al., n.d..; Harasym et al., 2020). However, this first-line agent is only useful in the case of mild to moderate pain and is less effective for chronic inflammatory pain which is the primary form of pain in residents due to arthritic conditions and musculoskeletal disorders (Ali et al., n.d.).

Opioid analgesics

While there is growing evidence that supports the safety and efficacy of opioid analgesics to treat noncancer chronic pain, less than 10% of chronic pain patients in Canada are treated with a major opioid (Lisa & Jessica, 2018). This said, scheduled low-dose opioids have been established as being the foundation to the effective treatment of chronic persistent pain (Peter A. Winn, 2010). In Canadian LTC homes, opioid analgesics are a secondary recourse given their confirmed efficacy in the treatment of moderate to severe pain (Prostran et al., 2016). They can be classified into two groups: strong opioids and weak opioids (Ali et al., n.d.). Strong opioids include morphine, hydromorphone, oxycodone, fentanyl, and buprenorphine, while weak opioids include tapentadol and tramadol (Ali et al., n.d.). Opioids are available in multiple dosages and have several routes of administration, including oral, transdermal, intramuscular, intravenous, subcutaneous infusion, rectal, epidural, intrathecal, intranasal, and transmucosal (Queremel Milani & Davis, 2022). The WHO recommends a three-step approach to treating pain beginning with acetaminophen, followed by a weak opioid such as codeine if the pain is uncontrolled, then a strong opioid such as morphine if needed (Auret & Schug, 2005). Opioids are currently the standard of care for chronic nociceptive pain (i.e., pain caused by damage to body tissue) and neuropathic pain (i.e. pain resulting from

neurological dysfunction) (Nicholson, 2003). These pharmaceutical compounds bind and activate receptors in the peripheral nervous system and inhibitory pain circuits of the midbrain (Nicholson, 2003). While opioids are an effective short-term therapy, there is considerable risk of interactions between opioids, prescription drugs and over-the-counter compounds which is an important consideration for older adults who take multiple medications (Prostran et al., 2016). Furthermore, a study by Wei et al. suggests that residents living with dementia are less likely to have opioids prescribed to them when reporting moderate to severe pain compared to residents without dementia (Wei et al., 2021). This potentially points to a lack of recognition and awareness of chronic moderate to severe pain in residents living with dementia in LTC, combined with difficulties in diagnosing pain in this population. This said, since 1999, there has been an increasing rate of opioid misuse in Canada, which has ultimately led to the ongoing Canadian opioid epidemic (Lisa & Jessica, 2018; Mailis & Lakha, n.d.). In Ontario, opioid-related deaths increased by 285% between 1995 and 2015 (Mailis & Lakha, n.d.). The biggest cause of opioid misuse and related harms is the high rate of nonmedical opioid use (Lisa & Jessica, 2018). This said, within LTC homes in Ontario, trends suggest a reduced prevalence of opioid agents in this setting, with the exception of hydromorphone, and a reduction in inappropriate opioid prescribing between 2009 and 2017 (Iaboni et al., 2019). For instance, between 2009 and 2017, there was a 26% reduction in codeine prescribing, a 40% reduction in fentanyl prescribing and a 37% reduction in oxycodone prescribing in Ontario LTC homes (Iaboni et al., 2019). However, the percent increase in opioid prevalence between 2009 and 2017 was significantly greater for residents living with dementia and for residents aged more than 85 years, suggesting a higher use of opioids at the end-of-life (Iaboni et al., 2019). Prescription opioids have also been deemed essential for pain management in palliative care (Cloutier et al., 2021; Lau et al., 2022). As for primary care physicians who prescribe opioid

analgesics in LTC, they describe the most important attributes of this practice as being pain control, reduction of breakthrough pain, and low potential for abuse and addiction (Boulanger et al., 2007).

Non-opioid analgesics

Analgesic alternatives to opioids exist and will be broadly categorized as non-opioid analgesics for the context of this study. Typically, the first line of pharmacological treatment is acetaminophen (i.e. paracetamol) or aspirin (i.e. acetylsalicylic acid) which can be given pro re nata (PRN) (or "as needed") (Peter A. Winn, 2010). A recent study by Iacono et al. (2022) found that LTC residents in Ontario were more likely to receive a non-opioid analgesic than an opioid analgesic when complaining of severe pain. Scheduled non-opioid analgesics include anticonvulsants (gabapentin and pregabalin); antidepressants (amitriptyline and duloxetine); topical agents (lidocaine and capsaicin), and nonsteroidal anti-inflammatory drugs (NSAIDs) (NEJM, 2022). NSAIDs (i.e. ibuprofen, diclofenac, naproxen and celecoxib) are often prescribed for LTC residents whose pain is not effectively controlled by acetaminophen or aspirin (Ali et al., n.d.). NSAIDs have proven efficacy in treating inflammatory pain (Ali et al., n.d.). However, these non-opioids are recommended for short-term use only, given their potential side effects for LTC residents including dizziness, gastrointestinal irritation, renal failure, myocardial infarction and stroke (Wegman et al., 2004). Oral corticosteroids can also be used as an adjuvant therapy for pain control although there is potential for psychiatric side effects such as delirium or depression (Iacono et al., 2022; Vyvey, 2010). Side effects of pharmaceutical treatment for pain are a concern in LTC given the risk of contraindications that could lead to urinary retention, constipation, and sedation (Domenichiello & Ramsden, 2019). Pain therapies, such as the use of opioid analgesics, can lead to concerns due to potential side effects such as respiratory depression, addiction and falls, and thus create reluctance among practitioners (Borsheski & Johnson, 2014).

For LTC residents who have difficulty swallowing, standard-dose lidocaine can be prescribed as a topical non-opioid analgesic that acts by blocking pain signaling (Ali et al., n.d.); however, this drug is typically used for medical assistance in dying rather than daily chronic pain (Stukalin et al., 2022). The Centers for Disease Control and Prevention posit that non-opioid analgesics are preferable treatments for chronic pain that is outside of active cancer and palliative or end-of-life care (NEJM, 2022). When residents are at their end of life, they are more likely to be prescribed opioid analgesics (typically morphine or fentanyl) than non-opioid analgesics given their ability to block pain, induce sleepiness and relax muscles (Dalhousie University, n.d.; Masman et al., 2015). Good pain management at end of life can also include a combination of a non-opioid analgesic with a weak opioid, for example, 600 mg acetaminophen with 60 mg codeine (Schüchen et al., 2018). This is an important consideration given that there is no gold standard for pain treatment at the end of life especially for palliation resulting from a non-malignant disease which is the case for 65% of palliative patients (Schüchen et al., 2018). Given the increase in residents in LTC who are at the end of life and the proven high prevalence of pain at this life stage, it is important that research be conducted to establish adequate pain therapies (Cloutier et al., 2021).

2.4 END-OF-LIFE CARE FOR LTC RESIDENTS

An increasing number of older adults are dying in LTC as a result of increased life expectancies (Cloutier et al., 2021). Approximately 24% of all Canadian deaths take place in LTC and this number is expected to increase steadily by 2030 (Brink & Kelley, 2015). End-of-life care aims to provide maximum comfort, devoid of pain, to residents (Coelho et al., 2016). Palliative care, which encompasses end-of-life care, is complex as it adheres to patient values and goals of care while also managing biopsychosocial symptoms; respecting spiritual and religious patient practices;

improving quality of life; inciting health professional teamwork and promoting communication and decision-making amid a life-limiting illness (van der Steen et al., 2022). Despite the lack of established and formalized palliative programs and services in LTC homes in Canada, consensus has been reached regarding the importance of comfort for residents at the end of life (Cloutier et al., 2021; Coelho et al., 2016). In 2015, only one in twenty residents who died in LTC received palliative care (Canadian Institute for Health Information, n.d.). This highlights the importance of end-of-life research in an effort to inform and influence evidence-based clinical practice in LTC for both residents with and without dementia (van der Steen et al., 2022). Timely palliative care is even more arduous when it is intended for a patient living with dementia because many of these individuals lack decisional capacity and health professionals are unable to accurately assess time to death for patients living with dementia (Eisenmann et al., 2020).

End-of-life care for residents living with dementia

In Canada, older adults living with dementia have a mortality rate that is four times higher than older adults without dementia, making them an even greater target for timely palliative care (Canadian Institute for Health Information, n.d.). This said, older adults living with dementia are less likely to have access to palliative care than their cognitively intact counterparts (Eisenmann et al., 2020). Residents living with dementia display specific symptoms before dying, including pain, fear, anxiety, difficulty eating, loss of breath, urinary infections, and neuropsychiatric manifestations (Boyd et al., 2019; Eisenmann et al., 2020). However, these residents risk receiving suboptimal treatments for pain due to their difficulty verbalizing their needs including whether the pain medication has achieved an optimal level of pain relief (Lundin & Godskesen, 2021). A study conducted by Boyd et al. found that residents living with dementia and chronic illness experienced more physical distress in their last months of life than residents with cancer (Boyd et al., 2019).

This said, symptom burden (i.e. the severity of symptoms which leads to negative physiological responses) at the end of life for residents living with dementia can be reduced using pharmacological interventions (Eisenmann et al., 2020). While good pain management is facilitated by good communication between healthcare staff, caregivers, and residents, clear communication can be difficult for residents living with dementia which can lead staff to confuse pain for anxiety (Lundin & Godskesen, 2021). The difficulty differentiating between pain and anxiety in residents, leads many nurses to administer both an analgesic and an anxiolytic or psychotropic medication at once (Lundin & Godskesen, 2021). At the same time, many staff members worry about balancing the risks of under- and over-medication for residents living with dementia (Wilson et al., 2015).

Pain medication for residents living with dementia at end-of-life

Deprescribing is the process of reviewing and potentially halting inappropriate medications for patients at end-of-life in an attempt to improve their quality of life (Thompson, 2019). This consists of discontinuing medications with little benefit (i.e., dyslipidaemic drugs such as statins) or with potential harm (i.e., liver dysfunction or acute renal failure) (Thompson, 2019). As a result, only essential medications such as those for primary or secondary prevention are typically maintained (Thompson, 2019). The practice of deprescribing at the end of life is aimed at symptomatic control and disease management, and typically does not involve cessation of medication treating pain, delirium or anxiety (Peralta et al., 2022). Notably, the treatment of pain is an integral component of end-of-life care wherein experts do not have to worry about long-term dependence or drug abuse (National Institute on Aging, n.d.-a; Peralta et al., 2022). In a recent study conducted in Portugal, the most common schedule prescribed drug subgroup on the day of death for patients in a palliative unit were opioids (83%), followed by muscarinic antagonists (52%), corticosteroids (45%),

hypnotics (30%), antipsychotics (30%), and drugs for constipation (25%) (Peralta et al., 2022). Table 1 displays other typical palliative pain medications used in Canada.

2.5 SUMMARY

The growing aging Canadian population will lead to significant increase in the demand for comprehensive LTC services. For this reason, it is important that LTC delivery continues to progress to improve the quality of life of aging Canadians through proper pain management. Given unique circumstances, healthcare delivery can be a challenge in LTC, especially for residents living with dementia, and thus particular attention must be paid to ensuring comfort and pain relief for all residents regardless of their cognitive status.

Table 1. Medication used in palliative care for pain management in Canada.

Acetaminophen, NSAIDS	
Generic Name	**Standard Adult Dosage**
Acetaminophen	325 to 650 mg PO q4-6 h (max: 4000 mg daily)
Celecoxib	100 to 200 mg PO bid
Diclofenac	75 mg daily in 3 divided doses (max: 100 mg daily)
Ibuprofen	200 to 400 mg PO q4h (max: 2400 mg per day)
Indomethacin	25 to 50 mg PO tid
Ketorolac	10 mg PO qid (max duration: 5 days)
Naproxen	250 to 500 mg PO bid
Naproxen sodium	220 mg PO bid
Opioids	
Fentanyl	12 to 100 mcg/hour applied to skin every 72 hours
Hydromorphone	2 to 8 mg PO q4h
Morphine	5 to 60 mg PO q4
Methadone	Varies widely
Oxycodone	5 to 20 mg PO q4
Sufentanil	12.5 1mcg sublingual G /dose PRN;
Buprenorphine	5 to 20 mcg/hour applied to skin every 7 days
Neuropathic Pain Adjuvants	
Cannabidiol, D-9-	1 spray buccally/sublingual BID
Clonazepam	0.5 mg PO at bedtime, up to 2 mg qid
Desipramine	10 to 25 mg PO at bedtime
Dexamethasone	2 mg PO/SCE daily to 8 mg bid (am & noon)
Duloxetine	30 to 60 mg PO daily
Gabapentin	300 to 1200 mg PO tid
Nabalone	0.5 mg PO at bedtime
Nortriptyline	10 to 150 mg PO at bedtime
Pregabalin	75 mg PO bid
Topiramate	25 mg PO daily
Valproic acid	250 mg PO at bedtime
Bone Pain Adjuvants	
Calcitonin	50 units SC at bedtime up to 200 units bid
Clodronate	800 mg PO bid
Denosumab	120 mg SC once every 4 weeks
Pamidronate	90 mg IV monthly
Zoledronic acid	4 mg IV monthly

Abbreviations: BID two times per day; **G** generics; **IV** intravenous; **max** maximum dose; **mcg** microgram; **mg** milligram; **NSAID** nonsteroidal anti-inflammatory drug; **PO** by mouth; **PRN** as needed; **q** every 1 hour; **qid** four times per day; **SC** subcutaneous; **tid** three times per day

[1]Government of British Columbia. (2017). https://www2.gov.bc.ca/assets/gov/health/practitioner-pro/bc-guidelines/palliative2_pain_medtable.pdf

Currently, it is estimated that the prevalence of chronic pain in LTC residents is 40-85% (Guliani et al., 2021; Russell et al., 2010). This indicates a clear need to investigate pain therapies and management provided to older adults in this setting. Prescription opioids have been deemed essential for pain management in palliative care which is important given the increasing number of older adults at the end of life in LTC (Cloutier et al., 2021; Lau et al., 2022). However, residents living with dementia are less likely to have opioids prescribed to them when reporting moderate to severe pain compared to residents without dementia (Wei et al., 2021). This potentially points to a lack of recognition and awareness of chronic pain in residents living with dementia in LTC that warrants investigation. This project builds upon the identified gaps in pain literature to better understand opioid and non-opioid pain treatment at end-of-life in LTC according to the residents' cognitive status.

Key Messages from Literature Review

- Many individuals hold the misguided belief that pain is expected with age.
- It is currently estimated that 27% to 76% of residents within LTC homes across Canada live with chronic pain.
- Chronic pain is commonly under-treated in residents living with dementia.
- Residents living with dementia are less likely to be prescribed analgesics when reporting moderate to severe pain compared to residents without dementia.
- Residents living with dementia have a mortality rate that is four times higher than those without dementia, making them an even greater target for timely end-of-life care.
- End-of-life care should focus on pain relief and comfort without the fear of causing drug dependence or drug abuse.

Chapter 3: RESEARCH METHODS

3.1 STUDY POPULATION

The study population included all residents of a LTC home in Ontario who died between January 1, 2017, and December 31, 2019. I excluded residents who were not Ontario residents, were younger than 65 years of age at their time of death, as well as residents who had no RAI-MDS assessment record in CCRS within the last year of life. Of the 2,695 residents in the study cohort, 1,496 had dementia while 1,199 did not. I stratified and compared (1) residents living with dementia experiencing chronic moderate to severe pain to (2) residents without dementia experiencing chronic moderate to severe pain. The flow diagram of cohort creation with inclusion and exclusion criteria is presented in Chapter 4.

3.2 STUDY DESIGN

I used a population-based retrospective cohort study of residents in Ontario, Canada, who were 65 years of age and older, were residents of a LTC home in the province, and who died between January 1, 2017, and December 31, 2019. I described the rates of opioid and non-opioid analgesics prescribed to treat chronic moderate to severe pain, stratified by dementia status, in LTC residents who are in their last year of life. Death was considered the index event in this study, and the last year of life was captured using consecutive thirty-day intervals from the residents' date of death.

Ascertainment of Dementia Cases

Dementia cases were identified based on CCRS records denoting a diagnosis of Alzheimer's Disease and/or dementia other than Alzheimer's Disease (i.e., codes I1V = Dementia

other than Alzheimer's Disease, and I1R = Alzheimer's Disease) identified on a full assessment closest to (in either direction before/after) the 360 days prior to death date (between January 1, 2017, and December 31, 2019).

Ascertainment of Chronic Moderate to Severe Pain

In Ontario, regulations mandate the use of the CCRS tool for the assessment and reporting of pain upon admission into LTC and at least once per week thereafter coding for the highest level of pain (in frequency (J2A) and intensity (J2B)) in the last seven days (CIHI, n.d.c). In this study, chronic moderate to severe pain was defined as the presence of at least two consecutive CCRS records that documented daily moderate to severe pain within the last year of life (i.e., codes J2A=2 x J2B=2,3, codes J2A=2 (i.e., pain daily) *and* J2B=2 or J2B=3 (i.e., moderate pain or times when pain is horrible or excruciating)). We developed this definition based on the WHO's definition of chronic pain which posits that pain persisting for longer than three months is considered chronic (Schwan et al., 2019).

Outcome Definitions

The primary outcome was the number of residents with a minimum of one day supplied opioids or non-opioids. The second outcome was days supplied opioids or non-opioids for residents for a minimum of one day supplied per 30 days in LTC in their final year of life. To avoid capturing days LTC residents spent outside of LTC (i.e., in acute care settings), I divided the days supplied opioids and non-opioids by days spent in LTC. To approximate use on a monthly basis, I multiplied the per-day rate by 30 days to derive the days supplied per 30 days in LTC. Appendix C presents the distribution of the number of days outside LTC for each month prior to death.

