# Opioid Deprescribing at Transitions of Care in Australia

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**Statement of Originality**

This is to certify that the content of this thesis is my own work. This thesis has not been submitted for any other degree or purpose.

I certify that the intellectual content of this thesis is the product of my own work, and that all assistance received in preparing this thesis and all sources have been acknowledged.

Jeffery Wang
25 September 2025

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*Strength, Determination, Growth.*

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**Artificial Intelligence Statement**

No content produced by generative Artificial Intelligence tools has been used in the preparation of this thesis.

Jeffery Wang

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Tables in chapters with published papers are not included in this list.

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## Abstract

### Introduction

Opioid analgesics are widely used to manage acute, chronic, and perioperative pain, but their long-term use across healthcare settings has contributed to global increase in misuse, dependence, and opioid-related mortality and morbidity. Transitions of care, such as the transfer of care from hospital discharge to primary care, are critical points where prescribing errors, oversupply, and inadequate follow-up frequently occur, which can be of particular concern for ensuring appropriate use of opioids. Deprescribing, defined as the planned and supervised process of dose reduction or cessation of medicines that may cause harm or are no longer beneficial, has emerged as a key strategy to mitigate opioid-related harms. However, evidence on how best to incorporate opioid deprescribing at transitions of care remains limited.

### Aims

This thesis aimed to synthesise current international and Australian evidence on opioid deprescribing interventions and examine healthcare professionals' confidence and perspectives on existing support to deprescribe opioids at transitions of care.

### Method

A mixed-methods approach was adopted. A scoping review synthesised existing interventions, outcomes, intervention complexity and key implementation factors for opioid deprescribing during care transitions. Complexity of interventions was assessed using the Intervention Complexity Assessment Tool for Systematic Reviews (iCAT_SR). Implementation factors were captured using the Reach, Effectiveness, Adoption, Implementation, and Maintenance (RE-AIM) framework. An online anonymous survey targeting Australian healthcare professionals working in any care setting was then conducted to further explore their confidence, and resource needs to deprescribe opioids at transitions of care. Both quantitative and qualitative analyses were applied to characterise key determinants of practice.

### Results

The scoping review identified 79 studies with a wide range of intervention types. The predominant types of interventions were multicomponent i.e. 'mixed', integrating pharmacological strategies (e.g., multimodal analgesic protocols), and non-pharmacological

supports (e.g., educational aids), particularly during the hospital to home transition, and mixed interventions appeared to reduce opioid use across transitions of care. Mixed interventions were generally more complex than pharmacological and non-pharmacological interventions alone. Additionally, approach to implementation of interventions was not clearly reported across studies and rendered difficulty in evaluating interventions' implementability.

The national survey recruited 105 Australian healthcare professionals, predominantly pharmacists, doctors, and nurses, with representation mainly across hospital and community settings. Most respondents reported confidence in initiating opioid deprescribing at transitions of care, but qualitative analysis findings identified significant barriers including lack of supports that complement existing workflows, time constraints, and competing clinical priorities. Satisfaction with existing resources was low, and healthcare professionals most frequently cited the need for locally approved policies, and access to evidence-based guidelines. Collectively, the survey results demonstrate strong clinician recognition of the importance of opioid deprescribing at care transitions, but also highlight the need for structured, co-designed supports to embed practice change.

**Discussion**

Findings highlight that while opioid deprescribing is increasingly recognised as a clinical necessity at care transitions, interventions vary considerably in their nature and complexity. Importantly, very few studies reported the implementation process of opioid deprescribing interventions, and as such their implementability at transitions of care remains under explored. Survey results showed that healthcare professionals questioned the utility of existing support, citing the limited integration and compatibility within existing clinical workflows and available resources, and therefore prefer local policies as a support mechanism. These findings emphasise that opioid deprescribing strategies embedded within policy frameworks need to balance standardised practice with flexibility, and successful implementation requires tailoring these strategies to clinical context, workflow priorities, and patient goals. National stewardship frameworks offer a platform for change, yet their effectiveness depends on co-design with clinicians, patients, and carers to ensure integration and compatibility.

This thesis highlights the importance of co-designing tailored interventions and supports with healthcare professionals to ensure compatibility with local practices while maintaining patient safety at transitions of care. With different components creating a complex intervention, understanding which active components contributing to an effect can be difficult, and this can

be further compounded by the implementability of the component and its integration within policies that are tailored towards a local care setting. Clinicians seek supports to be integrated into existing workflow, highlighting that co-designing interventions to suit the local context and considering their implementability are essential. Advancing this work requires ongoing collaboration with healthcare professionals across settings to undertake implementation-focused research that translates opioid deprescribing strategies into practice and to facilitate opportunities for opioids to be deprescribed safely and sustainably at transitions of care.

# Chapter 1 – Introduction

## 1.1 Overview of international and Australian trends of opioid use

Opioids are a class of medicines primarily acting on μ-opioid receptors to produce analgesia (1). The 20th century saw significant pharmacological developments in opioids, as pharmaceutical companies aimed to enhance their potency and effect, which extended their application (2). Common opioids in Australia include morphine, oxycodone, fentanyl, codeine, and buprenorphine, which are widely used across a person's lifespan to provide pain relief for a variety of conditions, such as acute post-surgical pain (3), dental pain (4), cancer-related pain (5), chronic non-cancer pain (6), and end-of-life care management (7).

During the late 1990s in the United States, pharmaceutical companies promoted prescription opioids as safe and effective for chronic non-cancer pain management (8), and opioid manufacturers discounted concerns from many physicians about addiction, claiming that they were confusing it with "physical dependence" which was "clinically unimportant" (8). This led to a surge in opioid prescriptions, with medications like modified-release oxycodone, hydrocodone, and morphine becoming widely used (9).

Global opioid consumption increased from 2015 to 2019 (10), from 27.52 morphine milligram equivalent per 1000/day (16.63–45.54) in 2015 to 29.51 morphine milligram equivalent per 1000/day (17.85–48.79) in 2019. In North America and Oceania, there appears to be a downward trend in opioid consumption since 2019 (10), but these regions continue to account for a substantial share of global use. Across other continents, such as South America, Eastern Europe, Asia, and Western and Central Europe, consumption remained low in comparison to North America and Oceania, despite the upward trends observed between 2015 and 2019. In Africa, between 1999-2021, there has been stagnant opioid consumption, which may reflect the inadequate access to opioids (11) compared to the rest of the world. Australia recorded a marked rise in prescribed opioid analgesic use from 4.6 daily defined doses to 17.6 daily defined doses per 1000 population per day between 1990 and 2014 (12, 13). However, between 2015 – 2022, total prescribed opioid analgesic use decreased by 21.2%, from 1231.4 to 970.6 oral morphine equivalent per 1000 population per day likely due to regulatory reforms (14).

## 1.2 Opioid-related effects and their impact

Global increase in opioid use have been accompanied by rising rates of opioid-related harms, including dependence, misuse, and overdose deaths. Opioids can cause the euphoria seen in drugs of abuse (15, 16). However, the pleasurable sensation of euphoria tends to diminish frequent use, leading to tolerance, and requiring larger opioid doses to achieve the same initial effects (17). This increase in dose can lead to physical dependence, where cessation of opioid use results in withdrawal symptoms, causing negative emotional and physical states (18). However, the risk of opioid dependence can occur irrespective of its indication, which can contribute further to the global trends in opioid-related harm.

Harms associated with opioid use has emerged as a significant global public health issue (19), with widespread consequences such as misuse, addiction, and overdose deaths (18) across the United States (20), Canada (21), and parts of Europe (22). Despite the post-2019 decline in opioid consumption in North America, opioid related overdose deaths in the United States and Canada increased between 2019 and 2023/2024 (20)(21), and in Europe, opioids accounted for over 75% of fatal overdoses in 2024 (22).