Baseline Variables

The covariates of interest included age, sex, primary language spoken, and chronic conditions including diabetes mellitus, hypertension, arteriosclerotic heart disease, arthritis, osteoporosis, cancer, and other cardiovascular disease. I considered the number of chronic conditions in each resident from 0 to 6. I also captured acute diseases including transient ischemic attack, cardiac dysrhythmias, congestive heart failure and hip fracture.

Cognitive assessment scores on the Cognitive Performance Scale (CPS) (i.e., 0-1 or 2+) were also included. This scale assesses residents' levels of cognitive functioning on a scale from no cognitive impairment (0) to very severe cognitive impairment (6) (Morris et al., 1994). The CPS displays good validity and reliability for its use in LTC (Hartmaier et al., 1995; Martin et al., 2007; Snowden et al., 1999).

Scores on the Depression Rating Scale (DRS) were pulled from the CCRS assessment (either full or quarterly) closest to death, wherein 0-2 indicated no-to-minimal risk of depression, 3-5 indicated moderate risk of depression, and 6+ indicated high risk of depression. This scale assesses depressive symptomatology ranging from no mood symptoms (0) to all mood symptoms present (14) (Burrows et al., 2000). The DRS also displays good validity and reliability (Burrows et al., 2000; Martin et al., 2007).

3.3 DATA SOURCES

This thesis used health administrative data housed at ICES (formerly known as the Institute for Clinical Evaluative Sciences), an independent non-profit research institute funded by an annual grant from the Ontario Ministries of Health and Long-Term Care (ICES, 2022). ICES is authorized to collect and use Ontario's health-related data for the purpose of translating data into evidence and for health system evaluation (ICES, 2022). The primary data source for this study was the

Continuing Care Reporting System (CCRS-LTC), which contains RAI-MDS assessment data. Many other datasets were used for the purpose of this study, including the Ontario Drug Benefit (ODB); the Registered Persons Database (RPDB); the Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD); the Ontario Health Insurance Plan (OHIP), and Information about Ontario health care institutions funded by the Ministries of Health and Long-Term Care (MOHLTC/INST). These datasets are linked using unique encoded identifiers and analyzed at ICES. The use of these datasets does not require review by a research ethics board in Ontario and is permitted under section 45 of the *Personal Health Information Protection Act*. However, the research team applied for and was granted approval by the University of Ottawa research ethics board on 19-07-2022 (see Appendix A for the ethics certificate).

CCRS-LTC database

The CCRS-LTC dataset is comprised of data collected using the RAI-MDS version 2.0. RAI-MDS assessments are performed by nursing staff and other health providers on individuals receiving care in publicly funded facilities in Canada, such as hospitals with continuing and complex care beds and residential care facilities or LTC homes (CIHI, n.d.b). The RAI-MDS contains over 500 items to document clinical and functional resident characteristics, such as cognitive function, and disease diagnoses (CIHI, n.d.b). All LTC residents must be fully assessed by the fourteenth day of their stay, and annually moving forward. Assessments are also completed every quarter between full assessments, within a maximum of 92 days following the last full or quarterly assessment (CIHI, n.d.b). Residents must also be assessed by the 14th day following the determination that a significant change (either decline or improvement) in the resident's functional or health status has occurred and that (1) cannot resolve itself without staff mediation or disease-related clinical intervention; (2) affects more than one area of the resident's health and/or (3)

requires review or revision of the resident's care plan (CIHI, n.d.c; Zimmerman et al., 1995). The assessments enable healthcare providers and nursing staff to assess key health domains including functional, mental and physical health as well as resident social support and service use (CIHI, n.d.c). Items known as "triggers" (ex. extensive care clinical indicators) are recorded and directed toward care planning protocols and flag residents as potentially benefiting from further evaluation of specific problems or risks for functional decline (CIHI, n.d.b). The information provided through CCRS data can be used by clinicians to support front-line planning; for care quality improvement, and for comparative reporting (CIHI, n.d.-a).

ODB database

The ODB database is maintained by the Ministry of Health's Drug Programs Branch (Information and Privacy Commissioner of Ontario, 2023). This dataset contains information on prescription claims made by or on behalf of individuals who are eligible for the Ontario Drug Benefit plan. This includes Ontario seniors, aged 65 and older, Ontario residents eligible for OHIP+, residents of LTC homes, and individuals receiving professional home and community care services (Government of Ontario, n.d.-b). The ODB program covers most of the cost of approximately 5000 medications purchased in Ontario, including opioid and non-opioid drugs listed in the Formulary/Comparative Drug Index (Government of Ontario, 2023, n.d.-b). ODB data contains a Drugs List with the Drug Identification Number (DIN), date of dispensing, generic name, subclasses, and route of administration of medications (Ontario, 2022a). The ODB program also covers a few palliative care medications (e.g., narcotic drugs for pain relief) if they are prescribed by a physician or nurse practitioner in a Palliative Care Facilitated Access List (Government of Ontario, n.d.).

3.4 DATA ANALYSIS

All analyses were conducted using SAS 9.4[39]. Given that we had few missing data (i.e., less than 5%), analyses were solely conducted on individuals with complete data. Chi-square tests were used to examine differences between people living with dementia and those without dementia on categorical variables including age, sex, primary language spoken, count of comorbid conditions, and CPS and DRS scores. Kruskal-Wallis tests were used to examine differences between residents with and without dementia on continuous variables (i.e., primary language spoken, count of comorbid conditions, and CPS and DRS scores) including the median rates of days supplied opioids and non-opioids per 30 days in LTC, as well as days spent in hospital. One-way ANOVAs were used for each of the last 12 months of life to examine whether differences in prescription existed between residents with and without dementia. We used a Bonferroni correction to account for the increased risk of a type I error when doing multiple statistical tests. In accordance with this correction method, a p-value <0.004 was considered significant to counteract false positives when running our multiple statistical tests (Vickerstaff et al., 2019).

We ran two mixed effect regression models including a mixed-effect logistic regression and a negative binomial regression. A mixed effect logistic regression was used to describe the propensity of receiving a minimum of one day's supply of opioids in the last thirty days of life; and to determine whether this differed according to dementia status while also controlling for age, sex, primary language spoken, presence of diabetes mellitus, hypertension, arteriosclerotic heart disease, other cardiovascular disease, arthritis, osteoporosis, cancer, transient ischemic attack, cardiac dysrhythmias, congestive heart failure, hip fracture and/or depression/anxiety, count of comorbid conditions, and CPS and DRS scores. We used a mixed effect regression to account for

facility-level variation (i.e., residents nested within different long-term care homes). Based on the literature and clinical experience, variations across facilities exist (Bronskill et al., 2012; Chappell et al., 2022; Iacono et al., 2022; Rochon et al., 2007). These facility-level variations in drug prescribing patterns can arise due to low staffing levels (Chappell et al., 2022) or LTC physician practices (Bronskill et al., 2012). As such, there may be clustering effects at the level of the LTC home. Due to constraints related to data access, I did not seek to explain facility-level characteristics (ex., facility size or rurality) but I did control for inherent variation by using a fixed-effects model and assuming that the intercept varies from facility to facility. Based on the literature and clinical experience, variations across facilities exist (Bronskill et al., 2012; Chappell et al., 2022; Iacono et al., 2022; Rochon et al., 2007). In the case of this study, a multi-level model was used based on the understanding that individual level characteristics including age, sex, presence of the above-mentioned conditions, count of chronic conditions, CPS and DRS scores contribute to the outcome (i.e., whether residents receive analgesics and how many days they are supplied).

Due to overdispersed count outcome variables (see Appendix B), a mixed effect negative binomial regression model with random intercepts was estimated to investigate the days supplied opioids for residents with and without dementia in the last thirty days of life while controlling for the above-mentioned variables. Similarly to the logistic regression described above, this model also accounted for facility-level differences. Only residents who were supplied with one or more days of analgesics in any given thirty days in the last month of life were included in this analysis. Similar to the logistic regression model, we included both fixed and random effects, which proves useful in research surrounding LTC residents who have individual-level characteristics (fixed) nested in facility-level characteristics (random).

Chapter 4: THESIS ARTICLE

Exploring changes in prescribing patterns for chronic pain in long-term care residents living with dementia near the end of life

Alixe Ménard[1,2], Annie Robitaille[1,3], Ben Robert[2], Arne Stinchcombe[4,5], Anna Clarke[6], Amy Hsu[5,7,]

[1]Interdisciplinary School of Health Sciences, University of Ottawa, Ontario, Canada; [2]Ottawa Hospital, Ontario, Canada; [3]Perley Health, Ontario, Canada; [4]Faculty of Social Sciences, Psychology, University of Ottawa, Ontario, Canada; [5]Bruyère Research Institute, Ontario, Canada; [6]ICES, Ontario, Canada; [7]Department of Medicine, Division of Palliative Care, University of Ottawa, Ontario, Canada.

Corresponding Author

Alixe Ménard
Graduate Student

Word count (abstract): 250
Word count (main text): 4135
Reference count: 39
Number of tables and figures: 6

ABSTRACT

Background: The rate of pain medication prescribed to long-term care (LTC) residents living with chronic moderate to severe pain, with and without dementia, in the last year of life has not been well investigated.

Aim: This study aimed to describe the rates of opioid versus non-opioid analgesics prescribed to treat chronic pain, stratified by dementia status, in LTC residents who are in their last year of life.

Methods: A retrospective cohort study of residents 65 years of age and older receiving care in an LTC home in Ontario, Canada, and who died between January 1, 2017, and December 31, 2019. Using health administrative data, we identified LTC residents who were living with chronic moderate to severe pain and compared the prescription of opioid and non-opioid analgesics in the last year of life. All analyses were stratified by dementia status.

Results: We identified 2,695 LTC residents in Ontario who experienced chronic moderate to severe pain for a minimum of six months: 1,496 had dementia (55.5%) and 1,199 did not have dementia (44.5%). No differences exist in the number of days supplied with opioids and non-opioids for any given thirty days in each month in the last year of life between residents with and without dementia.

Conclusion: No differences exist in the prescription of opioids during the last month of life between residents with and without dementia, when using both a mixed effects logistic regression and a mixed effects binomial regression. However, differences for varying Cognitive Performance Scale scores warrant further investigation.

KEYWORDS: chronic pain; pain management; long-term care; analgesics; palliative care.

Introduction

It is currently estimated that 20-30% of the global population live with chronic pain, making it a global health priority (Cohen et al., 2014; Treede et al., 2015). In Canada, many individuals live with chronic pain, which is a widespread health concern that can impact various aspects of their lives (Mailis & Lakha, n.d.). Approximately one in five Canadians live with chronic pain (Jones, n.d.). Chronic pain is a common medical condition among older adults and is estimated to affect 25-85% of this population (Stompór et al., 2019). This is an important consideration given the demographic transition in recent decades that has resulted in a significant increase in the aging population (Ali et al., n.d.).

According to the World Health Organization (WHO), chronic pain is defined as pain persisting longer than three months and that has a severe impact on quality of life by affecting physical, psychological, social and/or spiritual well-being (Gudmannsdottir & Halldorsdottir, 2009). Untreated chronic pain can impede on an individual's daily activities and quality of life, while also having repercussions in the workplace and on their social environment (Dueñas et al., 2016). This medical condition leads to physical deterioration in approximately 50% of those affected and has demonstrated a bidirectional association with sleep; thus, negatively impacting quality of life (Dueñas et al., 2016). For older adults receiving care and living in long-term care (LTC) homes (also known as nursing care facilities or nursing homes), pain prevalence rates range from 27.1% to 75.6% within LTC homes across Canada (Gallant et al., 2020). However, chronic pain is reportedly undertreated in LTC, especially in residents living with dementia (Reid et al., 2015).

Pain relief for LTC residents

Many approaches exist for the treatment of chronic pain in older adults, such as physical rehabilitation, pharmaceutical interventions, and procedural interventions that seek to break the cycle of pain (Schwan et al., 2019). Pharmaceutical interventions are common for treating chronic pain in older adults, especially for those living with dementia (Moyle et al., 2017). However, the introduction and use of pharmacological treatments in this population needs careful assessment, given the high prevalence and concerns associated with polypharmacy (i.e., taking multiple medications) and the complexities of multiple comorbidities in the older adult population (Cooper et al., 2015). The use of opioid analgesics can lead to concerns due to potential side effects such as respiratory depression, addiction and falls, and thus creating reluctance among practitioners (Borsheski & Johnson, 2014). As a result of this reluctance, undertreated pain has been linked to cognitive decline, depression, increased rates of delirium, functional impairment, falls, and sleep disturbances (Ali et al., n.d.; Feldt, 2004). Practitioners must balance anticipated benefits of pain management and risks associated with pharmaceutical interventions for pain (Domenichiello & Ramsden, 2019).

There is currently a paucity of literature pertaining to the management of chronic pain in LTC settings, especially in relation to the experience of older adults living with dementia and whether they are prescribed similar analgesics at a similar rate to their cognitively intact counterparts at the end of life (Reid et al., 2015; Robitaille et al., 2018). Given the heterogeneity of older adults in LTC, it is important to understand trends in pain medication prescriptions and how they are influenced by a resident's dementia status (Robitaille et al., 2018).

Study objectives

Using population-level health administrative data, the objectives of this retrospective cohort study were to (1) describe the prevalence and rates of opioid and non-opioid analgesics prescribed to treat chronic moderate to severe pain in LTC residents with and without dementia in their last year of life, and (2) examine differences in the prescription of opioids used to treat chronic moderate to severe pain in the last month of life, stratified by their dementia status.

Methods

Design and Setting

A retrospective cohort study was conducted using health administrative data from Ontario, Canada. The study included LTC residents 65 years of age or older, who reported experiencing chronic moderate to severe pain, and who died between January 1, 2017, and December 31, 2019. This end date was chosen to avoid data overlapping with the start of the COVID-19 pandemic, given that there was an increased weekly dispensing of anticonvulsants, antipsychotics, antidepressants, benzodiazepines, and trazodone hydrochloride in Ontario LTC homes during this unprecedented time[38].

Data Source

Multiple health administrative datasets housed at ICES, linked at the individual level, were used for the purpose of this study, including the: (1) Continuing Care Reporting System-Long Term Care (CCRS-LTC); (2) Ontario Drug Benefit (ODB); (3) Registered Persons Database (RPDB); (4) Canadian Institute for Health Information Discharge Abstract Database (CIHI-DAD); (5) Ontario Health Insurance Plan (OHIP) billing data, and (6) Information about Ontario health care institutions (INST) funded by the Ministries of Health and Long-Term Care.

The CCRS-LTC comprises data collected using the Resident Assessment Instrument-Minimum Dataset (RAI-MDS) version 2.0, which ascertains dementia cases and captures pain status, as well as demographic, clinical, functional and resource utilization information on individuals receiving continuing care services in hospitals or long-term care homes in Canada (CIHI, n.d.c). The ODB contains a list of medications covered under the provincial drug benefit plan and includes the Drug Identification Number (DIN), dispensing dates for claims submitted to the plan, drug names, subclasses, dosage, and route administered of medications (Government of Ontario, n.d.-b). The RPDB is a population-based registry maintained by the Ontario Ministry of Health that contains demographic information (including age, sex, area of residence, dates of birth and where applicable, death) for all individuals who are eligible for health insurance in Ontario (Ontario, n.d.). The CIHI-DAD contains detailed patient-level information abstracted from hospital records from all acute care, chronic, and day surgery institutions in the province of Ontario (CIHI, 2022). The OHIP dataset contains billings to the provincial health insurance plan for publicly funded physician services (Ontario, 2022b). The INST dataset contains health and health related units, facilities, clinics, programs, and service characteristics (Government of Ontario, n.d.-a).

Data use in this study was authorized under section 45 of Ontario's Personal Health Information Protection Act (PHIPA) and research ethics approval was granted by the University of Ottawa Research Ethics Board (see Appendix A).

Study Population

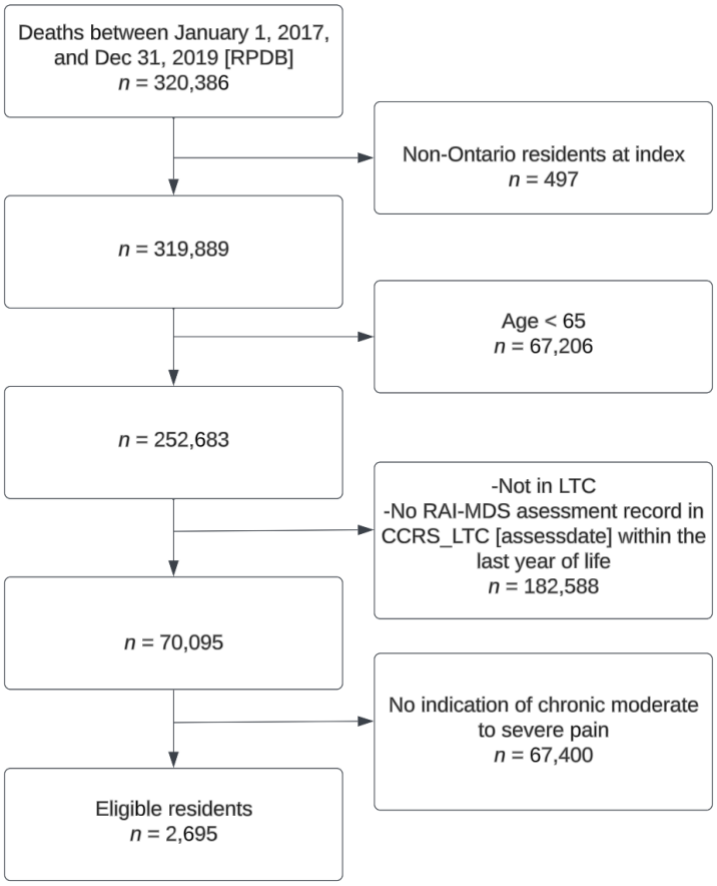
Our initial sample, prior to excluding non-Ontario residents (n=497), was 320,386 individuals who died between January 1, 2017, and December 31, 2019. After removing individuals

below the age of 65 (n=67,206), we had 252,683 individuals. We then removed individuals who were not in LTC and who did not have a CCRS assessment in their final year of life (n=182,588) as well as residents who did not report moderate to severe pain on two consecutive RAI-MDS assessments (n=67,400). Our final cohort included 2,695 residents (Figure 1). Of these residents, 1,199 (44.5%) did not have dementia and 1,496 (55.5%) had dementia.

Exposures

In this study, we defined chronic moderate to severe pain using two consecutive CCRS-LTC records with codes J2A=2 (i.e., pain daily) *and* J2B=3 (i.e., times when pain is horrible or excruciating) indicating daily moderate to severe pain. Dementia cases were identified based on CCRS records denoting a dementia or Alzheimer's diagnosis on any RAI-MDS assessment prior to resident death between January 1, 2017, and December 31st, 2019. This method of using administrative data for identifying dementia cases has very good sensitivity and positive predictive value (Foebel et al., 2013).

Figure 1. Flow diagram of cohort creation with inclusion and exclusion criteria.



Outcomes

This study had two outcomes. The first outcome was the prevalence and rate of claims for opioid and non-opioid analgesics, in median number of days, prescribed to treat chronic moderate to severe pain in LTC residents. Due to prior studies reporting fewer opioids for LTC residents living with dementia compared to residents without dementia (Achterberg et al., 2010; Jensen-Dahm et al., 2015; Sandvik et al., 2016), we decided to explore this further for the last month prior to death. Thus, the second outcome was the odds of being prescribed opioids to treat chronic moderate to severe pain in the last month of life. Days spent outside of LTC in hospital were

collected to understand the rates of use of opioids and non-opioids (see Appendix C). To avoid capturing days residents spent outside of LTC, the days supplied opioids and non-opioids were divided by days in LTC. This standardization was applied to enforce uniformity in the comparison of both resident cohorts in this study.

Opioids included morphine, hydromorphone, transdermal fentanyl, and non-opioids included acetaminophen, acetaminophen + codeine, and dexamethasone.

Covariates

The covariates of interest included age (65-69, 70-74, 75-79, 80-84 and 85+), sex (male/female), primary language spoken (French, English or other), and count of chronic conditions including diabetes, hypertension, arteriosclerotic heart disease, arthritis, osteoporosis, cancer, and other cardiovascular disease. We considered the number of chronic conditions in each resident from 0 to 6. We also captured acute diseases such as transient ischemic attack, cardiac dysrhythmias, congestive heart failure and hip fracture; and cognitive assessment scores on the Cognitive Performance Scale (CPS) (i.e., 0-1 or 2+). Depression scores were also captured based on the Depression Rating Scale (DRS) at one year prior to death, wherein 0-2 indicated no to minimal risk of depression, 3-5 indicated moderate risk of depression, and 6+ indicated high risk of depression.

Statistical Analyses

All analyses were conducted using SAS 9.4[39]. Given that we had few missing data (i.e., less than 5%), all analyses were conducted on only individuals with complete data. Chi-square tests were used to examine differences between people living with dementia and those without

dementia on categorical variables including age, sex, primary language spoken, count of comorbid conditions, and CPS and DRS scores. Kruskal-Wallis tests were used to examine differences between residents with and without dementia on continuous variables (i.e., primary language spoken, presence of the above-mentioned conditions, count of comorbid conditions, and CPS and DRS scores) including the median rates of days supplied opioids and non-opioids per 30 days in LTC, as well as days spent in hospital. One-way ANOVAs were used for each of the last 12 months of life to examine whether differences in prescription existed between residents with and without dementia. We used a Bonferroni correction to account for the increased risk of a type I error when doing multiple statistical tests. In accordance with this correction method, a p-value <0.004 was considered significant to counteract false positives when running our multiple statistical tests (Vickerstaff et al., 2019).

A mixed effect logistic regression was used to describe the propensity of receiving a minimum of one day's supply of opioids in the last thirty days of life; and to determine whether this differed according to dementia status while controlling for age, sex, primary language spoken, CPS score, DRS, and count of comorbid conditions. We used a mixed effect regression to account for facility-level variation (i.e., residents nested within different long-term care homes). Due to overdispersed count outcome variables (see Appendix B), a mixed effect negative binomial regression model with random intercepts was estimated to investigate the days supplied opioids for residents with and without dementia in the last thirty days of life while controlling for the above-mentioned variables. Only residents who were supplied with one or more days of analgesics in any given thirty days in the last month of life were included in this analysis.

Results

Cohort characteristics

The average age of LTC residents living with dementia at one year prior to death was 86.1 (±7.1) years, while the average age for residents without dementia was 83.8 (±9.0) years (p <.0001). The majority of both cohorts were female (70.3% with dementia vs 69.1% without dementia, p=0.504), and spoke English as a primary language (85.6% vs. 88.2%, respectively, p=0.177). A majority of residents living with dementia scored a 3 on the CPS (44.6%) indicating a moderate impairment, while most residents without dementia scored between 0 and 1 on the CPS, indicating intact cognition (51.9%), p<.0001. The majority of both groups scored between 0 and 2 on the DRS indicating no mood symptoms (45.6% vs. 59.1%, p<.0001). Of the chronic conditions we captured, the majority of residents with and without dementia had hypertension (68.1% vs. 68.0%, p=0.9375) and arthritis (55.9% vs. 58.4%, p=0.1927). Most residents living with dementia had 2 chronic conditions on top of their dementia diagnosis (27.8%) while most residents without dementia had 3 chronic conditions (30.1%), p=0.0003. Table 1 further details the cohort characteristics.

Table 1. Cohort characteristics for residents with chronic moderate to severe pain, stratified by dementia status captured one year prior to death.

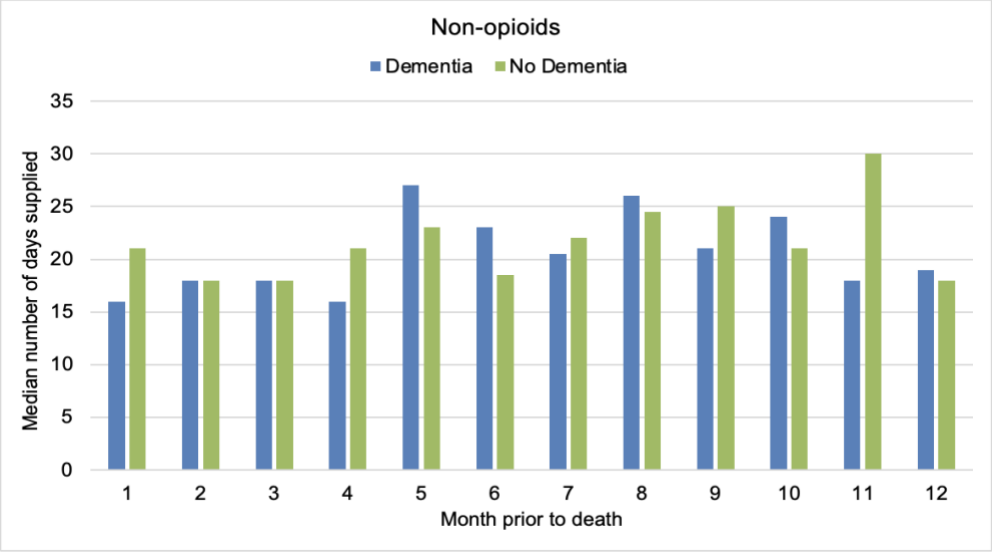
Variables	Dementia		No-Dementia		
	n	%	*n*	%	*p*-value
Sex					0.504
Female	1,034	69.1	843	70.3	
Male	462	30.9	356	29.7	
Age					<.0001
65-69	31	2.1	105	8.8	
70-74	73	4.9	118	9.8	
75-79	173	11.6	160	13.3	
80-84	272	18.2	191	15.9	
85+	947	63.3	625	52.1	
Primary language spoken					0.1772
Allophone	142	9.5	86	7.2	
Anglophone	1,281	85.6	1,057	88.2	
Francophone	*61-65		*51-55		
Cognitive Performance Scale (CPS)					<.0001
0-1	108	7.2	622	51.9	
2	242	16.2	309	25.8	
3	667	44.6	213	17.8	
4	138	9.2	39	3.3	
5	205	13.7	10	0.8	
6	*131-135		6	0.5	
Depression Rating Scale (DRS)					<.0001
0-2	682	45.6	709	59.1	
3-5	464	31.0	333	27.8	
6+	*345-349		157	13.1	
Number of chronic conditions					0.0003
0	386	25.8	234	19.5	
1	416	27.8	337	28.1	
2	405	27.1	361	30.1	
3	215	14.4	186	15.5	
4	57	3.8	75	6.3	
5	*12-16		*2-6		
6	*1-5		*1-5		
Diabetes Mellitus	425	28.4	416	34.7	0.0005
Hypertension	1,019	68.1	815	68.0	0.9375
Arteriosclerotic Heart Disease	274	18.3	261	21.8	0.0255
Other Cardiovascular Disease	347	23.2	305	25.4	0.1767
Arthritis	836	55.9	700	58.4	0.1927
Osteoporosis	482	32.2	399	33.3	0.5605
Cancer	227	15.2	202	16.8	0.2379
Transient Ischemic Attack	108	7.2	58	4.8	0.0106
Cardiac Dysrhythmias	139	9.3	128	10.7	0.232
Congestive Heart Failure	257	17.2	279	23.3	<.0001
Hip Fracture	112	7.5	73	6.1	0.1537
Depression/Anxiety	649	43.4	475	39.6	0.0488

Note. * = Caution, small cells

Non-opioids supplied in last year of life

In the 12th month before death, residents living with dementia were supplied non-opioids for a median [interquartile range] of 19 days [11-24] and residents without dementia were supplied non-opioids for a median of 18 days [7-29], p=0.924. In the 11th month before death, residents living with dementia were supplied non-opioids for a median of 18 days [12-27] and residents without dementia were supplied non-opioids for 30 days [22-30], p=0.074. Similar differences in median days supplied non-opioids (although not statistically significant) were found for months 10 to 4 prior to death (see Figure 2). However, for months 3 and 2 prior to death, both groups were supplied non-opioids for a median of 18 days in any given thirty days in each of these two months. We found that in their last month of life, residents living with dementia were supplied non-opioids for a median of 16 days [9-27] while residents without dementia were supplied non-opioids for a median of 21 days [16-30] in any given thirty days in this month (p=0.200). No significant differences were found for each month before death in the last year of life.

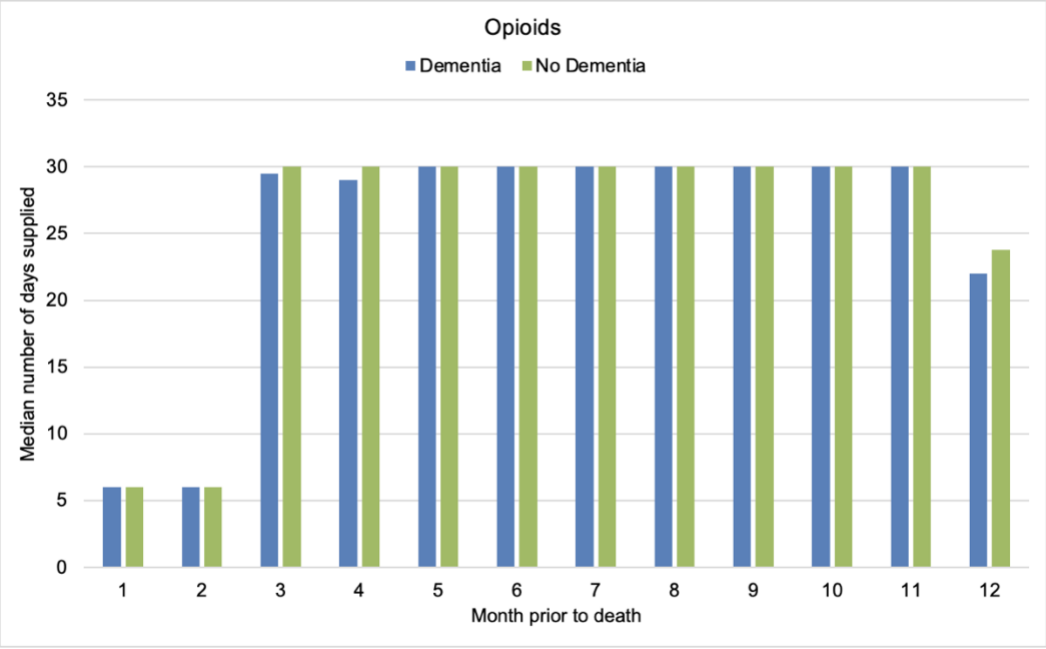
Figure 2. Median number of days for non-opioids supplied for each month prior to death stratified by dementia status.



Opioids supplied in last year of life

In the 12th month before death, residents living with dementia were supplied opioids for a median [interquartile range] of 22 days [13-27] compared to residents without dementia who were supplied opioids for 23.8 days [18-28], p=0.081. Figure 3 presents the median number of days for opioids supplied for each month prior to death stratified by dementia status. Through the 11th to 3rd months before death, both groups were supplied opioids for a median of approximately 30 days for each of these months. However, in their final two months of life, both groups were supplied opioids for a median of 6 days in any given thirty days in each of these two months.

Figure 3. Median number of days for opioids supplied for each month prior to death stratified by dementia status.



Using a mixed effects logistic regression, we found that the rate of days supplied opioids did not differ according to dementia status (RR=1.10; 95% CI= 0.89-1.35) when all other

covariates (i.e., age, sex, primary language spoken, CPS, DRS, and count of comorbid conditions) were held constant and controlled for. However, among residents who received an analgesic for at least one day in their last month of life, the rate of days supplied opioids was 18% less (RR=0.82; 95% CI= 0.53-1.27) for francophone residents compared to anglophone residents, but this association was not statistically significant (p=0.3647). Figure 4 presents the logistic regression describing the propensity of receiving at least one day's supply of opioids in the last thirty days of life for residents with and without dementia according to the above-listed covariates.

Figure 4. Logistic regression describing the propensity of receiving at least one day's supply of opioids in the last thirty days of life between residents with and without dementia.

Effect	Estimate	*SE*	95% CI		*p*-value
			LL	UL	
Fixed effects					
Intercept		0.2571			0.3819
Dementia diagnosis	1.10	0.1056	0.89	1.35	0.3743
70-74 years of age	0.94	0.2372	0.59	1.51	0.8116
75-79 years of age	1.42	0.2185	0.93	2.19	0.1065
80-84 years of age	1.38	0.2104	0.91	2.09	0.1249
85+ years of age	1.63	0.1946	1.11	2.39	0.0126
65-69 years of age	1.00	.	.	.	.
Female	1.14	0.09374	0.95	1.38	0.1523
Male	1.00	.	.	.	.
Allophone	0.94	0.1550	0.69	1.27	0.6736
Francophone	0.82	0.2223	0.53	1.27	0.3647
Anglophone	1.00	.	.	.	.
CPS 2	1.14	0.1259	0.89	1.46	0.3046
CPS 3	1.24	0.1276	0.96	1.59	0.0940
CPS 4	1.37	0.2005	0.93	2.03	0.1150
CPS 5	1.65	0.1990	1.12	2.44	0.0119
CPS 6	2.58	0.2474	1.59	4.20	0.0001
CPS 0-1	1.00	.	.	.	.
DRS 3-5	1.14	0.09950	0.94	1.39	0.1885
DRS 6+	1.16	0.1218	0.92	1.48	0.2154
DRS 0-2	1.00	.	.	.	.
1 chronic condition	1.05	0.1203	0.83	1.33	0.7016
2 chronic conditions	0.96	0.1210	0.76	1.22	0.7344
3 chronic conditions	0.88	0.1433	0.66	1.16	0.3690
4 chronic conditions	1.15	0.2157	0.75	1.75	0.5230
5 chronic conditions	0.82	0.5080	0.30	2.21	0.6897
6 chronic conditions	0.44	1.0577	0.06	3.52	0.4395
0 chronic conditions	1.00	.	.	.	.
Transient Ischemic Attack	1.16	0.1811	0.82	1.66	0.4041
Cardiac Dysrhythmias	1.04	0.1451	0.78	1.38	0.7945
Congestive Heart Failure	0.78	0.1064	0.63	0.96	0.0177
Hip Fracture	0.80	0.1668	0.58	1.11	0.1800
Random effects					
Intercept (null)	0.20	0.0672	0.12	0.44	0.0012
Intercept (with predictors)	0.19	0.0676	0.10	0.44	0.0028

Note. SE = Standard Error; CI = confidence interval; LL = lower limit; UL = upper limit; CPS = Cognitive Performance Scale; DRS = Depression Rating Scale; * = small cells.

Similarly, using adjusted negative binomial distribution, we found that among residents who received an opioid for at least one day in their last 30 days of life, the rate of days supplied opioids did not differ according to dementia status (RR=0.97; 95% CI= 0.86-1.09) when all other covariates (i.e., age, sex, primary language spoken, CPS, DRS, and count of comorbid conditions) were held constant and controlled for. However, among residents who received an analgesic for at least one day in the last 30 days of life, the rate of days supplied opioids was 41% less (RR=0.59; 95% CI= 0.48-0.74) for residents with a CPS score of 4 (i.e., indicating moderate or severe cognitive impairment) ($p<0.0001$). Figure 5 presents the negative binomial distribution.

Figure 5. Negative binomial regression model with random intercepts for days supplied opioids for residents with and without dementia in the last thirty days of life.