In Australia, similar trends in opioid-related deaths have been reported and continue to be a growing concern. Annual drug-induced deaths have doubled over the past two decades, and opioids remain the leading cause of drug-induced deaths (14, 23). In 2022, annual drug-induced deaths reached 2,356 with opioids contributing to 49.3% (926 such deaths) (23). This number continues to remain high with Australia's annual drug-induced deaths reaching 2,272 fatal overdoses in 2023, and opioids contributing to 43.9% (24). With growing local concerns surrounding opioid-related harm, the government has implemented a number of public health initiatives and regulatory changes to combat this. For example, codeine was up-scheduled from over-the-counter to prescription-only in 2018, but there was an increase in the use of prescription-only codeine (>15mg) from 26.9% to 43.4% between 2019 and 2022, likely to circumvent prescribing restrictions from the Pharmaceutical Benefits Scheme (PBS) restrictions (14). Between 2015 to 2022, PBS dispensing claims of opioid analgesic use showed a decrease by 21.2%, yet private dispensing and public hospital use of opioid analgesic in Australia doubled from 13.8% to 27.0% (14). This may indicate that the public health measures targeting opioids may inadvertently shift use to less-regulated channels, creating blind spots in monitoring and harm minimisation.

Furthermore, the introduction of real-time prescription monitoring systems in 2020 (25) allowed healthcare professionals to track and access real-time information on patients' controlled medicine prescriptions and other potential drugs of abuse, enabling timely identification of high-risk use and improving prescribing safety. However, their impact on opioid-related overdoses and deaths remains unclear (26). With varying government regulatory reforms and restrictions in place, it is difficult to determine what interventions are truly effective to minimise opioid-related harm in real world practices, and further understanding of existing interventions in practice is needed to provide insights into ongoing opioid use.

### 1.2.1 Opioid use and related harms across settings of care

Despite the harms associated with opioids, they remain an important pharmacological treatment for the management of pain. A study of the whole-of-population in Australia reported that approximately half of all opioid initiations were by General Practitioners (GPs) (12) between 2013 – 2017, similar to the United States (27). This reflects how common GPs encounter and manage pain conditions such as arthritis and back pain in primary care (28). For patients experiencing post-surgical pain, opioids remain an important component of the acute phase of the recovery journey, and the preferred pharmacological option for surgeons when simple analgesics are perceived to be insufficient to achieve adequate pain control for patients. An Australian study of adults residing in New South Wales and dispensed a PBS prescription for any opioid between 2014 – 2018, identified that new oxycodone users could be associated with recent hospital discharge, an emergency department visit or a therapeutic procedure (29).

Multiple systematic reviews have evaluated the efficacy of opioids across different pain conditions. For acute musculoskeletal pain, there was high certainty evidence that oral opioids relative to placebo provided small benefits in the acute phase of pain, including both immediate (≤ 24 hours or closest to 12 hours), and short-term (> 24 hours to 7 days or closest to 4 days). For immediate-term, there was a mean difference of 8.8 in pain score using the visual analogue scale between opioids vs placebo (95% CI – 12.0 to – 5.6), and for short-term, there was a mean difference of 9.2 in pain score (95% CI – 13.9 to – 4.4) (30), however, no effects beyond six months were reported in the review. Additionally, the systematic review highlighted inconsistency in the reporting of harms from the included studies, but reported adverse events including confusion and dizziness (30).

In chronic non-cancer pain, a systematic review (31) identified a randomised controlled trial (32) that found no significant difference in pain-related function between opioid therapy and

non-opioid alternatives at six months or longer. Improvement of at least 30% on the Brief Pain Inventory interference score occurred in 69 participants receiving opioids versus 71 receiving non-opioid therapy (RR = 1.11; 95% CI: 0.89–1.39; p = 0.35) (31). Additionally, two randomised controlled studies (32, 33) showed a significant difference between the opioid group vs non-opioid group in the number of reported cases of drug abuse when determined using the Abuse index (219/4397 vs 226/8708 patients, Relative Risk of 1.89, 95% CI: 1.57 – 2.27; $p < 0.001$). Another meta-analysis of 36 trials studying people using opioids for osteoarthritis (34), identified no significant association between opioid dose (10 – 126 morphine milligram equivalent/day) and pain relief (e.g., Visual Analogue scale, or Numeric Rating Scale), or incidence of adverse events at six weeks to less than 12 months, however the evidence was assessed against the Grading of Recommendations, Assessment, Development and Evaluations (35) criteria, and determined to be low quality, where future research is very likely to have an important impact on our confidence in the effect estimate and is likely to change the estimate (36).

A number of surgical studies have identified various factors that have contributed to prolonged opioid use. For example, a retrospective cohort study of spine surgery patients identified that pre-operative use of opioids was associated with post-operative opioid usage over 12 months (37). Similarly, a systematic review of 416,321 patients who underwent total joint arthroplasty (TJA) found pre-operative use of opioids as a risk factor with 12% of all patients included in the review still using opioids 3-months post-TJA (38). Another systematic review and meta-analysis of 33 observational studies evaluating opioid use after surgery in 1,922,743 individuals showed that regardless of whether the surgery is minor or major, pre-operative opioid use was a risk factor for prolonged opioid use after surgery (OR, 5.32; 95% CI, 2.94-9.64) (39). As patients transition from surgery to discharge, opioid use may change, and patients with increased doses of opioids at surgical discharge can be typically associated with an increase dose of opioids consumed during the follow-up period (40). This is further supported by a systematic review identifying that in opioid-naïve surgical or trauma patients, having an increased opioid dose exposure post-surgery or trauma was considered a risk factor for persistent opioid use (41). Persistent opioid use can range from 3.9% to 10.5% of surgical patients between two and four months after discharge (42). These studies highlight that opioid use in one care setting can continue to persist in subsequent care transitions.

Upon discharge from hospital, patients' ongoing care is transferred to their GP. This transitions may result in misaligned expectations between hospital teams and primary care providers

regarding post-discharge pain management and opioid requirements (43). Subsequently, some prescribers fear damaging the patient-prescriber relationship (44), and report feeling pressured or intimidated by patients, resulting in inappropriate prescribing (45) and continuation of opioids. Given the widespread use of opioids for different indications and continuation across different healthcare settings (46), it is unsurprising that opioid-related misuse, dependence, and adverse outcomes remain a significant public health concerns in Australia and globally (47). This further underscores the need for targeted interventions to reduce inappropriate use during transfer between care settings and prevent opioid-related harm such as overdose deaths.

### 1.3 What are transitions of care?

The World Health Organization's third Global Patient Safety Challenge with the theme '*Medication Without Harm'*, identified the prevention of medication-related harm during transitions of care as a priority action area (48). Transitions of care are when a person's health care is transferred between care providers, within and between healthcare locations, settings, care delivery and levels of care (49). For example, patients may transfer between home, hospital, residential care settings and consultations with different healthcare providers, such as from a general practitioner to specialist or allied health professional. Furthermore, within the hospital setting, patients may transfer from one area to another, such as from the intensive care unit to the ward (see Figure 1). During these transitions of care, patients' medications may be reviewed and changed (50). This phase is critical as it often involves complex medical decision-making, medication management, and coordination between different health settings, specialties and clinicians, with varying available resources or skillsets. As such, medication harms can often occur at transitions of care, and these can include errors in the prescribing, preparing, administering or monitoring of medications (51), and more than 50% of all medication errors occur when people move from one healthcare setting to another (52).

Opioids are considered high-risk medicines and are associated with some of the most common medication-related errors (53). Such errors commonly occur during both the prescribing and administration phases of the medication management cycle (54). Errors in opioid prescriptions can result in patient harm such as adverse drug events, and hospital readmission (55, 56), while also contributing to delays in care, inappropriate monitoring, confusion about a patient's care plan, and increased health expenditure (57). Causes of these errors during transitions of care include lack of complete information, multiple healthcare professionals operating independently across different settings without complete knowledge of the services and

medications provided in previous settings (58), and inadequate communication. This fragmentation of care across different settings can pose a significant risk of opioid misadventure (58), and suggests the need to understand what supports healthcare professionals require to deprescribe opioids at transitions of care.