Effect	Estimate	*SE*	95% CI		*p*-value
			LL	UL	
Fixed effects					
Intercept		0.1279			<.0001
Dementia diagnosis	0.97	0.06046	0.86	1.09	0.5892
70-74 years of age	1.00	0.1501	0.75	1.35	0.9891
75-79 years of age	0.88	0.1332	0.68	1.14	0.3240
80-84 years of age	0.90	0.1295	0.70	1.16	0.4206
85+ years of age	0.73	0.1210	0.58	0.93	0.0109
65-69 years of age	1.00	.	.	.	.
Female	1.04	0.05351	0.94	1.15	0.4783
Male	1.00	.	.	.	.
Allophone	1.22	0.08588	1.03	1.44	0.0231
Francophone	1.16	0.1200	0.92	1.47	0.2114
Anglophone	1.00	.	.	.	.
CPS 2	0.82	0.07382	0.71	0.95	0.0082
CPS 3	0.95	0.07411	0.82	1.10	0.5163
CPS 4	0.59	0.1120	0.48	0.74	<.0001
CPS 5	0.87	0.1052	0.71	1.07	0.1823
CPS 6	1.18	0.1143	0.94	1.47	0.1534
CPS 0-1	1.00	.	.	.	.
DRS 3-5	1.04	0.05529	0.94	1.16	0.4453
DRS 6+	1.09	0.06505	0.96	1.23	0.2005
DRS 0-2	1.00	.	.	.	.
1 chronic condition	0.95	0.06624	0.83	1.08	0.4350
2 chronic conditions	0.96	0.06772	0.84	1.09	0.5215
3 chronic conditions	1.06	0.08090	0.91	1.25	0.4393
4 chronic conditions	1.27	0.1172	1.01	1.59	0.0448
5 chronic conditions	1.04	0.2853	0.60	1.82	0.8836
6 chronic conditions	2.32	0.6659	0.63	8.56	0.2070
0 chronic conditions	1.00	.	.	.	.
Transient Ischemic Attack	1.14	0.09534	0.94	1.37	0.1839
Cardiac Dysrhythmias	0.98	0.08122	0.84	1.15	0.8196
Congestive Heart Failure	0.95	0.06292	0.84	1.07	0.3925
Hip Fracture	0.95	0.09737	0.78	1.15	0.5992

Note. SE = Standard Error; CI = confidence interval; LL = lower limit; UL = upper limit; CPS = Cognitive Performance Scale; DRS = Depression Rating Scale; * = small cells.

Discussion

The purpose of this study was to describe the rates of opioid versus non-opioid analgesics prescribed to treat chronic moderate to severe pain, stratified by dementia status, in LTC residents who are in their last year of life; and to examine differences in the prescription of opioids used to treat chronic moderate to severe pain in the last month of life, stratified by their dementia status. These aims were investigated using health administrative data to better understand the role of dementia diagnoses in timely and adequate pain management (specifically chronic pain management) at the end of life for residents reporting daily moderate to severe chronic pain.

Our findings demonstrate that no differences exist in the number of days supplied with opioids and non-opioids for any given thirty days in each month in the last year of life between residents with and without dementia. We also found no differences in the prescription of opioids during the last month of life between residents with and without dementia, when using both a mixed effects logistic regression and a mixed effects binomial regression. These findings differ from the international literature, specifically in Norway and Denmark, which suggests that residents living with dementia demonstrate a lower use of analgesics when compared to residents without dementia (Achterberg et al., 2021). However, these findings align with research from Finland wherein residents with and without dementia are equally as likely to receive opioids for the treatment of pain (Roitto et al., 2019). Literature from the United States and Australia, have shown that more severe cognitive impairment was tied to higher opioid use (Lintula et al., 2020; Mehta et al., 2021). Similarly, in our study, residents who scored a 4 on the CPS (indicating moderate impairment) compared to those with a CPS score of 0-1 (indicating intact cognition) had a rate of days supplied opioids that was 41% less (RR=0.59; 95% CI= 0.48-0.74, $p<0.0001$) among residents who received an analgesic for at least one day. This potentially points to a difference in

prescribing practices between residents with varying degrees of cognitive impairment and may be absorbing the effects of a dementia diagnosis since the two variables are highly collinear. This could be attributable to complications related to the recognition and assessment of pain in populations with cognitive impairment and/or to differences in length of hospital stays (Achterberg et al., 2021). Discrepancies in prescribing patterns for medication in LTC could also be explained by the fact that older adults living with dementia have a median length of stay in hospital that is 1.3 to 2 times higher than older adults without dementia (CIHI, n.d.-b) which could mean fewer days supplied analgesics in LTC. Appendix C presents the days outside of LTC for our study cohort. Furthermore, our study found that for residents who received an analgesic for at least one day in their last month of life, the rate of days supplied opioids was 18% less (RR=0.82; 95% CI= 0.53-1.27) for francophone residents compared to anglophone residents, however, this association was not statistically significant (p=0.3647). Unfortunately, language barriers are a proven obstacle to pain assessment in LTC (Egan & Cornally, 2013). Despite the possibility of this result being a chance occurrence, it is consistent with current literature which suggests that francophone residents in LTC in Ontario are more likely to report pain than their anglophone counterparts (Batista et al., 2021). This said, more research is needed to understand the risk of language barriers and discordance (i.e., when a provider speaks a different language than their patient) on analgesic dispensing practices.

Additionally, there is an established lack of knowledge of dementia and pain among healthcare workers, LTC personnel and informal caregivers (Liao et al., 2023). Comprehensive assessment is the foundation of pain management and is only attainable through self-report by residents or observation of pain-related behaviors by personnel and/or family and friends (Liao et al., 2023). Furthermore, increased frailty in residents living with dementia makes it difficult for

providers to predict death in this population and thus to prescribe end of life medication accordingly (Aprahamian et al., 2019). The length of the dying phase is also not well known for residents living with dementia (van der Steen et al., 2017). Herein lies the importance of recognizing barriers to pain assessment in residents living with dementia or any form of cognitive impairment, in order to address them and better care for these populations. Given the global health catastrophe that is untreated pain, there is a growing consensus that freedom from unnecessary pain is a fundamental human right (King & Fraser, 2013). Furthermore, access to pain management has been deemed a human right under international law (King & Fraser, 2013). For this reason, there should be no serious obstacles to the fair distribution of effective pain treatments and continuous pain relief should be promoted for all demographics (King & Fraser, 2013). These efforts would reduce significant health disparities and remove burden on the healthcare systems (Domenichiello & Ramsden, 2019).

Limitations

Although our study has many strengths such as a large sample size and validated algorithms that define dementia, pain, and many of our covariates, certain limitations warrant consideration. Notably, health administrative data is most commonly criticized for potential issues with the accuracy of billing codes to classify diagnoses (Johnson & Nelson, 2013). Coding accuracy can greatly vary according to the data source, as well as the condition, procedure, and disease definitions (Johnson & Nelson, 2013). Coding accuracy can also suffer as a result of clerical error, issues with code precision and omission of codes by billing or coding staff due to oversight or perceived irrelevance (Johnson & Nelson, 2013). The CCRS data in LTC settings has been shown to be consistently high in clerical and measurement errors wherein test scores can differ from true scores for residents being assessed (Hirdes et al., 2013). Furthermore, RAI-MDS assessments are

not completed at discharge which negatively impacts researchers' abilities to study changes in resident health statuses from entry into- and exit from LTC (Hirdes et al., 2013). Ascertainment bias may also be prevalent in MDS data as a result of differences in abilities to measure complex resident characteristics such as pain and depression in cognitively impaired residents (Hirdes et al., 2013). In this case, diligent staff members may assess higher rates of pain than their less diligent counterparts (Hirdes et al., 2013). The pain quality indicator has been shown to be systematically biased depending on facility characteristics (i.e., pain scores are reported as being lower in high quartile facilities and higher in low quartile facilities) (Hutchinson et al., 2010). In the context of this study, we were unable to capture physician characteristics and subsequent prescribing behaviors. Furthermore, it is important to note that there is no standardized code for the reporting of chronic pain using RAI-MDS data. This meant that our team had to create a MDS chronic pain definition (i.e., chronic moderate to severe pain) according to pain severity and duration. This said, RAI instruments are subject to extensive ongoing testing to establish and improve reliability and validity through tests of inter-reliability and internal consistency (Hirdes et al., 2013). Moreover, we were not able to capture pro re nata (PRN) (or "as needed") pain medication such as ibuprofen which is typically given in response to symptoms that do not require regular medication (Nilsen et al., 2020). We were also unable to differentiate between opioids supplied for pain management versus opioids supplied for shortness of breath. This ultimately means that we cannot attest to whether pain is sufficiently managed at the end of life in LTC.

Conclusion

Overall, the rates of opioids prescribed in LTC to treat chronic moderate to severe pain at each month during the last year of life did not appear to vary significantly according to the presence or absence of dementia in residents. This is a promising finding in the equal practice of opioid

prescribing in LTC residents irrespective of cognitive abilities. However, with a median of 6 days supplied with opioids and non-opioids [3-15] for any given thirty days in the last month prior to death, it is possible residents are experiencing unmanaged pain in the time surrounding their final month of life. Adequate pain management in LTC is a complex task that warrants further investigation. The duration of residents' dying phases should be further investigated to better understand the timely supply of analgesics to manage pain at the end of life for both residents with and without dementia.

Appendix A. Ethics certificate.

Université d'Ottawa
Bureau d'éthique et d'intégrité de la recherche

University of Ottawa
Office of Research Ethics and Integrity

CERTIFICAT D'APPROBATION ÉTHIQUE | CERTIFICATE OF ETHICS APPROVAL

Numéro du dossier / Ethics File Number	H-07-22-7994
Titre du projet / Project Title	Exploring changes in prescribing patterns for chronic severe pain in long-term care residents living with dementia near the end of life
Type de projet / Project Type	Thèse de maîtrise / Master's thesis
Statut du projet / Project Status	Approuvé / Approved
Date d'approbation (jj/mm/aaaa) / Approval Date (dd/mm/yyyy)	19/07/2022
Date d'expiration (jj/mm/aaaa) / Expiry Date (dd/mm/yyyy)	18/07/2023

Équipe de recherche / Research Team

Chercheur / Researcher	Affiliation	Role
Alixe MÉNARD	École interdisciplinaire des sciences de la santé / Interdisciplinary School of Health Sciences	Chercheur Principal / Principal Investigator
Annie ROBITAILLE	École interdisciplinaire des sciences de la santé / Interdisciplinary School of Health Sciences	Superviseur / Supervisor
Amy HSU	Département de médecine familiale / Department of Family Medicine	Co-chercheur / Co-investigator

Conditions spéciales ou commentaires / Special conditions or comments

Appendix B. Medication use for residents who were supplied opioids and non-opioids for a minimum of one day.

Opioids					
	Dementia		No-Dementia		
Months	$\tilde{X}$	IQR	$\tilde{X}$	IQR	*p*
	n = 999		*n* = 698		
1	6	3-14	6	3-18	0.34
	n = 300		*n* = 237		
2	26	7-30	26	7-30	0.74
	n = 252		*n* = 198		
3	30	8-30	30	9-30	0.69
	n = 227		*n* = 167		
4	29	7-30	30	12-30	0.05
	n = 191		*n* = 156		
5	30	9-30	30	15-30	0.20
	n = 175		*n* = 140		
6	30	13-30	30	18-30	0.48
	n = 153		*n* = 125		
7	30	20-30	30	23-30	0.29
	n = 152		*n* = 118		
8	30	11-30	30	21-30	0.03
	n = 131		*n* = 109		
9	30	17-30	30	24-30	0.18
	n = 129		*n* = 107		
10	30	17-30	30	20-30	0.24
	n = 124		*n* = 96		
11	30	18-30	30	25-30	0.49
	n = 119		*n* = 90		
12	22	13-27	24	18-28	0.08
Non-opioids					
	Dementia		No-Dementia		
Months	$\tilde{X}$	IQR	$\tilde{X}$	IQR	*p*
	n = 15		*n* = 30		
1	16	9-27	21	16-30	0.20
	n = 8		*n* = 21		
2	18	7-25	19	12-30	0.40
	n = 8		*n* = *167*		
3	22	15-30	15	10-28	0.31
	n = 7		*n* = 15		
4	16	8-30	21	14-30	0.47
	n = 8		*n* = 11		
5	27	16-30	23	17-28	0.53
	n = 10		*n* = 12		
6	24	18-30	19	10-30	0.28
	n = 7		*n* = 12		
7	21	17-30	22	11-30	0.54
	n = 6		*n* = 13		
8	26	14-30	25	19-30	0.86
	n = 7		*n* = 15		
9	21	12-30	25	23-30	0.40
	n = 7		*n* = 14		
10	24	18-30	21	5-27	0.24
	n = 9		*n* = 17		
11	18	12-27	30	22-30	0.07
	n = 7		*n* = 17		
12	19	11-24	18	7-29	0.92

Appendix C. Distribution of the number of days outside LTC in each of the 12 months prior to death.

	Dementia		No-Dementia		
	n =1,496		*n* =1,199		
Months	M	SD	M	SD	*p*
1	1.97	4.88	2.97	5.99	<.0001
2	0.92	3.92	1.45	4.81	0.0016
3	0.96	4.39	1.49	5.19	0.0042
4	1.39	5.41	2.09	6.49	0.0025
5	2.02	6.81	2.96	8.13	0.0012
6	2.65	7.94	3.82	9.4	0.0005
7	3.29	8.94	4.89	10.47	<.0001
8	3.88	9.67	5.83	11.32	<.0001
9	4.51	10.36	6.67	11.96	<.0001
10	5.05	10.92	7.38	12.52	<.0001
11	5.82	11.57	8.22	13.01	<.0001
12	6.41	12.04	9.02	13.4	<.0001

REFERENCES

1. Gudmannsdottir GD, Halldorsdottir S. Primacy of existential pain and suffering in residents in chronic pain in nursing homes: a phenomenological study. *Scand J Caring Sci*. 2009;23(2):317-327. doi:10.1111/j.1471-6712.2008.00625.x
2. King NB, Fraser V. Untreated Pain, Narcotics Regulation, and Global Health Ideologies. *PLoS Med*. 2013;10(4):e1001411. doi:10.1371/journal.pmed.1001411
3. Treede RD, Rief W, Barke A, et al. A classification of chronic pain for ICD-11. *Pain*. 2015;156(6):1003-1007. doi:10.1097/j.pain.0000000000000160
4. Cohen SP, Vase L, Hooten WM. Chronic pain: an update on burden, best practices, and new advances. *The Lancet*. 2021;397(10289):2082-2097. doi:10.1016/S0140-6736(21)00393-7
5. Stompór M, Grodzicki T, Stompór T, Wordliczek J, Dubiel M, Kurowska I. Prevalence of Chronic Pain, Particularly with Neuropathic Component, and Its Effect on Overall Functioning of Elderly Patients. *Med Sci Monit Int Med J Exp Clin Res*. 2019;25:2695-2701. doi:10.12659/MSM.911260
6. Ali A, Arif AW, Bhan C, et al. Managing Chronic Pain in the Elderly: An Overview of the Recent Therapeutic Advancements. *Cureus*. 10(9):e3293. doi:10.7759/cureus.3293
7. Mailis A, Lakha SF. From (Ontario Ministry of Health and Long-Term Care) policy to implementation: A retrospective look at a community-based patient-centered model of care for chronic pain. *Can J Pain*. 3(1):114-125. doi:10.1080/24740527.2019.1614880
8. Jones A. Chronic Pain Management and Canadian Public Health Insurance: Do We Need More Comprehensive Health Care? UBC Medical Journal. Published n.d. Accessed October 29, 2022. https://ubcmj.med.ubc.ca/ubcmj-volume-7-issue-1/chronic-pain-

management-and-canadian-public-health-insurance-do-we-need-more-comprehensive-health-care/chronic-pain-management-and-canadian-public-health-insurance-do-we-need-more-comprehensive-health-care/

9. Ramage-Morin PL. Chronic pain in Canadian seniors. *Health Rep*. 2008;19(1):37-52.
10. Dueñas M, Ojeda B, Salazar A, Mico JA, Failde I. A review of chronic pain impact on patients, their social environment and the health care system. *J Pain Res*. 2016;9:457-467. doi:10.2147/JPR.S105892
11. Dagnino APA, Campos MM. Chronic Pain in the Elderly: Mechanisms and Perspectives. *Front Hum Neurosci*. 2022;16. Accessed November 19, 2022. https://www.frontiersin.org/articles/10.3389/fnhum.2022.736688
12. Schopflocher D, Taenzer P, Jovey R. The prevalence of chronic pain in Canada. *Pain Res Manag J Can Pain Soc*. 2011;16(6):445-450.
13. Reid MC, O'Neil KW, Dancy J, Berry CA, Stowell SA. Pain Management in Long-Term Care Communities: A Quality Improvement Initiative. *Ann Long-Term Care Off J Am Med Dir Assoc*. 2015;23(2):29-35.
14. Wells N, Pasero C, McCaffery M. Improving the Quality of Care Through Pain Assessment and Management. In: Hughes RG, ed. *Patient Safety and Quality: An Evidence-Based Handbook for Nurses*. Advances in Patient Safety. Agency for Healthcare Research and Quality (US); 2008. Accessed October 26, 2022. http://www.ncbi.nlm.nih.gov/books/NBK2658/
15. CIHI. Manuals and Forms for Continuing and Residential Care interRAI Assessors | CIHI. Published n.d. Accessed November 2, 2022. https://www.cihi.ca/en/manuals-and-forms-for-continuing-and-residential-care-interrai-assessors