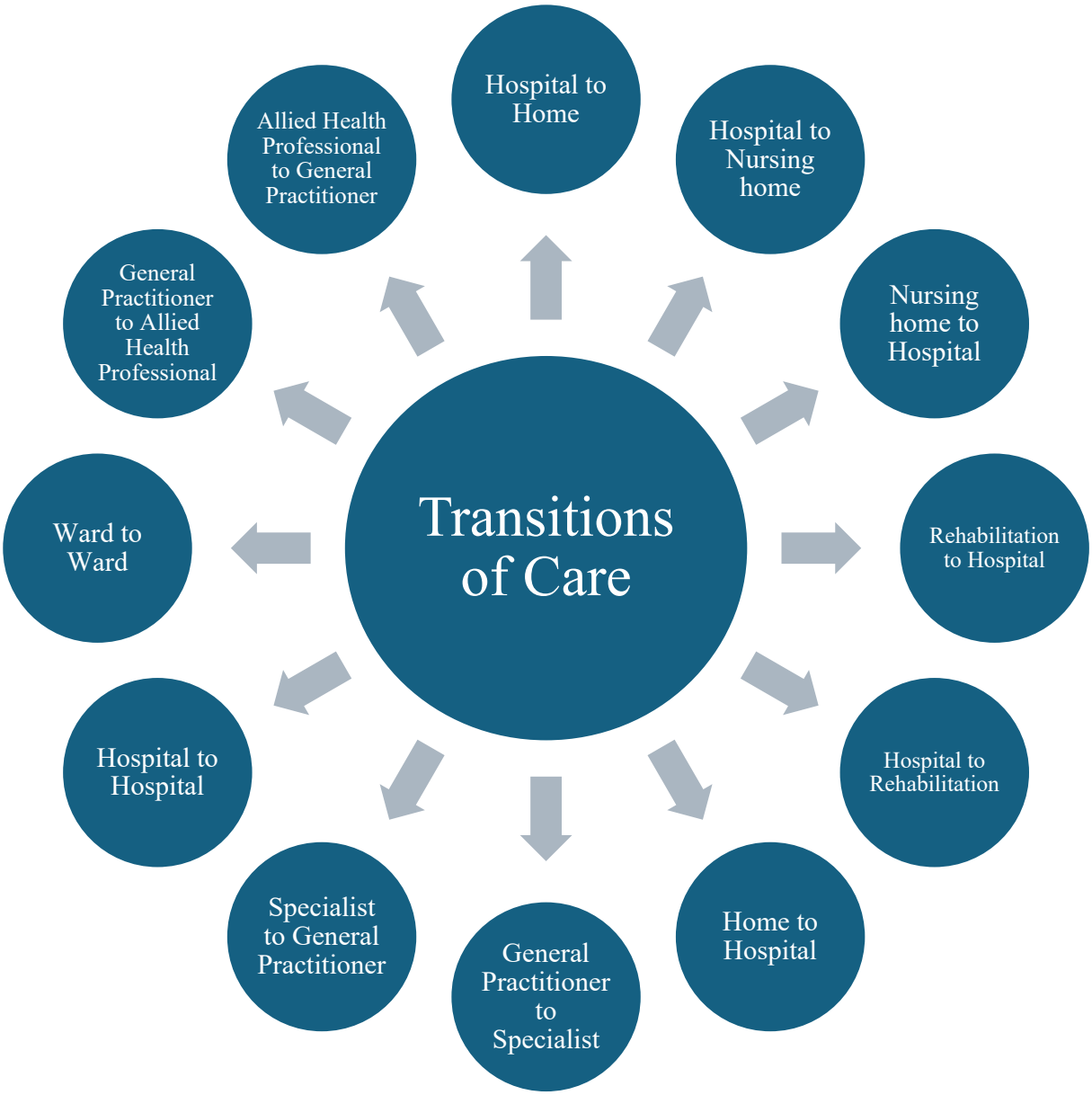


**Figure 1:** Different forms of Transitions of Care.

### 1.3.1 Medication management at transitions of care

Medication safety initiatives during transitions of care, such as My Health Record, pharmacist shared medicines list, best possible medication history, medication reconciliation, and partnered pharmacist medication charting, focus primarily on preventing omissions and incorrect medication (59), but do not address inappropriate continuation. Effective reconciliation depends on timely access to comprehensive medication information, a process increasingly enabled by national and state-based digital health platforms in Australia. These include My Health Record and real time prescription monitoring which can also help in reviewing medications at transitions of care (60). However, there is limited research on their impact on reducing and ceasing opioid use during transitions of care.

The establishment of My Health Record in 2012 (61) has helped monitor the prescribing and dispensing of prescription drugs in general, but is more broadly used to improve the efficiency and coordination of healthcare, rather focusing on medications specifically (62), which is the purpose of real-time prescription monitoring. Since 2009, real-time prescription monitoring systems in Australia, such as Drugs and Poisons Information System Online Remote Access in Tasmania (63), SafeScript in Victoria (64) and New South Wales (65) provide prescribers, pharmacists and other healthcare professionals with real-time prescribing and dispensing information of a patient's medication regimen specifically for drugs of potential misuse and abuse, such as opioids. These sources of information provide clinicians with the opportunity to review the appropriateness of opioid use at the point of care, and can mitigate identified risks such as over-supply at discharge or unsafe continuation in the community. Additionally, other tools targeting healthcare professionals have been developed to assist in the review and tapering of opioids, including a opioid targeted deprescribing guideline (66), with additional tools such as an opioid tapering algorithm (67), conversation guide (67), and a discussion tool (68), however there is limited research on their impact on reducing and ceasing opioid use during transitions of care. Given the heightened risks associated with opioid prescribing, especially during care transitions, it is essential to explore how these junctures influence the continuation, escalation, de-escalation or cessation of opioid use.

### 1.3.2 Opioid use often overlooked at transitions of care

Transitions of care represents a high-risk period where inadequate coordination, unclear clinical responsibility, and poor communication can lead to opioid oversupply, diversion, and

prolonged use. As discussed in Section 1.2.1, an increase in opioid prescribing in the postoperative phase is correlated with an increase in opioid consumption and risk of new persistent opioid use in opioid-naïve individuals who continue to receive opioid prescriptions months after the initial exposure (69, 70). Similarly, studies have shown that patients receiving opioids during admission and provided excess quantities of opioids at discharge, may contribute to increasing prolonged opioid use in the community and circulation of unused opioids (37, 38, 40, 71-74), diversion and unintended long-term use (75). Notably, studies report that approximately 5% of patients without prior opioid exposure who receive an opioid prescription at discharge subsequently become chronic users (43). Additionally, recent evidence showed that using opioids after surgical discharge were no more superior to non-opioids in reducing pain intensity and had increased adverse events (76, 77).

One key challenge across different care settings is the unclear responsibility of opioid use review with multiple clinicians involved (78). In surgical settings, opioid cessation is often not considered a priority by treating doctors, as they may focus on other competing clinical priorities, leaving opioid review under-addressed during hospitalisation (79). Fragmented care systems exacerbate this issue, as patients may experience overlapping high-dose opioid prescriptions from disconnected providers. The lack of communication between providers (80) at care transitions regarding opioid review reflects not only clinical inertia but also a broader structural problem (81). When no single provider is accountable for ongoing opioid use at discharge or transfer of care, passive prescribing behaviour is worsened by time constraints as patients transition more frequently between providers, such as when opioids are initiated during hospitalisation and continued on transition to the community setting such as an aged care facility, rehabilitation, respite or home. These persistent gaps highlight a critical opportunity to embed structured opioid review and deprescribing processes into transition-of-care protocols, ensuring that opioid therapy is continued only when clinically appropriate.

### 1.4 Deprescribing opioids across settings of care – a growing necessity

Deprescribing, the “process of tapering, stopping, discontinuing, or withdrawing drugs with the goal of managing polypharmacy and improving outcomes” (82), aims to optimise a person's medication regimen by aligning it with their current health conditions, treatment goals, and evidence-based care. It is a proactive, patient-centred approach that involves shared decision-making between healthcare providers and patients to reduce medication burden, minimise adverse drug events, and enhance quality of life (83). Deprescribing requires assessment of a

drug's indication, potential risks, and therapeutic alternatives, including time to benefit, risk of withdrawal or symptom recurrence, and patient preferences (84).

Deprescribing research has traditionally focused on polypharmacy and older adults (85), is considered to be on a continuum with prescribing (86), and intends to enhance medication safety (87). Opioid deprescribing in clinical practice requires supervised process of reducing or discontinuing opioid medications to minimise harm and improve patient outcomes. This process involves patients in decision-making, and using a gradual tapering method to minimise withdrawal symptoms (88). Healthcare professionals value the importance of opioid deprescribing, but are challenged by the clinical practice due to complexities associated with transitions of care, and the need for improved communication between different care settings (78). These care transitions represent high-risk periods for inappropriate continuation or escalation of opioid therapy, making them a strategic point for deprescribing. Research is expanding to highlight the nuances across different population groups, such as chronic pain management (89, 90), and surgical patients (91-94), reflecting growing awareness of opioid-related harms and the need for safer, more tailored deprescribing practices. Previous reviews have evaluated opioid deprescribing interventions during patients' hospital admission or when stabilised in the community setting (90, 95-98), and showed mixed results in the effectiveness of opioid deprescribing interventions. However, interventions to support opioid deprescribing at the point of care transition remain under-investigated.

### 1.4.1 Barriers and facilitators to opioid deprescribing

Understanding patient perspectives of opioid deprescribing is essential for identifying safer approaches to reducing opioid use. Alternative pain management therapies can be available through the public health system (99), but the lack of access to these services for patients are further compounded by cost, time and distance (45). Additionally, psychological dependence, fear of pain escalation, and prior negative experiences with withdrawal can lead to resistance or refusal to initiate deprescribing (78, 100-103). An exploratory study of older adults' perspectives identified that patients felt deprescribing was unnecessary unless an adverse event occurred (100), and similarly, veterans from another study did not see the benefits of opioid deprescribing and feared the consequences in the absence of opioid therapy (104). These barriers are counterbalanced by facilitators such as recognition of opioid harms, clear communication, and prescriber support (45).

Many clinicians provide care for patients taking opioids for pain management yet are confronted by patients' unique medical background that can challenge opioid deprescribing. During a patient's transition of care, such as hospital to home, discharge summaries are an essential piece of communication, but can be incomplete, and unhelpful for community healthcare providers (105). The lack of a clear plan or guidance makes it challenging for GPs to manage patients' opioid therapy in the community after hospital discharge (43). Rural physicians reported inadequate knowledge and foundational support, reluctance to initiate deprescribing, and patient pressures to continue opioids (44). Another study identified restrictive remuneration schedules for consultations rather than comprehensive pain management (106). Advanced Nurse Practitioners also faced similar challenges (107) and reported that poor access to non-pharmacological treatments and secondary care services hindered opioid deprescribing, resulting in professional frustration and dependence on under-resourced pathways. Other barriers reported by clinicians include limited time, lack of training, confidence, and uncertainty about how to manage opioid withdrawal or access to alternative pain management options (44, 45, 107-109). Facilitators for clinicians included peer support, access to interdisciplinary care, systematic approaches, and prior tapering experience (106).

System-level obstacles faced by clinicians and patients include prescribing culture, fragmented communication systems and care coordination between hospital and community providers, resource gaps, professional role ambiguities, lack of shared decision-making tools (110), and limited access to non-pharmacological pain management alternatives (111). These barriers undermine the benefits of deprescribing, and are compounded by inadequate support, and inconsistent implementation, and heighten the risk of continuation of inappropriate opioid therapy. These findings reinforce transitions of care as a pivotal opportunity for targeted opioid deprescribing interventions.

### 1.4.2 Deprescribing interventions at transitions of care

There are a number of studies examining broad medication-related interventions and the perspectives of healthcare professionals at transitions of care in different cohorts of patients and forms of transition. For example, a systematic review identified that multicomponent interventions, involving education of healthcare professionals and provision of guidelines were effective in deprescribing inappropriate medication at hospital discharge, but not at the point of discharge from the intensive care unit (112). Other studies examined the challenges and stakeholder perspectives of deprescribing in post-acute care transitions to home (113, 114),

highlighting the importance to align the timing of deprescribing and medication reconciliation (115) to enhance effective communication between the physician, nurse and pharmacist during transitions of care. A randomised trial identified that patients receiving a pharmacist or nurse practitioner-led patient centred-deprescribing recommendation took 14% fewer medications at postacute care discharge, and 15% fewer medications at 90-day follow-up when compared to the control group ($p < 0.001$) (116). Notably within the trial, opioids were the sixth most commonly deprescribed medication class out of twenty. Across these studies, hospital to home is a commonly studied transition, yet opioids have not been a focal point.

For opioids, literature shows that patient-targeted deprescribing interventions are heterogeneous in nature, and include pharmacological, psychological, behavioural or a combination of the prior – 'mixed' interventions (117). Other interventions to reduce opioid use include educational strategies, guideline-based approaches, pharmacist-led initiatives and multi-faceted programs (118). Clinician-targeted interventions in primary care have also been studied, such as an education-based multicomponent intervention and case-based learning, which showed a decline in the prescribed daily opioid dose, opioid use and volume of prescriptions issued in the long-term (90). Although these highlight opioid-specific interventions, there is a paucity of literature of the effectiveness of these interventions in reducing and ceasing opioids at transitions of care. This gap highlights the need to understand the landscape of opioid deprescribing at transitions of care, but also to examine the implementability of such strategies, considering factors such as feasibility, acceptability, resource requirements, and integration into existing discharge processes.

### 1.4.3 Addressing gaps in knowledge, confidence and resources for opioid deprescribing

A recurring theme across deprescribing literature, extending well beyond opioids, is the critical role of clinician knowledge, self-efficacy, and resource access in determining whether tapering practices are effectively adopted. In primary care settings, uncertainties persist regarding how to safely reduce or stop medications, particularly in multimorbid patients with polypharmacy and complex care needs (84). Recent research in other medicines such as thyroid hormones identified that physicians lack knowledge of deprescribing (119), with another study exploring multidisciplinary perspectives on deprescribing people with cystic fibrosis and identified low self-efficacy as the most prominent gap (120). An antidepressant deprescribing study highlighted that general practitioners have limited practical tools, and are uncertain when to deprescribe antidepressants (121). These themes highlight that healthcare professionals face a

lack of clear guidance leaving them unprepared for safely managing deprescribing in various clinical scenarios (1). These stakeholders encounter similar challenges related to opioid deprescribing, as discussed in Section 1.3.1. To address the challenges faced by healthcare professionals in deprescribing opioids in patients, various interventions and resources have been developed to support clinicians and healthcare settings in this clinical practice.

In Australia, a number of strategies have been recently rolled out to facilitate opioid deprescribing or judicious use of opioids. One example is the Australian Commission on Safety and Quality in Health Care's Opioid Analgesic Stewardship in Acute Pain Clinical Care Standard (122), launched nationally in April 2022. This standard specifically addresses opioid prescribing in acute care contexts, and advises clinicians to plan for appropriate opioid use, ongoing review, and develop a weaning and cessation plan for people presenting with acute pain to the emergency department or following surgery, up to and including, discharge from hospital. Another example is the recently developed National Health and Medical Research Council approved Evidence-Based Clinical Practice Guideline for Deprescribing Opioid Analgesics (66), which recommends a tailored approach to deprescribing opioids for adults prescribed opioids in primary care settings (67, 123, 124). These guidelines recommend initiating an individualised deprescribing plan at opioid initiation, incorporating gradual tapering with regular monitoring, and avoiding abrupt cessation to minimise withdrawal and harm.

Although the aforementioned resources suggest the development of an opioid cessation plan, a gap remains in how healthcare professionals can implement these recommendations at the point of care transitions, and what support they require to make this possible.

### 1.4.4 Understanding healthcare professionals' required support and needs in deprescribing opioids at transitions of care

Understanding healthcare professionals' perspectives on existing resources and supports can help further improve the design of interventions to deprescribe opioids. For example, a qualitative study exploring Australian healthcare professionals' perspectives on the implementation of the Australian Commission on Safety and Quality in Health Care's Opioid Analgesic Stewardship in Acute Pain Clinical Care Standard (122) reported a need for increased executive support, improved access to allied health clinicians and non-pharmacological pain alternatives, integration of technology into workflow and addressing

staffing issues. Similarly, another qualitative study explored Australian General Practitioners' perspectives on the implementation of the Australian Commission on Safety and Quality in Health Care's Low Back Pain Clinical Care Standard. The results also highlighted the need for developing stakeholder relationships, improving access to allied health services, and supporting clinicians through interactive assistance (125). These findings support existing literature on the facilitators to deprescribe opioids, which have been expressed by healthcare professionals, however, implementing all these facilitators is not always feasible in areas with limited access to other healthcare professionals, healthcare facilities, and longer travel distances, such as rural and remote areas (126). Additionally, a study on Canadian rural physicians also expressed the need for alternative pain management options to be available and not just accessible (44). The lack of consistency in availability and equitable access to healthcare services highlights the need to further understand the support needs across varying geographical areas.