16. Hirdes JP, Poss JW, Caldarelli H, et al. An evaluation of data quality in Canada's Continuing Care Reporting System (CCRS): secondary analyses of Ontario data submitted between 1996 and 2011. *BMC Med Inform Decis Mak*. 2013;13(1):27. doi:10.1186/1472-6947-13-27
17. Hutchinson AM, Milke DL, Maisey S, et al. The Resident Assessment Instrument-Minimum Data Set 2.0 quality indicators: a systematic review. *BMC Health Serv Res*. 2010;10(1):166. doi:10.1186/1472-6963-10-166
18. Ferrell BA. Pain evaluation and management in the nursing home. *Ann Intern Med*. 1995;123(9):681-687. doi:10.7326/0003-4819-123-9-199511010-00007
19. Gallant NL, Peckham A, Marchildon G, Hadjistavropoulos T, Roblin B, Stopyn RJN. Provincial legislative and regulatory standards for pain assessment and management in long-term care homes: a scoping review and in-depth case analysis. *BMC Geriatr*. 2020;20(1):458. doi:10.1186/s12877-020-01758-7
20. Schwan J, Sclafani J, Tawfik VL. Chronic Pain Management in the Elderly. *Anesthesiol Clin*. 2019;37(3):547-560. doi:10.1016/j.anclin.2019.04.012
21. Moyle W, El Saifi N, Draper B, et al. Pharmacotherapy of Persons with Dementia in Long-term Care in Australia: A Descriptive Audit of Central Nervous System Medications. *Curr Drug Saf*. 2017;12(2):95-102. doi:10.2174/1574886312666170209113203
22. Cooper JA, Cadogan CA, Patterson SM, et al. Interventions to improve the appropriate use of polypharmacy in older people: a Cochrane systematic review. *BMJ Open*. 2015;5(12):e009235. doi:10.1136/bmjopen-2015-009235

23. Borsheski R, Johnson QL. Pain Management in the Geriatric Population. *Mo Med*. 2014;111(6):508-511.
24. Feldt KS. The Complexity of Managing Pain for Frail Elders. *J Am Geriatr Soc*. 2004;52(5):840-841. doi:10.1111/j.1532-5415.2004.52228.x
25. Domenichiello AF, Ramsden CE. The silent epidemic of chronic pain in older adults. *Prog Neuropsychopharmacol Biol Psychiatry*. 2019;93:284-290. doi:10.1016/j.pnpbp.2019.04.006
26. Knopp-Sihota JA, MacGregor T, Reeves JTH, Kennedy M, Saleem A. Management of Chronic Pain in Long-Term Care: A Systematic Review and Meta-Analysis. *J Am Med Dir Assoc*. 2022;23(9):1507-1516.e0. doi:10.1016/j.jamda.2022.04.008
27. Cloutier D, Stajduhar KI, Roberts D, Dujela C, Roland K. 'Bare-bones' to 'silver linings': lessons on integrating a palliative approach to care in long-term care in Western Canada. *BMC Health Serv Res*. 2021;21(1):610. doi:10.1186/s12913-021-06606-x
28. Brink P, Kelley ML. Death in Long-term Care: A Brief Report Examining Factors Associated with Death within 31 Days of Assessment. *Palliat Care*. 2015;9:1-5. doi:10.4137/PCRT.S20347
29. Coelho A, Parola V, Escobar-Bravo M, Apóstolo J. Comfort experience in palliative care: a phenomenological study. *BMC Palliat Care*. 2016;15(1):71. doi:10.1186/s12904-016-0145-0
30. Canadian Institute for Health Information. Palliative and end-of-life care [report]. Published online n.d. Accessed November 22, 2022. https://www.cihi.ca/en/dementia-in-canada/spotlight-on-dementia-issues/palliative-and-end-of-life-care#ref8

31. Wang SY, Aldridge MD, Gross CP, et al. End-of-Life Care Intensity and Hospice Use: A Regional-Level Analysis. *Med Care*. 2016;54(7):672-678. doi:10.1097/MLR.0000000000000547

32. National Institute on Aging. Providing Care and Comfort at the End of Life. National Institute on Aging. Accessed February 13, 2022. http://www.nia.nih.gov/health/providing-comfort-end-life

33. Sachs GA, Shega JW, Cox-Hayley D. Barriers to Excellent End-of-life Care for Patients with Dementia. *J Gen Intern Med*. 2004;19(10):1057-1063. doi:10.1111/j.1525-1497.2004.30329.x

34. Lau J, Mazzotta P, Whelan C, et al. Opioid safety recommendations in adult palliative medicine: a North American Delphi expert consensus. *BMJ Support Palliat Care*. 2022;12(1):81-90. doi:10.1136/bmjspcare-2021-003178

35. Peralta T, Castel-Branco MM, Reis-Pina P, Figueiredo IV, Dourado M. Prescription trends at the end of life in a palliative care unit: observational study. *BMC Palliat Care*. 2022;21:65. doi:10.1186/s12904-022-00954-z

36. National Institute on Aging. Providing Care and Comfort at the End of Life. National Institute on Aging. Accessed November 16, 2022. https://www.nia.nih.gov/health/providing-comfort-end-life

37. Robitaille A, Piccinin AM, Hofer SM, Johansson B, Muniz Terrera G. An examination of the heterogeneity in the pattern and association between rates of change in grip strength and global cognition in late life. A multivariate growth mixture modelling approach. *Age Ageing*. 2018;47(5):692-697. doi:10.1093/ageing/afy048

38. Campitelli MA, Bronskill SE, Maclagan LC, et al. Comparison of Medication Prescribing Before and After the COVID-19 Pandemic Among Nursing Home Residents in Ontario, Canada. *JAMA Netw Open*. 2021;4(8):e2118441. doi:10.1001/jamanetworkopen.2021.18441

39. SAS. Accessed April 11, 2022. https://www.sas.com/en_ca/curiosity.html?utm_source=google&utm_medium=cpc&utm_campaign=brand-global&utm_content=GMS-158646-gbc-cf&gclid=CjwKCAjwo8-SBhAlEiwAopc9W-eX8YxgNrF0ug3P9Ys4SNVkoEhLfBASeI7UpGWvseTe_cn3HPj_-xoC3GcQAvD_BwE

Chapter 5: DISCUSSION

Given the global health catastrophe that is untreated pain, there is a growing consensus that freedom from unnecessary pain is a fundamental human right (King & Fraser, 2013). Furthermore, access to pain management has been deemed a human right under international law (King & Fraser, 2013). For this reason, there should be no serious obstacles to the fair distribution of effective pain treatments, and continuous pain relief should be promoted for all demographics (King & Fraser, 2013). These efforts would reduce significant health disparities and remove burden on the healthcare systems (Domenichiello & Ramsden, 2019).

The purpose of this study was to describe the rates of opioid and non-opioid analgesics prescribed to treat chronic pain, stratified by dementia status, in LTC residents who are in their last year of life; and to examine differences in the prescription of opioids used to treat chronic moderate to severe pain in the last month of life, stratified by their dementia status. These aims were investigated using health administrative data to better understand the role a dementia diagnosis plays in timely and adequate pain management (specifically chronic pain management) at the end of life. Our findings demonstrated that no differences exist in the number of days supplied with opioids and non-opioids for any given thirty days in each month in the last year of life between residents with and without dementia. We also found no differences in the prescription of opioids during the last month of life between residents with and without dementia, when using both a mixed effects logistic regression and a mixed effects binomial regression.

The current international literature suggests that residents living with dementia demonstrate a lower use of analgesics when compared to residents without dementia (Achterberg et al., 2021). Research from Nordic countries such as Norway and Denmark, suggest that residents

living with dementia demonstrate a lower use of analgesics when compared to residents without dementia (Achterberg et al., 2021). However, our findings align with research from Finland wherein residents with and without dementia are equally as likely to receive opioids for the treatment of pain (Roitto et al., 2019). Literature from the United States and Australia, have shown that more severe cognitive impairment was tied to higher opioid use (Lintula et al., 2020; Mehta et al., 2021). Similarly, in our study, residents who scored a 4 on the CPS (moderate impairment) compared to those with a CPS score of 0-1 (intact cognition) had a rate of days supplied opioids that was 41% less (RR=0.59; 95% CI= 0.48-0.74, $p<0.0001$) among residents who received an analgesic for at least one day.

This undertreatment is believed to be attributable to complications related to the recognition and assessment of pain in this cognitively impaired population (Achterberg et al., 2021). Furthermore, there is an established lack of knowledge of dementia and pain among healthcare workers, LTC personnel and informal caregivers (Liao et al., 2023). Comprehensive assessment is the foundation of pain management and is only attainable through self-report by residents or observation of pain-related behaviors by personnel and/or family and friends (Liao et al., 2023). Herein lies the importance of recognizing barriers to pain assessment in patients living with dementia, in order to address them and better care for our dementia population.

Prescription patterns in LTC

Research into medications or prescribing patterns for residents living with dementia living in LTC is lacking in Canada. Common medications in LTC include antipsychotics, antianxiety drugs, antidepressants, hypnotics, benzodiazepines, opioids, and non-opioid analgesics (Muench et al., 2022). Compared to residents without dementia, residents living with dementia are more

likely to be prescribed an antipsychotic (27% vs 23%) (Muench et al., 2022). However, residents living with dementia are less likely to receive antidepressants (63% vs 65%); hypnotics (2% vs 5%), opioids (31% vs 47%) and non-opioid analgesics (9% vs 14%) than their cognitively intact counterparts (Muench et al., 2022).

Pain communication barriers

Critical components of pain management in residents living with dementia include noting changes in nonverbal expressions, new injuries, and past medical history (Liao et al., 2023). Other telltale signs of pain include moaning; whining; rubbing or touching the affected area; reluctance to move; discolored skin; reduced appetite; changes in eating; changes in weight, and drooling (Liao et al., 2023). Dementia can lead to many functional impairments affecting communication, behavior, and psychology (Achterberg et al., 2021). This disease leads to atypical presentation of pain in its patients which, combined with aphasia, can lead to pain being expressed via behavioral changes and/or psychiatric symptoms (Neumann-Podczaska et al., 2016). Recent studies suggest that residents living with dementia experiencing pain often demonstrate socially inappropriate behaviors, abnormal thought processes and delusions as a result of not being able to verbally communicate their pain (Tosato et al., 2012). Poor pain control can also lead residents living with dementia to demonstrate aggressive and anxious behaviors (Lichtner et al., 2016). Furthermore, these neuropsychiatric symptoms and communication barriers lead to difficulties in collecting accurate pain-related information for healthcare workers, LTC personnel and informal caregivers (Liao et al., 2023). These symptoms also result in an increased time commitment for clinical staff, and often leads to suboptimal care or the inappropriate prescription of antipsychotics in lieu of analgesics (Liao et al., 2023; Lichtner et al., 2016). Further difficulties are presented when residents living with dementia display baseline behavioral and psychological symptoms of

dementia (ex., apathy, depression, agitation), variable alertness, and obscure pain-related behaviors (Liao et al., 2023). Notably, many residents living with dementia have recall difficulty which leads staff to be dependent on their own interpretations and identifications of resident pain responses to accurately assess pain (Lichtner et al., 2016). This inability to recall information related to their pain (ex., when it began; the cause) means that acute pain is more commonly reported than chronic pain for individuals living with dementia (Leong & Nuo, 2007; Lichtner et al., 2016). For this reason, many health professionals describe pain identification as being a "guessing game" (Kovach et al., 2000).

Pain perception barriers

A past study found that patients with vascular dementia reported pain of a significantly higher intensity than patients with pain from chronic painful diseases such as arthrosis (Scherder et al., 2003). While the neuropathology of pain has yet to be entirely understood for patients living with dementia, it has been established that dementia as a clinical syndrome can disrupt various neural pain networks (Scherder et al., 2003). For instance, dementia can lead to a disconnection between the hippocampus and hypothalamus thus causing overactivity in the hypothalamus-pituitary-adrenal (HPA) axis (Scherder et al., 2003). This can cause autonomic feedback (i.e., nervous system activity in response to emotionally evocative stimuli) disturbances and increased concentrations of the corticotropin-releasing hormone, a hormone that increases anxiety (Scherder et al., 2003). Notably, the activation of the corticotropin-releasing factor receptor can inhibit pain through opioid peptide release from neurons (Mousa et al., 2022). These disturbances can be found within the medial pain system, a system responsible for emotional responses to pain (Sewards & Sewards, 2002), thus leading patients living with dementia to manifest pain differently than patients without dementia (Scherder et al., 2003).

Pharmacological barriers

Administering medication for the purpose of pain relief is complex in residents living with dementia given their higher rate of polypharmacy and higher risk of adverse events from medications (Liao et al., 2023). Individuals living with dementia are likely to have three or more chronic diseases on top of this diagnosis, including hypertension, stroke, coronary heart disease and diabetes (Ruangritchankul et al., 2020). Individuals living with dementia are also more likely to have had an acute conditions for which they are still medicated such as transient ischemic attack (Pendlebury & Rothwell, 2019), cardiac dysrhythmias (Ott et al., 1997), congestive heart failure (Qiu et al., 2006) and hip fracture (Friedman et al., 2010). This leads to increased medication use in these individuals in order to treat these morbidities (Ruangritchankul et al., 2020). Compared to individuals without dementia, individuals living with dementia are also more likely to take medications aimed at treating cognitive and psycho-behavioral symptoms (Ruangritchankul et al., 2020). The combination of these many medications leads individuals living with dementia to be at a greater risk of polypharmacy and adverse medication reactions, leading many healthcare workers to be reticent of dispensing more medication to relieve pain (Liao et al., 2023). Healthcare workers are also reportedly concerned about using high doses of medication for moderate to severe pain in case more severe and unpredictable side effects arise (Liao et al., 2023).

CCRS limitations for capturing pain

Since its launch in 2003, CCRS has been a rich data repository used to support quality monitoring, outcome measurement and care planning in continuing care facilities (Hirdes et al., 2013). However, as with any large-scale data system, it has been the object of many evaluations into the quality of the data produced, and its comparability to other data holdings (Hirdes et al.,

2013). In order to ensure data reliability and validity, it is important that the psychometric properties of the data and the potential threats to its quality be evaluated systematically, especially with the growing importance of CCRS for decision-making in care (Hirdes et al., 2013). Notably, concerns have been raised with regards to measurement error being introduced into CCRS data (Hirdes et al., 2013). In the case of pain measurement (i.e., frequency and intensity), it is difficult to capture fluctuations in pain intensity as well as natural pain variability which leads to a great risk of measurement error being introduced into the data (Vigotsky et al., 2021). Researchers suggest that using raw or percentage units to report pain might not accurately represent the subjective nature of pain data (Vigotsky et al., 2021). Furthermore, the data collected using CCRS does not directly translate to directions for absolute or relative (percent) reductions in pain. Pain intensity ratings, which depend on numerical rating scales, are considered unidimensional measurements that are reductionist in nature (Vigotsky et al., 2021). For this reason, the intent to capture pain using the CCRS has been scrutinized due to its disregard of the greater context needed to derive metrics of clinical importance that can lead to care decision making (Vigotsky et al., 2021).

A need for palliative care

An increasing number of older adults are dying in LTC as a result of increased life expectancies making it an opportune setting for palliative care (Cloutier et al., 2021). For instance, the average age of a LTC home resident in Canada is 82 years (Government of Canada, 2015), and approximately 25% of all LTC residents die one year post-admission (Tanuseputro et al., 2015). LTC is palliative in nature and thus requires important discussions between clinicians, residents, and caregivers to ensure goals of care are met (Ersek & Carpenter, 2013). The most common resident wishes at the end of life include dying in a familiar environment, without pain, and in the

company of loved ones (Walther et al., 2022). Pain control at the end of life is typically a top priority for staff who also work to ensure psychological, sociological and spiritual wellbeing (Sholjakova et al., 2018). For this reason, analgesic therapy is individualized at the end of life and requires adaptation to the needs of each resident (Sholjakova et al., 2018).

Analgesics at end-of-life

Current studies suggest that 20% of residents in LTC experiencing pain receive no analgesics (Dowd et al., 2022; Lapane et al., 2013; Lukas et al., 2013). A 2016 study revealed that the pain prevalence in cognitively impaired residents was 14% higher than cognitively unimpaired/slightly impaired residents irrespective of their ability to communicate pain (Bauer et al., 2016). However, in this same study, cognitively unimpaired/slightly impaired residents were almost 10% more likely to have analgesic prescriptions than cognitively impaired residents (Bauer et al., 2016). The opposite was found for antipsychotics wherein cognitively impaired residents were almost 10% more likely to be prescribed antipsychotics than their cognitively unimpaired counterparts. When considering both scheduled and pro re nata medications, the most commonly used analgesics were cyclooxygenase inhibitors (i.e., Metamizol, Paracetamol), followed by topical analgesics (e.g., diclofenac gel) and opioids respectively (Bauer et al., 2016). However, this study did not examine end-of-life care and how cognitive impairment impacted drug dispensing at this stage. When attempting to treat with analgesics at end of life, it is recommended that a multimodal approach be taken, including commencing with mild non-opioid analgesics (Dowd et al., 2022). While acetaminophen is the most commonly distributed non-opioid analgesic in LTC, it is not recommended for end-of-life care (Schüchen et al., 2018). NSAIDs, flupirtine and dipyrone are typically combined with strong opioids for pain relief at end of life (Schüchen et al., 2018).

Chapter 6: CONCLUSION

6.1 SUMMARY OF FINDINGS

In conclusion, no statistically significant differences were found in the rate of opioids and non-opioids supplied in the last year of life according to dementia status. This is a promising finding in the equal management of pain in LTC. However, residents who scored a 4 on the CPS (indicating moderate impairment) compared to those with a CPS score of 0-1 (indicating intact cognition) had a rate of days supplied opioids that was 41% less (RR=0.59; 95% CI= 0.48-0.74, $p<0.0001$) among residents who received an analgesic for at least one day. This potentially points to a difference in prescribing practices between residents with varying degrees of cognitive impairment and may be absorbing the effects of a dementia diagnosis since the two variables are highly collinear. Further research is needed to investigate prescribing patterns for varying CPS scores.

6.2 LIMITATIONS

Although our study has many strengths such as a large sample size and validated algorithms that define dementia, pain, and many of our covariates, certain limitations warrant consideration. Notably, we did not extensively explore prescriber characteristics. Meanwhile, the literature has shown that prescriber attributes can impact prescription patterns in LTC (van Buul et al., 2014). These attributes include physician specialty, personal beliefs, and routine regarding the prescription of medication (Arnold et al., 2021; Joyce et al., n.d.). For this reason, we encourage future research to explore the impact of physician attributes on prescribing patterns for pain management at the end of life.

Furthermore, health administrative data is most commonly criticized for potential issues with the accuracy of billing codes to classify diagnoses (Johnson & Nelson, 2013). Coding accuracy can greatly vary according to the data source, as well as the condition, procedure, and disease definitions (Johnson & Nelson, 2013). Coding accuracy can also suffer as a result of clerical error, issues with code precision and omission of codes by billing or coding staff due to oversight or perceived irrelevance (Johnson & Nelson, 2013). The CCRS data in LTC settings has been shown to be consistently high in clerical and measurement errors wherein test scores can differ from true scores for residents being assessed (Hirdes et al., 2013). Furthermore, RAI-MDS assessments are not completed at discharge which negatively impacts researchers' abilities to study changes in patient health statuses from entry into- and exit from LTC (Hirdes et al., 2013). Ascertainment bias may also be prevalent in MDS data as a result of differences in abilities to measure complex resident characteristics such as pain and depression in cognitively impaired residents (Hirdes et al., 2013). In this case, diligent staff members may assess higher rates of pain than their less diligent counterparts (Hirdes et al., 2013). The pain quality indicator has been shown to be systematically biased depending on facility characteristics (i.e., pain scores are reported as being lower in high quartile facilities and higher in low quartile facilities) (Hutchinson et al., 2010). Furthermore, for the context of this study, it is important to note that there is no standardized code for the reporting of chronic pain using RAI-MDS data. This meant that our team had to create a MDS chronic pain definition based on pain severity and duration; keeping in line with the WHO's definition of chronic pain described above. This said, RAI instruments are subject to extensive ongoing testing to establish and improve reliability and validity through tests of inter-reliability and internal consistency (Hirdes et al., 2013).

6.3 AREAS OF FUTURE RESEARCH

There are many opportunities for future research in the context of pain management for residents in LTC. Notably, there is a need for a more standardized approach to pain assessment protocols in this environment, especially for residents living with dementia experiencing aphasia or any other language disorder or speech impediment preventing the communication of pain. Timely and adequate pain assessment is a cornerstone to optimal pain management (Fink, 2000). Current barriers to implementing standardized pain assessments protocols in LTC include resistance to change by nursing staff and communication breakdowns across professions (Gallant et al., 2020). Future research should consider investigating this resistance to change by interviewing nursing staff and personal support workers on ways to better support them as they care for residents while navigating transitional protocols. Future research could also be dedicated to understanding the communication breakdown between LTC staff and healthcare providers as they collaborate to build and improve resident care plans. Furthermore, a recent integrative review by Pu et al. demonstrated that family members play an important role in resident pain assessments but have difficulty contributing to the process due to a lack of communication with healthcare providers (Pu et al., 2022). For this reason, more research is also required on how to better highlight the role of family and friends in their understanding and communication of residents' pain signaling, and how to engage these individuals by recognizing them as active members of their loved ones' care teams.

6.4 INTERDISCIPLINARITY OF STUDY

The central focus of this study involved both residents living with dementia and their pain management through the timely administration of analgesics at the end of life. As a result, the

present study incorporated gerontology and pharmacology to better understand the role of dementia status in older adults residing in LTC and the administration of pain medication in their last year of life. The field of gerontology is interdisciplinary in nature given its focus on the mental, physical and social wellbeing of older adults (College of Public Health, n.d.) that calls upon disciplines such as psychology, social science and medicine. For this reason, we invited Dr. Arne Stinchcombe, an associate professor of psychology, and Dr. Benoît Robert, seniors' health, and palliative medicine specialist to advise the study in order to have a well-rounded and interdisciplinary perspective of chronic pain. By employing the expertise of these specialists, combined with Dr. Amy Hsu's expertise in epidemiology and Dr. Annie Robitaille's expertise in frailty-informed care, we created an environment for rich interdisciplinary exchange. The findings from this study will help to inform our understanding of pain management for LTC residents living with dementia from gerontological and pharmacological standpoints.

REFERENCES

Achterberg, W. P., Erdal, A., Husebo, B. S., Kunz, M., & Lautenbacher, S. (2021). Are Chronic Pain Patients with Dementia Being Undermedicated? *Journal of Pain Research*, *14*, 431–439. https://doi.org/10.2147/JPR.S239321

Achterberg, W. P., Gambassi, G., Finne-Soveri, H., Liperoti, R., Noro, A., Frijters, D. H. M., Cherubini, A., Dell'Aquila, G., & Ribbe, M. W. (2010). Pain in European long-term care facilities: Cross-national study in Finland, Italy and The Netherlands. *Pain*, *148*(1), 70–74. https://doi.org/10.1016/j.pain.2009.10.008

Ali, A., Arif, A. W., Bhan, C., Kumar, D., Malik, M. B., Sayyed, Z., Akhtar, K. H., & Ahmad, M. Q. (n.d.). Managing Chronic Pain in the Elderly: An Overview of the Recent Therapeutic Advancements. *Cureus*, *10*(9), e3293. https://doi.org/10.7759/cureus.3293

Anderson, T. S., Xu, E., Whitaker, E., & Steinman, M. A. (2019). A systematic review of methods for determining cross-sectional active medications using pharmacy databases. *Pharmacoepidemiology and Drug Safety*, *28*(4), 403–421. https://doi.org/10.1002/pds.4706

Aprahamian, I., Aricó de Almeida, G. V., de Vasconcellos Romanin, C. F., Gomes Caldas, T., Antunes Yoshitake, N. T., Bataglini, L., Mori Lin, S., Alves Pereira, A., Nara Alegrini Longhi, L., Mamoni, R. L., & Martinelli, J. E. (2019). Frailty Could Predict Death in Older Adults after Admissionat Emergency Department? A 6-month Prospective Study from a Middle-Income Country. *The Journal of Nutrition, Health & Aging*, *23*(7), 641–647. https://doi.org/10.1007/s12603-019-1207-9

Arnold, C., Koetsenruijter, J., Forstner, J., Peters-Klimm, F., & Wensing, M. (2021). Influence of physician networks on prescribing a new ingredient combination in heart failure: A

longitudinal claim data-based study. *Implementation Science*, *16*(1), 84. https://doi.org/10.1186/s13012-021-01150-y

Atee, M., Hoti, K., Parsons, R., & Hughes, J. D. (n.d.). Pain Assessment in Dementia: Evaluation of a Point-of-Care Technological Solution. *Journal of Alzheimer's Disease*, *60*(1), 137–150. https://doi.org/10.3233/JAD-170375

Auret, K., & Schug, S. A. (2005). Underutilisation of opioids in elderly patients with chronic pain: Approaches to correcting the problem. *Drugs & Aging*, *22*(8), 641–654. https://doi.org/10.2165/00002512-200522080-00002

Barnsteiner, J. H. (2008). Medication Reconciliation. In R. G. Hughes (Ed.), *Patient Safety and Quality: An Evidence-Based Handbook for Nurses*. Agency for Healthcare Research and Quality (US). http://www.ncbi.nlm.nih.gov/books/NBK2648/

Batista, R., Prud'homme, D., Rhodes, E., Hsu, A., Talarico, R., Reaume, M., Guérin, E., Bouchard, L., Desaulniers, J., Manuel, D., & Tanuseputro, P. (2021). Quality and Safety in Long-Term Care in Ontario: The Impact of Language Discordance. *Journal of the American Medical Directors Association*, *22*(10), 2147-2153.e3. https://doi.org/10.1016/j.jamda.2020.12.007

Bauer, U., Pitzer, S., Schreier, M. M., Osterbrink, J., Alzner, R., & Iglseder, B. (2016). Pain treatment for nursing home residents differs according to cognitive state – a cross-sectional study. *BMC Geriatrics*, *16*(1), 124. https://doi.org/10.1186/s12877-016-0295-1

Bausewein, C., Hodiamont, F., Berges, N., Ullrich, A., Gerlach, C., Oechsle, K., Pauli, B., Weber, J., Stiel, S., Schneider, N., Krumm, N., Rolke, R., Gebel, C., Jansky, M., Nauck, F., Wedding, U., van Oorschot, B., Roch, C., Werner, L., … for the PallPan Study Group. (2022). National strategy for palliative care of severely ill and dying people and their

relatives in pandemics (PallPan) in Germany—Study protocol of a mixed-methods project. *BMC Palliative Care*, *21*(1), 10. https://doi.org/10.1186/s12904-021-00898-w

Borsheski, R., & Johnson, Q. L. (2014). Pain Management in the Geriatric Population. *Missouri Medicine*, *111*(6), 508–511.

Boulanger, A., Clark, A. J., Squire, P., Cui, E., & Horbay, G. L. A. (2007). Chronic Pain in Canada: Have We Improved Our Management of Chronic Noncancer Pain? *Pain Research and Management*, *12*, 39–47. https://doi.org/10.1155/2007/762180

Boyd, M., Frey, R., Balmer, D., Robinson, J., McLeod, H., Foster, S., Slark, J., & Gott, M. (2019). End of life care for long-term care residents with dementia, chronic illness and cancer: Prospective staff survey. *BMC Geriatrics*, *19*(1), 137. https://doi.org/10.1186/s12877-019-1159-2

Brink, P., & Kelley, M. L. (2015). Death in Long-term Care: A Brief Report Examining Factors Associated with Death within 31 Days of Assessment. *Palliative Care*, *9*, 1–5. https://doi.org/10.4137/PCRT.S20347

Bronskill, S. E., Gill, S. S., Paterson, J. M., Bell, C. M., Anderson, G. M., & Rochon, P. A. (2012). Exploring Variation in Rates of Polypharmacy Across Long Term Care Homes. *Journal of the American Medical Directors Association*, *13*(3), 309.e15-309.e21. https://doi.org/10.1016/j.jamda.2011.07.001

Burrows, A. B., Morris, J. N., Simon, S. E., Hirdes, J. P., & Phillips, C. (2000). Development of a minimum data set-based depression rating scale for use in nursing homes. *Age and Ageing*, *29*(2), 165–172. https://doi.org/10.1093/ageing/29.2.165

Canada, E. and S. D. (2016, October 3). *Government of Canada—Action for Seniors report* [Research]. https://www.canada.ca/en/employment-social-

development/programs/seniors-action-report.html

Canada, H. (2003, April 3). *Long-term facilities-based care* [Education and awareness]. https://www.canada.ca/en/health-canada/services/home-continuing-care/long-term-facilities-based-care.html

Canadian Institute for Health Information. (2021). *Pandemic experience in the long-term care sector: How does Canada compare with other countries?* CIHI.

CDC. (2022, October 6). *Commonly Used Terms | Opioids | CDC*. https://www.cdc.gov/opioids/basics/terms.html

Chappell, V., Kirkham, J., & Seitz, D. P. (2022). Association Between Long-Term Care Facility Staffing Levels and Antipsychotic Use in US Long-Term Care Facilities. *Journal of the American Medical Directors Association*, *23*(11), 1787-1792.e1. https://doi.org/10.1016/j.jamda.2022.06.029

Cheung, E. N. M., Benjamin, S., Heckman, G., Ho, J. M.-W., Lee, L., Sinha, S. K., & Costa, A. P. (2018). Clinical characteristics associated with the onset of delirium among long-term nursing home residents. *BMC Geriatrics*, *18*(1), 39. https://doi.org/10.1186/s12877-018-0733-3

CIHI. (n.d.-a). *Continuing Care Metadata*. Retrieved November 26, 2022, from https://www.cihi.ca/en/continuing-care-metadata

CIHI. (n.d.-b). *Dementia in hospitals | CIHI*. Retrieved August 1, 2023, from https://www.cihi.ca/en/dementia-in-canada/dementia-care-across-the-health-system/dementia-in-hospitals

CIHI. (2022). *Discharge Abstract Database metadata (DAD) | CIHI*. https://www.cihi.ca/en/discharge-abstract-database-metadata-dad

CIHI. (n.d.c). *Manuals and Forms for Continuing and Residential Care interRAI Assessors | CIHI*. https://www.cihi.ca/en/manuals-and-forms-for-continuing-and-residential-care-interrai-assessors

Cloutier, D., Stajduhar, K. I., Roberts, D., Dujela, C., & Roland, K. (2021). 'Bare-bones' to 'silver linings': Lessons on integrating a palliative approach to care in long-term care in Western Canada. *BMC Health Services Research*, *21*(1), 610. https://doi.org/10.1186/s12913-021-06606-x

Coelho, A., Parola, V., Escobar-Bravo, M., & Apóstolo, J. (2016). Comfort experience in palliative care: A phenomenological study. *BMC Palliative Care*, *15*(1), 71. https://doi.org/10.1186/s12904-016-0145-0

Cohen, L. W., Zimmerman, S., Reed, D., Sloane, P. D., Beeber, A. S., Washington, T., Cagle, J. G., & Gwyther, L. P. (2014). Dementia in Relation to Family Caregiver Involvement and Burden in Long-Term Care. *Journal of Applied Gerontology*, *33*(5), 522–540. https://doi.org/10.1177/0733464813505701

College of Public Health. (n.d.). *What Is Gerontology?* College of Public Health UGA. https://publichealth.uga.edu/research/research-institutes/institute-of-gerontology/about/what-is-gerontology/

Cooper, J. A., Cadogan, C. A., Patterson, S. M., Kerse, N., Bradley, M. C., Ryan, C., & Hughes, C. M. (2015). Interventions to improve the appropriate use of polypharmacy in older people: A Cochrane systematic review. *BMJ Open*, *5*(12), e009235. https://doi.org/10.1136/bmjopen-2015-009235

Corsinovi, L., Martinelli, E., Fonte, G., Astengo, M., Sona, A., Gatti, A., Massaia, M., Bo, M., Zanocchi, M., Michelis, G., Isaia, G., & Molaschi, M. (2009). Efficacy of

oxycodone/acetaminophen and codeine/acetaminophen vs. Conventional therapy in elderly women with persistent, moderate to severe osteoarthritis-related pain. *Archives of Gerontology and Geriatrics*, *49*(3), 378–382. https://doi.org/10.1016/j.archger.2008.12.003

Dagnino, A. P. A., & Campos, M. M. (2022). Chronic Pain in the Elderly: Mechanisms and Perspectives. *Frontiers in Human Neuroscience*, *16*. https://www.frontiersin.org/articles/10.3389/fnhum.2022.736688

Dalhousie University. (n.d.). Palliative Interventions. *End-of-Life Law and Policy in Canada*. Retrieved February 1, 2023, from http://eol.law.dal.ca/?page_id=283

Domenichiello, A. F., & Ramsden, C. E. (2019). The silent epidemic of chronic pain in older adults. *Progress in Neuro-Psychopharmacology & Biological Psychiatry*, *93*, 284–290. https://doi.org/10.1016/j.pnpbp.2019.04.006

Dorfman, R., London, Z., Metias, M., Kabakchiev, B., Mukerjee, G., & Moser, A. (2020). Individualized Medication Management in Ontario Long-Term Care Clinical Impact on Management of Depression, Pain, and Dementia. *Journal of the American Medical Directors Association*, *21*(6), 823-829.e5. https://doi.org/10.1016/j.jamda.2020.04.009

Dowd, L. A., Cross, A. J., Veal, F., Ooi, C. E., & Bell, J. S. (2022). A Systematic Review of Interventions to Improve Analgesic Use and Appropriateness in Long-Term Care Facilities. *Journal of the American Medical Directors Association*, *23*(1), 33-43.e3. https://doi.org/10.1016/j.jamda.2021.09.024

Dueñas, M., Ojeda, B., Salazar, A., Mico, J. A., & Failde, I. (2016). A review of chronic pain impact on patients, their social environment and the health care system. *Journal of Pain Research*, *9*, 457–467. https://doi.org/10.2147/JPR.S105892

Edvardsson, D., Sandman, P.-O., Nay, R., & Karlsson, S. (2009). Predictors of job strain in residential dementia care nursing staff. *Journal of Nursing Management*, *17*(1), 59–65. https://doi.org/10.1111/j.1365-2834.2008.00891.x

Egan, M., & Cornally, N. (2013). Identifying barriers to pain management in long-term care. *Nursing Older People*, *25*, 25–31. https://doi.org/10.7748/nop2013.09.25.7.25.e455

Eisenmann, Y., Golla, H., Schmidt, H., Voltz, R., & Perrar, K. M. (2020). Palliative Care in Advanced Dementia. *Frontiers in Psychiatry*, *11*. https://www.frontiersin.org/articles/10.3389/fpsyt.2020.00699

Ersek, M., & Carpenter, J. G. (2013). Geriatric Palliative Care in Long-Term Care Settings with a Focus on Nursing Homes. *Journal of Palliative Medicine*, *16*(10), 1180–1187. https://doi.org/10.1089/jpm.2013.9474

Feldt, K. S. (2004). The Complexity of Managing Pain for Frail Elders. *Journal of the American Geriatrics Society*, *52*(5), 840–841. https://doi.org/10.1111/j.1532-5415.2004.52228.x

Ferrell, B. A. (1995). Pain evaluation and management in the nursing home. *Annals of Internal Medicine*, *123*(9), 681–687. https://doi.org/10.7326/0003-4819-123-9-199511010-00007

Fink, R. (2000). Pain assessment: The cornerstone to optimal pain management. *Proceedings (Baylor University. Medical Center)*, *13*(3), 236–239.