Deprescribing support needs may differ by care settings. In primary care, the priorities are protected review time, embedded decision-support within prescribing systems, and patient decision aids that help GPs communicate risks, benefits, and taper plans while coordinating with specialists (127). In secondary care, there is a need to manage the admitting condition, then address the deprescribing of inappropriate medications from admission to discharge, through medication reconciliation, explicit handover and follow-up ownership post-discharge (127). In residential aged care facilities, deprescribing is dependent on the organisation-wide capacity and culture with adequate staffing and training for non-pharmacological options, routine multidisciplinary team reviews with strong pharmacist involvement, and engagement of nurses and family representatives (127). Although these findings are not opioid-specific, they showcase the difference in expectations in how deprescribing should occur in various care settings. Further understanding the different support needs by healthcare professionals in and across these different care settings is critical to developing and implementing tailored strategies to deprescribe opioids at transitions of care.

### 1.5 Implementability of strategies to assist in opioid deprescribing at transitions of care

Implementability is defined as the likelihood that an intervention will be adopted into routine practice and into provider and recipient behaviours across settings and over time (128), and can be influenced by barriers and facilitators. Applying implementation science to conceptualise and evaluate effective deprescribing strategies may help bridge the gap between research and

practice (129). Implementation of deprescribing requires a number of considerations, including the "resources in existing healthcare systems, target patient populations, and intervention design, including content, intensity and duration" (111), and this is echoed throughout other studies reinforcing the requirement of a multi-level assessment on deprescribing implementation (127, 130).

Opioid deprescribing is still growing in practice, and its implementability in clinical practice can be influenced by not just the previously mentioned considerations such as system, organisation, clinician, patient and setting (88, 111), but also by the safety aspect of the deprescribing, and risk of symptom reoccurrence such as withdrawal symptoms and other unwanted harm (111). During transitions of care, the involvement of multiple prescribers, lack of continuity across care settings, and divergent perceptions of responsibility for deprescribing (45) highlights a multi-faceted and complex system. Hospital-based clinicians may defer tapering decisions to GPs after discharge, while primary care providers often feel unprepared or insufficiently informed to make such decisions without specialist input (44). Recognising these determinants is particularly important at transitions of care, where the convergence of high prescribing rates, and variable follow-up creates both heightened risk and a strategic opportunity for opioid deprescribing.

As discussed in Section 1.4.4, implementing an opioid clinical care standard requires a multi-level approach. Multidisciplinary pain programs have been shown to reduce opioid use, but deemed poorly implementable due to barriers associated with access, feasibility and resources (131), and could be further compounded within the context of transitions of care, yet there is no literature to understand that. Incorporating frameworks such as Proctor's implementation outcomes framework (132), which evaluates acceptability, adoption, appropriateness, feasibility, fidelity, penetration, and sustainability can facilitate a more structured assessment of which strategies are most likely to be integrated into routine deprescribing practice at transitions of care. Similarly, the RE-AIM framework (Reach, Effectiveness, Adoption, Implementation, Maintenance) (133) provides a pragmatic lens to evaluate both the potential impact and real-world scalability of opioid deprescribing interventions.

This emphasis on implementability provides a foundation for examining not only whether opioid deprescribing interventions work, but also how an intervention's components influences integration into diverse clinical workflows.

### 1.5.1 Implementation and complexity of deprescribing interventions

Deprescribing interventions are inherently complex (111), particularly at transitions of care where patient vulnerability, system fragmentation, and variable prescribing practices converge. Although there is growing evidence to understand the types and effect of opioid deprescribing interventions, as discussed in Section 1.4.2, their implementation and complexity is not well captured.

Translating evidence on opioid deprescribing interventions into routine practice requires navigating multifaceted organisational, behavioural, and contextual challenges. The process of a deprescribing intervention can be clinically complex, as multiple factors need to be considered such as medication regimen (111), individual context, patient-centredness, and collaborative teamwork, including patients, relatives and/or caregivers (134). However, how the deprescribing intervention is implemented within the broader context is poorly understood. Interventions contain components that may act both dependently and independently with each other and within the system, including at the individual, organisational, and population levels (135) to achieve an effect. This dynamic interplay underscores the complex nature of interventions. For example, research has shown that key components of a deprescribing intervention include "*education, medication review and reconciliation, assessment of deprescribing targets, and communication with patients, caregivers, and/or healthcare providers*" (111). Within the current literature, only one study has assessed the complexity of interventions on opioid use appropriateness (97) using the Cochrane's Intervention Complexity Assessment Tool for Systematic Reviews (iCAT_SR) (136), but only within the hospital inpatient setting and not at transitions of care.

Implementation assessments are particularly valuable for identifying contextual factors that influence whether interventions can be successfully translated into the real-world (127). Implementation is influenced by the interaction between components of an intervention and the context, highlighting the challenges of translating deprescribing strategies into routine clinical practice. However, the difficulty in implementation can be further compounded by the complex nature of the intervention, therefore, further understanding of the complexity of opioid deprescribing interventions and how they influence implementation, particularly at transitions of care, is essential to designing and implementing interventions that are both effective and sustainable.

Current literature consists of a number of reviews focusing on implementing deprescribing interventions in primary care settings (111, 137) and across different healthcare settings (113, 127, 138) but these do not focus on opioids. In contrast, a systematic review of 13 trials examining opioid stewardship interventions in acute hospital settings revealed a notable deficiency in implementation reporting (139). In another setting, a pharmacist-led deprescribing pilot program within oncology care demonstrated feasibility and acceptability for tapering opioids in palliative populations (140). Notably, research is currently underway to systematically assess the effects of implementation of interventions aimed to improve uptake of evidence-based opioid deprescribing by healthcare professionals (141). These studies show the growing call of clear implementation considerations when undertaking an interventional study on opioid deprescribing. The evidence suggests that while studies are emerging, there remains a paucity of literature that simultaneously addresses opioid deprescribing during transitions of care and considers implementation factors, underscoring a critical gap in the evidence base.

## 1.6 Thesis aim and objectives

The overall aim of this thesis is to identify and describe interventions designed to support opioid deprescribing during transitions of care, examine how these interventions are implemented, and identify the support healthcare professionals require to undertake this in clinical practice.

The first objective of this thesis is to identify the types and characteristics of interventions that have been tested to deprescribe opioids at transitions of care and to determine the implementability of interventions. This objective will be supported by conducting a scoping review and is described in Chapter 2.

The second objective is to explore the perspectives of Australian healthcare professionals on the support required to deprescribe opioids at transitions of care. This objective will be supported by conducting a national survey study and is described in Chapter 3.

### 1.6.1 Methodological approach for thesis

To address the overall aim and objectives, this thesis adopted a two-phase approach comprising of a scoping review and a national survey. Given the current diverse body of research on opioid deprescribing interventions such as study designs, patient populations, and types of interventions, a scoping review was chosen over a systematic review to capture the breadth and heterogeneity of opioid deprescribing interventions at transitions of care, with the aim of mapping their characteristics and implementation reporting rather than determining comparative effectiveness (142). The scoping review allowed the identification of knowledge gaps, classification of intervention types, and assessment of their implementability at transitions of care. This choice aligns with existing guidance on when to conduct scoping versus systematic reviews (142).

The review applied the Intervention Complexity Assessment Tool for Systematic Reviews (iCAT_SR) tool (135) to appraise the complexity of interventions identified, including intervention design, flexibility, and delivery, and the way in which different components of an intervention work together. Complexity of interventions is under-explored, given that opioid deprescribing interventions can contain differing number of components and are often delivered across different points of care transition. The Intervention Delivery Complexity Tool (143), while valuable and similar to iCAT_SR, was developed to characterise intervention complexity in embedded pragmatic clinical trials, and not suitable for use in observational studies, which the scoping review encompassed. Therefore, the iCAT_SR tool offered a more comprehensive appraisal for both randomised and observational studies, enabling a cross-comparison between pharmacological, non-pharmacological, and mixed interventions.