Foebel, A. D., Hirdes, J. P., Heckman, G. A., Kergoat, M.-J., Patten, S., & Marrie, R. A. (2013). Diagnostic data for neurological conditions in interRAI assessments in home care, nursing home and mental health care settings: A validity study. *BMC Health Services Research*, *13*(1), 457. https://doi.org/10.1186/1472-6963-13-457

Friedman, S. M., Menzies, I. B., Bukata, S. V., Mendelson, D. A., & Kates, S. L. (2010). Dementia and Hip Fractures. *Geriatric Orthopaedic Surgery & Rehabilitation*, *1*(2), 52–

62. https://doi.org/10.1177/2151458510389463

Gallant, N. L., Peckham, A., Marchildon, G., Hadjistavropoulos, T., Roblin, B., & Stopyn, R. J. N. (2020). Provincial legislative and regulatory standards for pain assessment and management in long-term care homes: A scoping review and in-depth case analysis. *BMC Geriatrics*, *20*(1), 458. https://doi.org/10.1186/s12877-020-01758-7

Gignac, M. A. M., Davis, A. M., Hawker, G., Wright, J. G., Mahomed, N., Fortin, P. R., & Badley, E. M. (2006). "What do you expect? You're just getting older": A comparison of perceived osteoarthritis-related and aging-related health experiences in middle- and older-age adults. *Arthritis and Rheumatism*, *55*(6), 905–912. https://doi.org/10.1002/art.22338

Government of Canada, S. C. (2021, September 16). *The Daily—A profile of nursing and residential care facilities, 2019*. https://www150.statcan.gc.ca/n1/daily-quotidien/210916/dq210916c-eng.htm

Government of Ontario. (2023). *Get coverage for prescription drugs | ontario.ca*. https://www.ontario.ca/page/get-coverage-prescription-drugs

Government of Ontario, M. of H. and L.-T. C. (n.d.-a). *Example—Programs and Services—Public Information—MOHLTC*. Government of Ontario, Ministry of Health and Long-Term Care. Retrieved February 20, 2023, from https://www.health.gov.on.ca/en/pro/programs/ohip/

Government of Ontario, M. of H. and L.-T. C. (n.d.-b). *The Ontario Drug Benefit (ODB) Program—Public Information—MOH*. Government of Ontario, Ministry of Health and Long-Term Care. Retrieved February 10, 2022, from https://www.health.gov.on.ca/en/public/programs/drugs/programs/odb/opdp_over_counte

r.aspx

Grissinger, M. (2016). From the Hospital to Long-Term Care: Protect Vulnerable Patients During Handoff. *Pharmacy and Therapeutics*, *41*(4), 204–205.

Gudmannsdottir, G. D., & Halldorsdottir, S. (2009). Primacy of existential pain and suffering in residents in chronic pain in nursing homes: A phenomenological study. *Scandinavian Journal of Caring Sciences*, *23*(2), 317–327. https://doi.org/10.1111/j.1471-6712.2008.00625.x

Guliani, H., Hadjistavropoulos, T., Jin, S., & Lix, L. M. (2021). Pain-related health care costs for long-term care residents. *BMC Geriatrics*, *21*(1), 552. https://doi.org/10.1186/s12877-021-02424-2

Harasym, P., Brisbin, S., Afzaal, M., Sinnarajah, A., Venturato, L., Quail, P., Kaasalainen, S., Straus, S. E., Sussman, T., Virk, N., & Holroyd-Leduc, J. (2020). Barriers and facilitators to optimal supportive end-of-life palliative care in long-term care facilities: A qualitative descriptive study of community-based and specialist palliative care physicians' experiences, perceptions and perspectives. *BMJ Open*, *10*(8), e037466. https://doi.org/10.1136/bmjopen-2020-037466

Hartmaier, S. L., Sloane, P. D., Guess, H. A., Koch, G. G., Mitchell, C. M., & Phillips, C. D. (1995). Validation of the Minimum Data Set Cognitive Performance Scale: Agreement with the Mini-Mental State Examination. *The Journals of Gerontology. Series A, Biological Sciences and Medical Sciences*, *50*(2), M128-133. https://doi.org/10.1093/gerona/50a.2.m128

Hirdes, J. P., Poss, J. W., Caldarelli, H., Fries, B. E., Morris, J. N., Teare, G. F., Reidel, K., & Jutan, N. (2013). An evaluation of data quality in Canada's Continuing Care Reporting

System (CCRS): Secondary analyses of Ontario data submitted between 1996 and 2011. *BMC Medical Informatics and Decision Making*, *13*(1), 27. https://doi.org/10.1186/1472-6947-13-27

Hutchinson, A. M., Milke, D. L., Maisey, S., Johnson, C., Squires, J. E., Teare, G., & Estabrooks, C. A. (2010). The Resident Assessment Instrument-Minimum Data Set 2.0 quality indicators: A systematic review. *BMC Health Services Research*, *10*(1), 166. https://doi.org/10.1186/1472-6963-10-166

Iaboni, A., Campitelli, M. A., Bronskill, S. E., Diong, C., Kumar, M., Maclagan, L. C., Gomes, T., Tadrous, M., & Maxwell, C. J. (2019). Time trends in opioid prescribing among Ontario long-term care residents: A repeated cross-sectional study. *CMAJ Open*, *7*(3), E582–E589. https://doi.org/10.9778/cmajo.20190052

Iacono, A., Campitelli, M. A., Bronskill, S. E., Hogan, D. B., Iaboni, A., Maclagan, L. C., Gomes, T., Tadrous, M., Evans, C., Gruneir, A., Guan, Q., Hadjistavropoulos, T., Cotton, C., Gill, S. S., Seitz, D. P., Ho, J., & Maxwell, C. J. (2022). Correlates of Opioid Use Among Ontario Long-Term Care Residents and Variation by Pain Frequency and Intensity: A Cross-sectional Analysis. *Drugs & Aging*, *39*(10), 811–827. https://doi.org/10.1007/s40266-022-00972-9

Information and Privacy Commissioner of Ontario. (2023). *Decisions*. IPC. https://decisions.ipc.on.ca/ipc-cipvp/orders/en/item/131640/index.do

Jensen-Dahm, C., Gasse, C., Astrup, A., Mortensen, P. B., & Waldemar, G. (2015). Frequent use of opioids in patients with dementia and nursing home residents: A study of the entire elderly population of Denmark. *Alzheimer's & Dementia*, *11*(6), 691–699. https://doi.org/10.1016/j.jalz.2014.06.013

Johnson, E. K., & Nelson, C. P. (2013). Utility and Pitfalls in the Use of Administrative Databases for Outcomes Assessment. *The Journal of Urology*, *190*(1), 17–18. https://doi.org/10.1016/j.juro.2013.04.048

Jones, A. (n.d.). *Chronic Pain Management and Canadian Public Health Insurance: Do We Need More Comprehensive Health Care?* UBC Medical Journal. https://ubcmj.med.ubc.ca/ubcmj-volume-7-issue-1/chronic-pain-management-and-canadian-public-health-insurance-do-we-need-more-comprehensive-health-care/chronic-pain-management-and-canadian-public-health-insurance-do-we-need-more-comprehensive-health-care/

Joyce, G. F., Carrera, M., Goldman, D. P., & Sood, N. (n.d.). PHYSICIAN PRESCRIBING BEHAVIOR AND ITS IMPACT ON PATIENT-LEVEL OUTCOMES. *The American Journal of Managed Care*, *17*(12), e462.

King, N. B., & Fraser, V. (2013). Untreated Pain, Narcotics Regulation, and Global Health Ideologies. *PLoS Medicine*, *10*(4), e1001411. https://doi.org/10.1371/journal.pmed.1001411

Knopp-Sihota, J. A., MacGregor, T., Reeves, J. T. H., Kennedy, M., & Saleem, A. (2022). Management of Chronic Pain in Long-Term Care: A Systematic Review and Meta-Analysis. *Journal of the American Medical Directors Association*, *23*(9), 1507-1516.e0. https://doi.org/10.1016/j.jamda.2022.04.008

Kontos, P. C., Miller, K.-L., & Mitchell, G. J. (2010). Neglecting the Importance of the Decision Making and Care Regimes of Personal Support Workers: A Critique of Standardization of Care Planning Through the RAI/MDS. *The Gerontologist*, *50*(3), 352–362. https://doi.org/10.1093/geront/gnp165

Kovach, C. R., Griffie, J., Muchka, S., Noonan, P. E., & Weissman, D. E. (2000). Nurses' perceptions of pain assessment and treatment in the cognitively impaired elderly. It's not a guessing game. *Clinical Nurse Specialist CNS*, *14*(5), 215–220. https://doi.org/10.1097/00002800-200009000-00011

Krebs, E. E., Gravely, A., Nugent, S., Jensen, A. C., DeRonne, B., Goldsmith, E. S., Kroenke, K., Bair, M. J., & Noorbaloochi, S. (2018). Effect of Opioid vs Nonopioid Medications on Pain-Related Function in Patients With Chronic Back Pain or Hip or Knee Osteoarthritis Pain: The SPACE Randomized Clinical Trial. *JAMA*, *319*(9), 872–882. https://doi.org/10.1001/jama.2018.0899

Lapane, K. L., Quilliam, B. J., Chow, W., & Kim, M. S. (2013). Pharmacologic Management of Non-Cancer Pain Among Nursing Home Residents. *Journal of Pain and Symptom Management*, *45*(1), 33–42. https://doi.org/10.1016/j.jpainsymman.2011.12.285

Lau, J., Mazzotta, P., Whelan, C., Abdelaal, M., Clarke, H., Furlan, A. D., Smith, A., Husain, A., Fainsinger, R., Hui, D., Sunderji, N., & Zimmermann, C. (2022). Opioid safety recommendations in adult palliative medicine: A North American Delphi expert consensus. *BMJ Supportive & Palliative Care*, *12*(1), 81–90. https://doi.org/10.1136/bmjspcare-2021-003178

Leong, I. Y.-O., & Nuo, T. H. (2007). Prevalence of Pain in Nursing Home Residents With Different Cognitive and Communicative Abilities. *The Clinical Journal of Pain*, *23*(2), 119. https://doi.org/10.1097/01.ajp.0000210951.01503.3b

Liao, Y.-J., Jao, Y.-L., Berish, D., Hin, A. S., Wangi, K., Kitko, L., Mogle, J., & Boltz, M. (2023). A Systematic Review of Barriers and Facilitators of Pain Management in Persons with Dementia. *The Journal of Pain*. https://doi.org/10.1016/j.jpain.2022.12.014

Lichtner, V., Dowding, D., Allcock, N., Keady, J., Sampson, E. L., Briggs, M., Corbett, A., James, K., Lasrado, R., Swarbrick, C., & Closs, S. J. (2016). The assessment and management of pain in patients with dementia in hospital settings: A multi-case exploratory study from a decision making perspective. *BMC Health Services Research*, *16*(1), 427. https://doi.org/10.1186/s12913-016-1690-1

Lin, J. J., Alfandre, D., & Moore, C. (2007). Physician Attitudes Toward Opioid Prescribing for Patients With Persistent Noncancer Pain. *The Clinical Journal of Pain*, *23*(9), 799–803. https://doi.org/10.1097/AJP.0b013e3181565cf1

Lintula, E., Tiihonen, M., Taipale, H., Tolppanen, A.-M., Tanskanen, A., Tiihonen, J., Hartikainen, S., & Hamina, A. (2020). Opioid Use After Hospital Care due to Hip Fracture Among Community-Dwelling Persons With and Without Alzheimer's Disease. *Drugs & Aging*, *37*(3), 193–203. https://doi.org/10.1007/s40266-019-00734-0

Lisa, B., & Jessica, H. (2018). Evidence synthesis - The opioid crisis in Canada: A national perspective. *Health Promotion and Chronic Disease Prevention in Canada : Research, Policy and Practice*, *38*(6), 224–233.

Liu, E., Dyer, S. M., Whitehead, C., O'Donnell, L. K., Gnanamanickam, E. S., Harrison, S. L., Milte, R., & Crotty, M. (2019). Patterns of medication prescription by dementia diagnosis in Australian nursing home residents: A cross-sectional study. *Journal of Pharmacy Practice and Research*, *49*(1), 33–40. https://doi.org/10.1002/jppr.1457

Lukas, A., Mayer, B., Fialová, D., Topinkova, E., Gindin, J., Onder, G., Bernabei, R., Nikolaus, T., & Denkinger, M. D. (2013). Treatment of Pain in European Nursing Homes: Results from the Services and Health for Elderly in Long TERm Care (SHELTER) Study. *Journal of the American Medical Directors Association*, *14*(11), 821–831.

https://doi.org/10.1016/j.jamda.2013.04.009

Lundin, E., & Godskesen, T. E. (2021). End-of-life care for people with advanced dementia and pain: A qualitative study in Swedish nursing homes. *BMC Nursing*, *20*(1), 48. https://doi.org/10.1186/s12912-021-00566-7

Mailis, A., & Lakha, S. F. (n.d.). From (Ontario Ministry of Health and Long-Term Care) policy to implementation: A retrospective look at a community-based patient-centered model of care for chronic pain. *Canadian Journal of Pain*, *3*(1), 114–125. https://doi.org/10.1080/24740527.2019.1614880

Martin, L., Hirdes, J. P., Fries, B. E., & Smith, T. F. (2007). Development and Psychometric Properties of an Assessment for Persons With Intellectual Disability—The interRAI ID. *Journal of Policy and Practice in Intellectual Disabilities*, *4*(1), 23–29. https://doi.org/10.1111/j.1741-1130.2006.00094.x

Masman, A. D., van Dijk, M., Tibboel, D., Baar, F. P. M., & Mathôt, R. A. A. (2015). Medication use during end-of-life care in a palliative care centre. *International Journal of Clinical Pharmacy*, *37*(5), 767–775. https://doi.org/10.1007/s11096-015-0094-3

Masnoon, N., Shakib, S., Kalisch-Ellett, L., & Caughey, G. E. (2017). What is polypharmacy? A systematic review of definitions. *BMC Geriatrics*, *17*(1), 230. https://doi.org/10.1186/s12877-017-0621-2

McCracken, J. A., Nakeshbandi, M., Arace, J., Riley, W. J., & Sharma, R. (2020). COVID-19 related deaths in an urban academic medical center in Brooklyn – a descriptive case series. *Translational Medicine Communications*, *5*(1), 12. https://doi.org/10.1186/s41231-020-00065-y

Mehta, H. B., Kuo, Y.-F., Raji, M., Li, S., Westra, J., & Goodwin, J. S. (2021). Time Trends in

Opioid Use by Dementia Severity in Long-Term Care Nursing Home Residents. *Journal of the American Medical Directors Association*, *22*(1), 124-131.e1. https://doi.org/10.1016/j.jamda.2020.04.029

Merriam-Webster. (2022). *Definition of ANALGESIC*. https://www.merriam-webster.com/dictionary/analgesic

Ministry of Long-Term Care. (2021). *Ontario Strengthening Medication Safety in Long-Term Care Homes*. News.Ontario.Ca. https://news.ontario.ca/en/release/60926/ontario-strengthening-medication-safety-in-long-term-care-homes

Morris, J. N., Fries, B. E., Mehr, D. R., Hawes, C., Phillips, C., Mor, V., & Lipsitz, L. A. (1994). MDS Cognitive Performance Scale©. *Journal of Gerontology*, *49*(4), M174–M182. https://doi.org/10.1093/geronj/49.4.M174

Moulin, D. E., Clark, A. J., Speechley, M., & Morley-Forster, P. K. (NaN/NaN/NaN). Chronic Pain in Canada—Prevalence, Treatment, Impact and the Role of Opioid Analgesia. *Pain Research and Management*, *7*, 179–184. https://doi.org/10.1155/2002/323085

Mousa, S. A., Khalefa, B. I., Shaqura, M., Al-Madol, M., Treskatsch, S., & Schäfer, M. (2022). Superior control of inflammatory pain by corticotropin-releasing factor receptor 1 via opioid peptides in distinct pain-relevant brain areas. *Journal of Neuroinflammation*, *19*(1), 148. https://doi.org/10.1186/s12974-022-02498-8

Moyle, W., El Saifi, N., Draper, B., Jones, C., Beattie, E., Shum, D., Thalib, L., Mervin, C., & O'Dwyer, S. (2017). Pharmacotherapy of Persons with Dementia in Long-term Care in Australia: A Descriptive Audit of Central Nervous System Medications. *Current Drug Safety*, *12*(2), 95–102. https://doi.org/10.2174/1574886312666170209113203

Muench, U., Jura, M., Samson, Z., Monroe, T., & Spetz, J. (2022). *Prescribing Patterns in*

Nursing Home Residents Living with Dementia by Specialty and Provider Type | Healthforce Center at UCSF. https://healthforce.ucsf.edu/publications/prescribing-patterns-nursing-home-residents-living-dementia

National Institute on Aging. (n.d.-a). *Providing Care and Comfort at the End of Life*. National Institute on Aging. Retrieved November 16, 2022, from https://www.nia.nih.gov/health/providing-comfort-end-life

National Institute on Aging. (n.d.-b). *What Is Dementia? Symptoms, Types, and Diagnosis*. National Institute on Aging. Retrieved November 16, 2022, from https://www.nia.nih.gov/health/what-is-dementia

NEJM. (2022, September 14). *Non-Opioid Analgesics Role in Pain Management*. NEJM Knowledge+. https://knowledgeplus.nejm.org/blog/non-opioid-analgesics-role-in-pain-management/

Neumann-Podczaska, A., Nowak, T., Suwalska, A., Łojko, D., Krzymińska-Siemaszko, R., Kozak-Szkopek, E., & Wieczorowska-Tobis, K. (2016). Analgesic use among nursing homes residents, with and without dementia, in Poland. *Clinical Interventions in Aging*, *11*, 335–340. https://doi.org/10.2147/CIA.S101475

Nicholson, B. (2003). Responsible prescribing of opioids for the management of chronic pain. *Drugs*, *63*(1), 17–32. https://doi.org/10.2165/00003495-200363010-00002

Nilsen, M. K., Sletvold, H., & Olsen, R. M. (2020). 'To give or not to give medication, that is the question.' Healthcare personnel's perceptions of factors affecting pro re nata medication in sheltered housing for older adults—A focus-group interview study. *BMC Health Services Research*, *20*(1), 622. https://doi.org/10.1186/s12913-020-05439-4

Ontario. (n.d.). *Registered Persons Database (RPDB)—Ontario Data Catalogue*. Retrieved

November 26, 2022, from https://data.ontario.ca/dataset/registered-persons-database-rpdb

Ontario. (2022a). *Medication Coverage*. Ontario.Ca. https://www.ontario.ca/page/check-medication-coverage

Ontario. (2022b). *What OHIP covers*. Ontario.Ca. http://www.ontario.ca/page/what-ohip-covers

Ott, A., Breteler, M. M. B., de Bruyne, M. C., van Harskamp, F., Grobbee, D. E., & Hofman, A. (1997). Atrial Fibrillation and Dementia in a Population-Based Study. *Stroke*, *28*(2), 316–321. https://doi.org/10.1161/01.STR.28.2.316

Pendlebury, S. T., & Rothwell, P. M. (2019). Incidence and prevalence of dementia associated with transient ischaemic attack and stroke: Analysis of the population-based Oxford Vascular Study. *The Lancet. Neurology*, *18*(3), 248–258. https://doi.org/10.1016/S1474-4422(18)30442-3

Peralta, T., Castel-Branco, M. M., Reis-Pina, P., Figueiredo, I. V., & Dourado, M. (2022). Prescription trends at the end of life in a palliative care unit: Observational study. *BMC Palliative Care*, *21*, 65. https://doi.org/10.1186/s12904-022-00954-z

Peter A. Winn, M. D. (2010). Palliative Care in LTC: Essentials of Pain Management. *Annals of Long-Term Care*, *18*(9). https://www.hmpgloballearningnetwork.com/site/altc/content/palliative-care-ltc-essentials-pain-management

Pringle, J., Mellado, A. S. A. V., Haraldsdottir, E., Kelly, F., & Hockley, J. (2021). Pain assessment and management in care homes: Understanding the context through a scoping review. *BMC Geriatrics*, *21*(1), 431. https://doi.org/10.1186/s12877-021-02333-4

Prostran, M., Vujović, K. S., Vučković, S., Medić, B., Srebro, D., Divac, N., Stojanović, R., Vujović, A., Jovanović, L., Jotić, A., & Cerovac, N. (2016). Pharmacotherapy of Pain in

the Older Population: The Place of Opioids. *Frontiers in Aging Neuroscience*, *8*. https://www.frontiersin.org/articles/10.3389/fnagi.2016.00144

Przekop, P., Haviland, M. G., Oda, K., & Morton, K. R. (2015). Prevalence and correlates of pain interference in older adults: Why treating the whole body and mind is necessary. *Journal of Bodywork and Movement Therapies*, *19*(2), 217–225. https://doi.org/10.1016/j.jbmt.2014.04.011

Pu, L., Chen, H., Jones, C., & Moyle, W. (2022). Family Involvement in Pain Management for People Living With Dementia: An Integrative Review. *Journal of Family Nursing*, 10748407221114502. https://doi.org/10.1177/10748407221114502

Qiu, C., Winblad, B., Marengoni, A., Klarin, I., Fastbom, J., & Fratiglioni, L. (2006). Heart Failure and Risk of Dementia and Alzheimer Disease: A Population-Based Cohort Study. *Archives of Internal Medicine*, *166*(9), 1003–1008. https://doi.org/10.1001/archinte.166.9.1003

Queremel Milani, D. A., & Davis, D. D. (2022). Pain Management Medications. In *StatPearls*. StatPearls Publishing. http://www.ncbi.nlm.nih.gov/books/NBK560692/

Ramage-Morin, P. L. (2008). Chronic pain in Canadian seniors. *Health Reports*, *19*(1), 37–52.

Reeve, E., Gnjidic, D., Long, J., & Hilmer, S. (2015). A systematic review of the emerging definition of 'deprescribing' with network analysis: Implications for future research and clinical practice. *British Journal of Clinical Pharmacology*, *80*(6), 1254–1268. https://doi.org/10.1111/bcp.12732

Reid, M. C., O'Neil, K. W., Dancy, J., Berry, C. A., & Stowell, S. A. (2015). Pain Management in Long-Term Care Communities: A Quality Improvement Initiative. *The Annals of Long-Term Care : The Official Journal of the American Medical Directors Association*,

23(2), 29–35.

Robitaille, A., Piccinin, A. M., Hofer, S. M., Johansson, B., & Muniz Terrera, G. (2018). An examination of the heterogeneity in the pattern and association between rates of change in grip strength and global cognition in late life. A multivariate growth mixture modelling approach. *Age and Ageing*, *47*(5), 692–697. https://doi.org/10.1093/ageing/afy048

Rochon, P. A., Stukel, T. A., Bronskill, S. E., Gomes, T., Sykora, K., Wodchis, W. P., Hillmer, M., Kopp, A., Gurwitz, J. H., & Anderson, G. M. (2007). Variation in Nursing Home Antipsychotic Prescribing Rates. *Archives of Internal Medicine*, *167*(7), 676–683. https://doi.org/10.1001/archinte.167.7.676

Roitto, H.-M., Kautiainen, H., Aalto, U. L., Öhman, H., Laurila, J., & Pitkälä, K. H. (2019). Fourteen-Year Trends in the Use of Psychotropic Medications, Opioids, and Other Sedatives Among Institutionalized Older People in Helsinki, Finland. *Journal of the American Medical Directors Association*, *20*(3), 305–311. https://doi.org/10.1016/j.jamda.2018.12.022

Rosenblum, A., Marsch, L. A., Joseph, H., & Portenoy, R. K. (2008). Opioids and the Treatment of Chronic Pain: Controversies, Current Status, and Future Directions. *Experimental and Clinical Psychopharmacology*, *16*(5), 405–416. https://doi.org/10.1037/a0013628

Ruangritchankul, S., Peel, N. M., Hanjani, L. S., & Gray, L. C. (2020). Drug related problems in older adults living with dementia. *PLoS ONE*, *15*(7), e0236830. https://doi.org/10.1371/journal.pone.0236830

Russell, T. L., Madsen, R. W., Flesner, M., & Rantz, M. J. (2010). Pain Management in Nursing Homes. *Journal of Gerontological Nursing*, *36*(12), 49–56. https://doi.org/10.3928/00989134-20100504-07

Sachs, G. A., Shega, J. W., & Cox-Hayley, D. (2004). Barriers to Excellent End-of-life Care for Patients with Dementia. *Journal of General Internal Medicine*, *19*(10), 1057–1063. https://doi.org/10.1111/j.1525-1497.2004.30329.x

Sandvik, R., Selbaek, G., Kirkevold, O., Aarsland, D., & Husebo, B. S. (2016). Analgesic prescribing patterns in Norwegian nursing homes from 2000 to 2011: Trend analyses of four data samples. *Age and Ageing*, *45*(1), 54–60. https://doi.org/10.1093/ageing/afv184

Sanford, A. M., Orrell, M., Tolson, D., Abbatecola, A. M., Arai, H., Bauer, J. M., Cruz-Jentoft, A. J., Dong, B., Ga, H., Goel, A., Hajjar, R., Holmerova, I., Katz, P. R., Koopmans, R. T. C. M., Rolland, Y., Visvanathan, R., Woo, J., Morley, J. E., & Vellas, B. (2015). An International Definition for "Nursing Home." *Journal of the American Medical Directors Association*, *16*(3), 181–184. https://doi.org/10.1016/j.jamda.2014.12.013

Scherder, E. J. A., Sergeant, J. A., & Swaab, D. F. (2003). Pain processing in dementia and its relation to neuropathology. *The Lancet. Neurology*, *2*(11), 677–686. https://doi.org/10.1016/s1474-4422(03)00556-8

Schofield, P., Dunham, M., Martin, D., Bellamy, G., Francis, S.-A., Sookhoo, D., Bonacaro, A., Hamid, E., Chandler, R., Abdulla, A., Cumberbatch, M., & Knaggs, R. (2022). Evidence-based clinical practice guidelines on the management of pain in older people – a summary report. *British Journal of Pain*, *16*(1), 6–13. https://doi.org/10.1177/2049463720976155

Schopflocher, D., Taenzer, P., & Jovey, R. (2011). The prevalence of chronic pain in Canada. *Pain Research & Management : The Journal of the Canadian Pain Society*, *16*(6), 445–450.

Schüchen, R. H., Mücke, M., Marinova, M., Kravchenko, D., Häuser, W., Radbruch, L., &

Conrad, R. (2018). Systematic review and meta-analysis on non-opioid analgesics in palliative medicine. *Journal of Cachexia, Sarcopenia and Muscle*, *9*(7), 1235–1254. https://doi.org/10.1002/jcsm.12352

Schwan, J., Sclafani, J., & Tawfik, V. L. (2019). Chronic Pain Management in the Elderly. *Anesthesiology Clinics*, *37*(3), 547–560. https://doi.org/10.1016/j.anclin.2019.04.012

Science Direct. (n.d.). *Nociception—An overview | ScienceDirect Topics*. Retrieved November 16, 2022, from https://www.sciencedirect.com/topics/neuroscience/nociception

Sewards, T. V., & Sewards, M. A. (2002). The medial pain system: Neural representations of the motivational aspect of pain. *Brain Research Bulletin*, *59*(3), 163–180. https://doi.org/10.1016/S0361-9230(02)00864-X

Sholjakova, M., Durnev, V., Kartalov, A., & Kuzmanovska, B. (2018). Pain Relief as an Integral Part of the Palliative Care. *Open Access Macedonian Journal of Medical Sciences*, *6*(4), 739–741. https://doi.org/10.3889/oamjms.2018.163

Snowden, M., McCormick, W., Russo, J., Srebnik, D., Comtois, K., Bowen, J., Teri, L., & Larson, E. B. (1999). Validity and responsiveness of the Minimum Data Set. *Journal of the American Geriatrics Society*, *47*(8), 1000–1004. https://doi.org/10.1111/j.1532-5415.1999.tb01297.x

Stockwell, S. (2018). Report: Nursing Homes Are Overmedicating People with Dementia. *AJN The American Journal of Nursing*, *118*(5), 14. https://doi.org/10.1097/01.NAJ.0000532816.04585.bb

Stompór, M., Grodzicki, T., Stompór, T., Wordliczek, J., Dubiel, M., & Kurowska, I. (2019). Prevalence of Chronic Pain, Particularly with Neuropathic Component, and Its Effect on Overall Functioning of Elderly Patients. *Medical Science Monitor : International Medical*

Journal of Experimental and Clinical Research, *25*, 2695–2701. https://doi.org/10.12659/MSM.911260

Stukalin, I., Olaiya, O. R., Naik, V., Wiebe, E., Kekewich, M., Kelly, M., Wilding, L., Halko, R., & Oczkowski, S. (2022). Medications and dosages used in medical assistance in dying: A cross-sectional study. *Canadian Medical Association Open Access Journal*, *10*(1), E19–E26. https://doi.org/10.9778/cmajo.20200268

Tanuseputro, P., Chalifoux, M., Bennett, C., Gruneir, A., Bronskill, S. E., Walker, P., & Manuel, D. (2015). Hospitalization and Mortality Rates in Long-Term Care Facilities: Does For-Profit Status Matter? *Journal of the American Medical Directors Association*, *16*(10), 874–883. https://doi.org/10.1016/j.jamda.2015.06.004

Thielke, S., Sale, J., & Reid, M. C. (2012). Aging: Are these 4 pain myths complicating care? *The Journal of Family Practice*, *61*(11), 666–670.

Thompson, J. (2019). Deprescribing in palliative care. *Clinical Medicine*, *19*(4), 311–314. https://doi.org/10.7861/clinmedicine.19-4-311

Tosato, M., Lukas, A., van der Roest, H. G., Danese, P., Antocicco, M., Finne-Soveri, H., Nikolaus, T., Landi, F., Bernabei, R., & Onder, G. (2012). Association of pain with behavioral and psychiatric symptoms among nursing home residents with cognitive impairment: Results from the SHELTER study. *Pain*, *153*(2), 305–310. https://doi.org/10.1016/j.pain.2011.10.007

Treede, R.-D., Rief, W., Barke, A., Aziz, Q., Bennett, M. I., Benoliel, R., Cohen, M., Evers, S., Finnerup, N. B., First, M. B., Giamberardino, M. A., Kaasa, S., Kosek, E., Lavand'homme, P., Nicholas, M., Perrot, S., Scholz, J., Schug, S., Smith, B. H., … Wang, S.-J. (2015). A classification of chronic pain for ICD-11. *Pain*, *156*(6), 1003–

1007. https://doi.org/10.1097/j.pain.0000000000000160

University of Bristol. (n.d.). *Random intercept models*. University of Bristol. Retrieved September 9, 2023, from https://www.bristol.ac.uk/cmm/learning/videos/random-intercepts.html#exvar

van Buul, L. W., van der Steen, J. T., Doncker, S. M., Achterberg, W. P., Schellevis, F. G., Veenhuizen, R. B., & Hertogh, C. M. (2014). Factors influencing antibiotic prescribing in long-term care facilities: A qualitative in-depth study. *BMC Geriatrics*, *14*(1), 136. https://doi.org/10.1186/1471-2318-14-136

van Dam, P. H., Achterberg, W. P., Husebo, B. S., & Caljouw, M. A. A. (2020). Does paracetamol improve quality of life, discomfort, pain and neuropsychiatric symptoms in persons with advanced dementia living in long-term care facilities? A randomised double-blind placebo-controlled crossover (Q-PID) trial. *BMC Medicine*, *18*(1), 407. https://doi.org/10.1186/s12916-020-01858-6

van der Steen, J. T., Bloomer, M. J., & Martins Pereira, S. (2022). The importance of methodology to palliative care research: A new article type for Palliative Medicine. *Palliative Medicine*, *36*(1), 4–6. https://doi.org/10.1177/02692163211069566

van der Steen, J. T., Lemos Dekker, N., Gijsberts, M.-J. H. E., Vermeulen, L. H., Mahler, M. M., & The, B. A.-M. (2017). Palliative care for people with dementia in the terminal phase: A mixed-methods qualitative study to inform service development. *BMC Palliative Care*, *16*(1), 28. https://doi.org/10.1186/s12904-017-0201-4

van Herk, R., Boerlage, A. A., van Dijk, M., Baar, F. P. M., Tibboel, D., & de Wit, R. (2009). Pain management in Dutch nursing homes leaves much to be desired. *Pain Management Nursing: Official Journal of the American Society of Pain Management Nurses*, *10*(1),

32–39. https://doi.org/10.1016/j.pmn.2008.06.003

Vickerstaff, V., Omar, R. Z., & Ambler, G. (2019). Methods to adjust for multiple comparisons in the analysis and sample size calculation of randomised controlled trials with multiple primary outcomes. *BMC Medical Research Methodology*, *19*, 129. https://doi.org/10.1186/s12874-019-0754-4

Vigotsky, A. D., Tiwari, S. R., Griffith, J. W., & Apkarian, A. V. (2021). What Is the Numerical Nature of Pain Relief? *Frontiers in Pain Research*, *2*. https://www.frontiersin.org/articles/10.3389/fpain.2021.756680

Vyvey, M. (2010). Steroids as pain relief adjuvants. *Canadian Family Physician*, *56*(12), 1295–1297.

Walther, W., Müller-Mundt, G., Wiese, B., Schneider, N., & Stiel, S. (2022). Providing palliative care for residents in LTC facilities: An analysis of routine data of LTC facilities in Lower Saxony, Germany. *BMC Palliative Care*, *21*(1), 111. https://doi.org/10.1186/s12904-022-00998-1

Wang, S.-Y., Aldridge, M. D., Gross, C. P., Canavan, M., Cherlin, E., Johnson-Hurzeler, R., & Bradley, E. (2016). End-of-Life Care Intensity and Hospice Use: A Regional-Level Analysis. *Medical Care*, *54*(7), 672–678. https://doi.org/10.1097/MLR.0000000000000547

Wegman, A., van der Windt, D., van Tulder, M., Stalman, W., & de Vries, T. (2004). Nonsteroidal antiinflammatory drugs or acetaminophen for osteoarthritis of the hip or knee? A systematic review of evidence and guidelines. *The Journal of Rheumatology*, *31*(2), 344–354.

Wei, Y.-J. J., Schmidt, S., Chen, C., Fillingim, R. B., Reid, M. C., DeKosky, S., Solberg, L.,

Pahor, M., Brumback, B., & Winterstein, A. G. (2021). Quality of opioid prescribing in older adults with or without Alzheimer disease and related dementia. *Alzheimer's Research & Therapy*, *13*(1), 78. https://doi.org/10.1186/s13195-021-00818-3

Wells, N., Pasero, C., & McCaffery, M. (2008). Improving the Quality of Care Through Pain Assessment and Management. In R. G. Hughes (Ed.), *Patient Safety and Quality: An Evidence-Based Handbook for Nurses*. Agency for Healthcare Research and Quality (US). http://www.ncbi.nlm.nih.gov/books/NBK2658/

WHO. (n.d.). *Palliative care*. Retrieved November 22, 2022, from https://www.who.int/news-room/fact-sheets/detail/palliative-care

Wilson, E., Morbey, H., Brown, J., Payne, S., Seale, C., & Seymour, J. (2015). Administering anticipatory medications in end-of-life care: A qualitative study of nursing practice in the community and in nursing homes. *Palliative Medicine*, *29*(1), 60–70. https://doi.org/10.1177/0269216314543042

Xu, Y., Jiang, N., Wang, Y., Zhang, Q., Chen, L., & Ma, S. (2018). Pain perception of older adults in nursing home and home care settings: Evidence from China. *BMC Geriatrics*, *18*(1), 152. https://doi.org/10.1186/s12877-018-0841-0

Zimmerman, D. R., Karon, S. L., Arling, G., Clark, B. R., Collins, T., Ross, R., & Sainfort, F. (1995). Development and testing of nursing home quality indicators. *Health Care Financing Review*, *16*(4), 107–127.

Zwakhalen, S. M., Hamers, J. P., Abu-Saad, H. H., & Berger, M. P. (2006). Pain in elderly people with severe dementia: A systematic review of behavioural pain assessment tools. *BMC Geriatrics*, *6*(1), 3. https://doi.org/10.1186/1471-2318-6-3