The Reach, Effectiveness, Adoption, Implementation and Maintenance (RE-AIM) framework (133) was adopted to evaluate the implementability of interventions identified. Alternative frameworks such as the Context and Implementation of Complex Interventions (CICI) (144), the Practical, Robust Implementation and Sustainability Model (PRISM) (145), and Proctor's implementation outcomes framework (132) were not applied during the review. CICI, while valuable for capturing sociocultural and political context, was less applicable to the clinical focus of this review. PRISM identifies factors that contribute to successful intervention implementation, whereas Proctor's framework does not address intervention effectiveness. The aim of the scoping review was to understand the current state of implementation assessments of opioid deprescribing interventions at transitions of care regardless of its success. Therefore,

the RE-AIM framework was selected to map out the state of implementation reporting across opioid deprescribing interventions at transitions of care.

For phase two, a national cross-sectional survey was conducted to capture the perspectives of Australian healthcare professionals. The survey allowed for a wide geographic reach of a multidisciplinary sample, and the ability to collect both quantitative and qualitative data within a limited timeframe. Alternative designs such as interviews or focus groups would have provided more in-depth insights but were not feasible within the study's scope and timeline. The Theoretical Domains Framework (TDF) (146) was selected as the underpinning framework for the survey's qualitative analysis because it provides a comprehensive structure for examining healthcare professional behaviour determinants of opioid deprescribing practices at transitions of care. Alternative frameworks, such as the Consolidated Framework for Implementation Research (CFIR) (147) provide a more focused view at the organisational level, which may have been too broad for the individual-level focus of the survey study. The TDF was therefore the most appropriate choice for mapping an understanding of support mechanisms preferred by clinicians to understand the determinants of deprescribing behaviour at transitions of care at an individual level.

Together, the scoping review maps existing evidence, while the survey highlights current needs and gaps in clinical practice.

## Chapter 2 – Implementability of opioid deprescribing interventions at transitions of care: a scoping review

***Declaration for thesis chapter***

Chapter 2 of this thesis has been published as: Implementability of opioid deprescribing interventions at transitions of care: A scoping review. British Journal of Clinical Pharmacology, 2025. 91(3):698-728.

I co-designed the study with Danijela Gnjidic, Carl R Schneider, Aili V Langford, and Chung-Wei Christine Lin, who also assisted and provided guidance on the study concept and design, data analysis and interpretation, and critical revision of the manuscript. Mouna Sawan assisted with data analysis and interpretation, and critical revision of the manuscript. Antonius Nugraha Widhi Pratama provided assistance on data visualisation and critical revision of the manuscript.

As supervisor for the candidature upon which this thesis is based, I can confirm that the

authorship attribution statements above are correct.

Lead Supervisor: Danijela Gnjidic

Signature:

Date: 25 September 2025

## 2.1 Introduction to scoping review

The inappropriate or prolonged opioid use contributes significantly to patient harm, particularly when opioid therapy is not adequately reassessed or deprescribed at key points in care. Transitions of care, such as hospital admission, discharge, inter-ward transfers, or within the community are clinically significant junctures where medication regimens are often modified, making them critical touchpoints for opioid deprescribing (78). Despite increasing policy attention and the introduction of a number of strategies to tackle opioid use (117, 148), existing evidence on implementability of opioid deprescribing interventions during these transitions remains unknown, with limited clarity on how these interventions are implemented or sustained in practice. In response to this gap, the following scoping review provides the first comprehensive synthesis of opioid deprescribing interventions at transitions of care through an implementability lens.

As discussed in Chapter 1, opioid deprescribing aims to minimise harm and improve patient outcomes, and transitions of care offers a unique opportunity to reduce and stop opioid use. However, there is a lack of literature to understand the evidence and implementability of opioid deprescribing interventions at transitions of care. Given the breadth, heterogeneity, and emerging nature of this field, a scoping review was chosen to allow for a broader exploration of existing interventions, implementation assessments, and contextual factors across diverse healthcare settings. Scoping reviews are particularly well-suited to mapping key concepts, identifying research gaps, and clarifying the extent, range, and nature of available evidence (149), especially where interventions are complex and inconsistently reported. This scoping review provides a foundational overview of how opioid deprescribing strategies are currently designed and delivered at care transitions, and where implementation barriers and opportunities lie.

## 2.2 Original article

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REVIEW ARTICLE

# Implementability of opioid deprescribing interventions at transitions of care: A scoping review

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## Abstract

Continuation of opioids at transitions of care increases the risk of long-term opioid use and related harm. To our knowledge, no study has examined the implementability of opioid deprescribing interventions at transitions of care. Our scoping review aimed to identify the type of opioid deprescribing interventions employed at transitions of care and assess the implementability of tested interventions. Nine electronic databases were searched on 15 May 2023 for English-language studies of adults transitioning between care settings, where opioid deprescribing interventions targeting patients, clinicians or health systems were implemented. Implementability was assessed using the Cochrane Intervention Complexity Assessment Tool for Systematic Reviews to determine intervention complexity, and mapped to the Reach, Effectiveness, Adoption, Implementation, Maintenance (RE-AIM) framework to understand the process evaluation. A total of 79 studies were identified, with 94.0% ($n = 74$) examining hospital-to-home transitions. Mixed interventions (combination of pharmacological and nonpharmacological) were tested in 49.0% ($n = 39$) of studies. Pharmacological interventions were identified in 31.0% ($n = 24$) of studies, and the remaining 20.0% ($n = 16$) applied nonpharmacological interventions. Mixed interventions comprising multiple components were the most complex and resulted in reduced opioid use across transitions of care in 28.0% ($n = 22$) of studies. Few studies reported on RE-AIM dimensions including implementation (5.0% of studies), reach (4.0%), adoption (4.0%) and maintenance (0%). Most opioid deprescribing interventions targeted hospital to home care transition with mixed results in opioid deprescribing. Further research should consider the implementability of interventions during transitions of care to elucidate the impact of opioid deprescribing interventions across care settings.

KEYWORDS
deprescribing, opioid analgesics, transitions of care

## 1 | INTRODUCTION

Opioid-related harm is a serious and global public health issue. During the period of 2019 to 2020, fatal opioid overdoses increased by 37% in the USA and by 72% in Canada.[1] Similarly, in Australia, all opioid-related deaths have increased since 2001, contributing to 49.8% of unintentional drug-induced deaths in 2021.[2,3] The persistent use of opioids and associated harms are particularly problematic in surgical patients. Evidence suggests that 59% of surgical patients receive opioids at hospital discharge[4] and are at a heightened risk of long-

term opioid use,[5,6] falls and fractures,[7] hospitalization,[8] opioid-use disorder,[9] and fatal overdose.[10] As such, interventions to facilitate opioid deprescribing, defined as the process of medication dose reduction or cessation, supervised by a health care professional[11] are increasingly being implemented to improve judicious opioid use and minimize opioid-related harm.[12]

Transitions of care are defined as *a set of actions to ensure patient coordination and continuity of care as patients transfer between different locations or levels*.[13] The World Health Organization has identified that care transitions are time-points of enhanced clinical risk,[14] and there is growing literature demonstrating a significant link between patient handovers and adverse events.[15] Opioid continuation between wards in a hospital setting is associated with increased quantities of opioids prescribed at the transition from hospital to home, resulting in increased outpatient opioid use.[9,16–18] Accordingly, transitions of care are critical points in determining how to safely prescribe or deprescribe medications.[19] Discontinuity of care within the health system is a key barrier to opioid deprescribing, with greater guidance on weaning of analgesics when a patient transitions from hospital to home, and improved communication between hospital and community prescribers during transition of care being required.[19,20]

Previous reviews have evaluated opioid deprescribing interventions during patients' hospital admission or when stabilized in the community setting.[21–25] Such reviews identified heterogenous interventions and found mixed results in the effectiveness of interventions to reduce or discontinue opioids. However, an examination of interventions to support opioid deprescribing at the point of care transition has yet to be investigated. Further, determining the level of complexity of such interventions and an evaluation of their implementability at care transition is lacking. This is essential to understand how interventions can be translated into real-world practice, and facilitate the translation of effective interventions into meaningful and impactful outcomes for patients in a sustainable manner. Such findings may inform evidence-based policy and practice initiatives to support safe and effective opioid use across care settings. Therefore, the aim of this scoping review was to identify the types and characteristics of interventions that have been tested to deprescribe opioids at transitions of care and to determine the implementability of interventions.

## 2 | METHODS

### 2.1 | Design and reporting

We conducted a scoping review with a systematic search strategy[26] in adherence with the Preferred Reporting Items for Systematic Reviews and Meta-analyses extension for scoping reviews (PRISMA-ScR).[27] A scoping review methodology was chosen to identify key characteristics of opioid deprescribing interventions and assess their implementability.[28] The review protocol was registered on Open Science Framework (osf.io/egr5h).

### 2.2 | Search strategy and study selection

On 15 May 2023, we conducted a search across the following 9 databases and registries: MEDLINE, EMBASE, Cochrane Library, CINAHL, PsycINFO, Cochrane Central Register of Controlled Trials, ClinicalTrials.gov, World Health Organization International Clinical Trials Registry Platform and International Pharmaceutical Abstracts. There were 3 main concepts for the search: *opioids*, *transitions of care* and *deprescribing*. We consulted an academic librarian to assist in the development of the search terms (Appendix 1).

All identified citations were imported into Endnote and duplicates removed. Titles and abstracts were screened independently using the predefined inclusion and exclusion criteria by 1 reviewer (J.W.). A second independent reviewer (A.L. or M.S.) conducted a 10% screening audit to ensure consistency and accuracy. Agreement was reached through discussion between 2 authors and if consensus could not be achieved, arbitration was provided by a third reviewer.

### 2.3 | Eligibility criteria

We included randomized and observational studies published in English that included patients aged 18 years or older who transitioned across different care settings (e.g. hospital to community, ward to ward, or hospital to hospital). We included studies with a deprescribing intervention that targeted patients, clinicians or health systems with an intention to dose reduce or cease any opioid analgesic. We excluded studies that focused on paediatric patients, patients living with cancer-related pain, palliative care patients, nonhuman studies and systematic reviews.

### 2.4 | Data extraction

The first author (J.W.) independently extracted data from eligible studies using a standardized data extraction form. The data extracted included study author, year of publication, country, study design, sample size, target group, transition of care, indication for opioid use, type of intervention, description of the intervention, duration of intervention, length of follow-up, opioid use and study results. Opioid use as an outcome measure was standardized for comparison between studies via conversion of results to oral morphine equivalents (OME).[29]

Interventions were categorized into 3 broad categories: (i) pharmacological; (ii) nonpharmacological; and (iii) mixed. Pharmacological interventions were defined as interventions that involved the use of pharmaceutical drug(s). Nonpharmacological interventions were defined as interventions with a psychological approach, education, counselling or physical/alternative therapies. Mixed interventions were defined as interventions that involved both the use of pharmacological and nonpharmacological components.

We assessed implementability as the complexity and implementation of interventions. The Intervention Complexity Assessment Tool for Systematic Reviews (iCAT_SR)[30] was used to determine the

complexity of each intervention, by grading the intervention components and their delivery from *low* to *high* complexity across a set of dimensions. An overall complexity score was not calculated as it may provide an overly simplistic view of intervention complexity, and some complexity dimensions may carry more weight than others.[31] The Reach, Effectiveness, Adoption, Implementation, Maintenance (RE-AIM) framework[32] was applied to determine which implementation elements were assessed and reported in each study. *Reach* determines the proportion of participants willing to engage. Opioid reduction or cessation across transitions of care were considered measures of *Effectiveness*; *Adoption* focused on intervention agent's willingness to apply the intervention; *Implementation* assessed the intervention fidelity; and *Maintenance* captured the sustainability of the intervention.

### 2.5 | Critical appraisal of studies

A risk of bias assessment was conducted by first author J.W., followed by a second independent 10% audit by a coauthor (A.L.), with discrepancies discussed to reach consensus. Randomized studies were assessed using the Cochrane Risk Of Bias Assessment Tool (ROB-2),[33] and observational studies were assessed with the Risk Of Bias In Non-randomised Studies of Interventions (ROBINS-I)[34] tool.

### 2.6 | Data synthesis

The study characteristics were reported descriptively and grouped according to intervention type: pharmacological, nonpharmacological and mixed, then alphabetized based on author. Due to the clinical heterogeneity of the results, a narrative synthesis was presented.

The type of intervention and frequency of outcomes captured at the different phases of transition were visualized using Plotly library[35] of the Python programming language[36] to generate a parallel categories diagram. For this analysis, studies were categorized into 3 common cohorts; (i) orthopaedic surgery; (ii) nonorthopaedic surgery; and (iii) noncancer pain. These categories were not mutually exclusive. We recorded the characteristics of the surgery as reported in the studies. We selected these categories because they are considered common[37,38] and can provide generalisability of findings across cohorts by grouping similar clinical conditions. Orthopaedic surgery was defined as patients undergoing knee, hip or shoulder arthroplasty or other surgeries involving the musculoskeletal system. Nonorthopaedic surgeries were defined as patients undergoing gastric bypass surgery, cholecystectomy, or surgeries that do not involve the musculoskeletal system. Noncancer pain conditions included chronic noncancer pain, abdominal pain or trauma-related pain.

## 3 | RESULTS

The search yielded a total of 18 390 records. After the removal of duplicates and screening, 79 studies were included in the review (Figure 1).[39] Within the included results, 94.0% ($n = 74$) assessed the transition of care from hospital to home, of which 28.0% ($n = 22$) were randomized and 72.0% ($n = 57$) were nonrandomized studies. Intrahospital transitions of care were reported in 6.0% ($n = 5$) of studies, such as *Ward to Ward* or *Intensive Care Unit (ICU) to Ward*. No hospital-to-hospital or hospital to nursing home transitions were identified. Of the included studies, 45.0% ($n = 36$) examined patients undergoing orthopaedic surgery, 28.0% ($n = 22$) studied noncancer pain and 27.0% ($n = 21$) studied nonorthopaedic surgery patients.

Mixed interventions were tested in 49.0% ($n = 39$) of studies, followed by pharmacological interventions in 31.0% ($n = 24$) and the remaining 20.0% ($n = 16$) applied nonpharmacological interventions. The included studies ($n = 79$) are summarized in Table 1.

### 3.1 | Types of interventions

Among the studies that examined the transition from hospital to home, pharmacological interventions were identified in 24.0% ($n = 19$) of studies. These interventions included intrathecal injection,[40] anaesthetic blocks,[41,42] reduced opioid supply,[43,44] and blisterpacks with scheduled doses of paracetamol, celecoxib and pregabalin.[45] Nonpharmacological interventions also commonly targeted patients, and were identified in 20.0% ($n = 16$) of the studies which included the dissemination of educational pain management resources,[46–48] analgesic/pain stewardship services,[49–51] video-based opioid education,[52,53] and occupational and physical therapy.[54] Among 47.0% ($n = 37$) of studies using mixed interventions that targeted both surgical and nonsurgical patients with pain, the interventions included psychological, education or counselling components coupled with the supply of various analgesia regimens with the aim of reducing opioid usage. Examples include multidisciplinary tapering programmes,[55,56] multimodal opioid-sparing and education protocols,[57–63] transitional pain services,[55–60,62–81] enhanced recovery after surgery programmes[79–83] and patient education sessions.[84–87] In contrast, 1 mixed intervention study used a quality improvement bundle[88] to target patients, physicians and nurses, and another study targeted physicians and multiple hospitals by implementing a computerized order set coupled with provider education.[89]

In studies that examined the transitions of care within the hospital setting, there was no use of nonpharmacological or mixed interventions, but only pharmacological interventions. These included the use of ketamine via intravenous infusion,[90,91] intravenous paracetamol,[92] intravenous ibuprofen[93] and a multimodal analgesic protocol order set.[94] All 3 types of interventions were applied and identified in patients undergoing orthopaedic surgery, noncancer pain and nonorthopaedic surgery.

### 3.2 | The implementability of interventions

Pharmacological and nonpharmacological interventions ranged from single-component (low complexity)[40,41,43,46,51,54,90,95–101] to

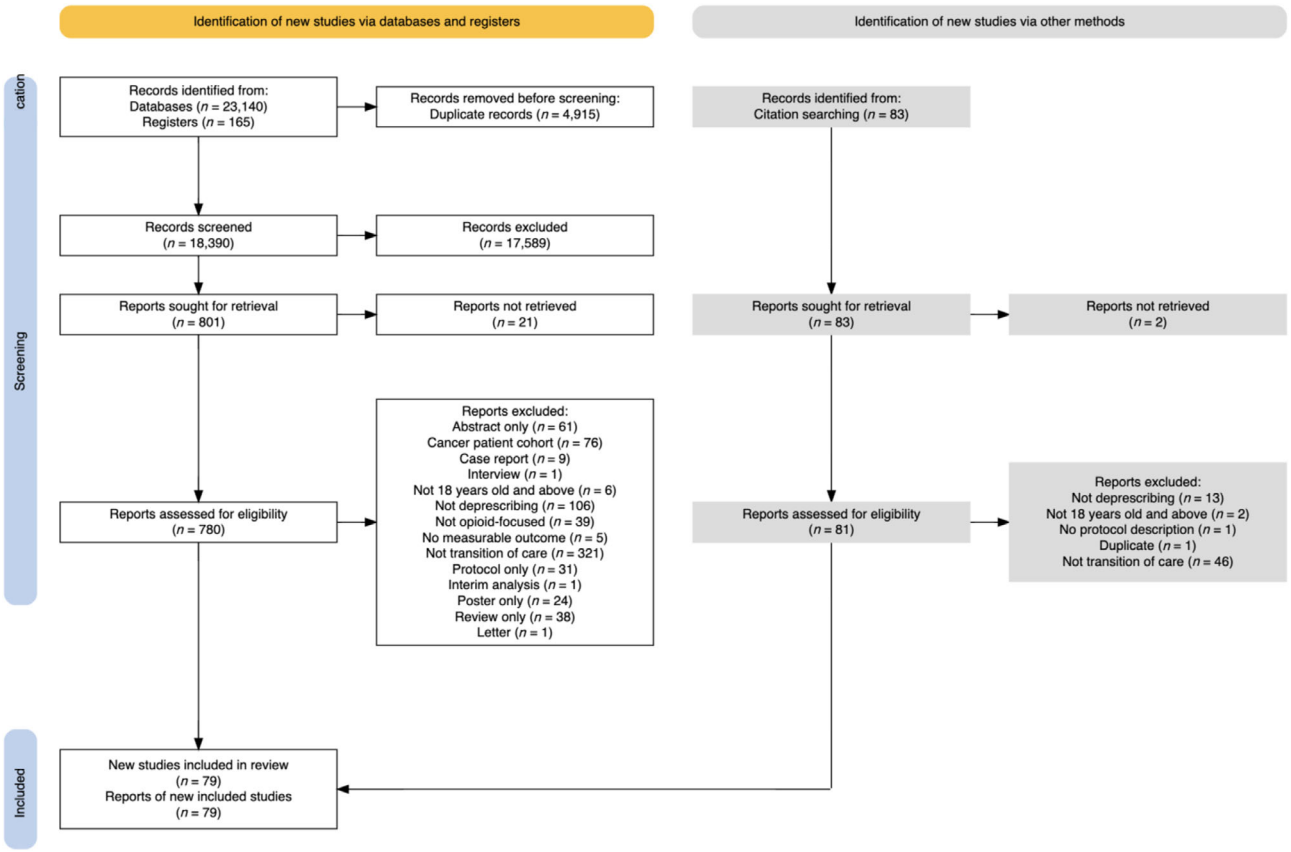


**FIGURE 1** PRISMA flow diagram.

multicomponent (high complexity) interventions.[42,44,45,47–50,52,53,102–107] Mixed interventions had an overall higher level of component complexity[55–58,60–68,76,79,83,85,87,89,108–110] compared to pharmacological and nonpharmacological approaches and heterogeneity was identified in targeted behaviours and actions, organizational change, and intervention modification flexibility (Appendix 2). Mixed interventions either used components collectively or performed a series of chronological steps, such as providing preoperative education, implementing multimodal analgesia, delivering discharge education and conducting postdischarge follow-up.[55–58,60–68,76,79,83,85,87,89,108–110]

As per the RE-AIM framework, *Reach* was evaluated in 6.0% ($n = 5$) of studies examining patients with noncancer pain[55,74,77,111] and orthopaedic surgery[54] via number of methods, such as recording attendance of training physicians of an opioid safety initiative,[111] descriptive results of facilitators and barriers to intervention completion or assessing completion rates of a rehabilitation programme[77] (Appendix 3).

Across the interventions identified in the included studies, interventions involving a multimodal opioid-sparing protocol or a multidisciplinary team reported a reduction in opioid use across transitions of care. However, nonpharmacological interventions did not appear to lead to reduction in opioid use (see Table 1). In studies reporting hospital to home transition, measures of *Effectiveness* were most commonly captured from the point of transition (Figure 2) and varied in the way they reported effectiveness (Appendix 4). Only 1 randomized trial assessed the effect of a mixed intervention at hospital discharge.[57] This trial used a multimodal opioid-sparing protocol with an educational infographic and reported a significant difference in the OME provided at discharge between the intervention group and control group (40.4 OME *vs.* 341.2 OME, mean difference of 300.8 OME, $P < .001$). Similarly, mixed interventions with a nonrandomized study design also reported a between-groups reduction in OME provided at discharge.[59,62,64,66,67,69,72,75,76,78,81,82,85,88,89,112] Among nonpharmacological interventions, only 1 randomized study[53] found that video education targeting patients did not reduce or cease opioids at discharge from hospital to home between the intervention and control group (210 OME *vs.* 210 OME, $P = .264$), and among nonrandomized studies, none assessed opioid reduction or cessation at discharge. Similarly, randomized studies that employed pharmacological interventions did not commonly assess opioid reduction or cessation at discharge; however, nonrandomized studies using pharmacological interventions such as electronic analgesia pain protocols[102,103,113,114] reported a significant difference in total OME received at discharge between groups ($P < .03$).

*Adoption* was captured in a noncancer pain study[114] and nonorthopaedic surgery study[67] that both explored challenges with staff who lacked familiarity with some nonopioid analgesics, and adherence measures by physician and patient to the study protocol. *Implementation* was measured in 5.0% ($n = 4$) of studies, also in patients with noncancer pain[53,55,70] and nonorthopaedic surgery[89] through

**TABLE 1** Study characteristics.

| Author, year, country | Target cohort | Study design: intervention (I) *vs.* comparator (C) | Outcomes measured | Reduction of opioid: pretransition, at transition, or post-transition; longest time to follow-up |
|---|---|---|---|---|
| **Pharmacological** | | | | |
| Boekel *et al.* 2023, Australia | Adults undergoing shoulder replacement | 3-arm RCT: (I) ultrasound-guided interscalene block ($n = 39$), (C) arthroscopic guidance suprascapular nerve block ($n = 39$), (C) ultrasound-guided suprascapular nerve block ($n = 40$) | Prescribed opioid requirement inpatient and postdischarge | Post-transition: the median 8-day OME dose for the US +ISB group 8-day was 130, the US+SSANB median OME dose was 113.5 and the A+SSANB median OME dose was 123 ($P = .063$); 8-days postop |
| Burton *et al.* 2022, USA | Adults with rib fractures | Retrospective cohort study: (I) multimodal pain regimen (MMPR; $n = 330$) *vs.* pre-MMPR ($n = 323$) | Proportion of people prescribed opioids on discharge and total opioid (OME) on discharge | At transition: there was a significant reduction in the total MME prescribed at discharge (median, 315.0; IQR, 210–488 MME PRE *vs.* median, 225; IQR, 180–375 MME POST; $P = .03$); at discharge |
| Carver *et al.* 2018, USA | Adults with rib fractures | Prospective DB-RCT: low-dose ketamine ($n = 46$) *vs.* normal saline ($n = 46$) | Prescribed opioid requirement inpatient | Not reported |
| Davidson *et al.* 2020, USA | Women undergoing pelvic surgery | Single-centre, unmasked, 2-arm, RCT: reduced quantity of oxycodone ($n = 59$), *vs.* routine quantity of oxycodone ($n = 59$) | Opioid consumption postdischarge (self-reported) | Post-transition: patients in the routine arm used more opioid tablets, with a median number of 4.5 OME, compared with 1.5 OME in the reduced arm ($P = .03$); 6 week |
| Donthula *et al.* 2021, USA | Patients with burn injuries. | Retrospective cohort study: pain therapy protocol ($n = 174$) *vs.* preprotocol cohort ($n = 495$) | Proportion of people prescribed opioids on discharge | Not reported |
| Eisenach *et al.* 2023, USA | Patients undergoing hip replacement | DB-RCT: intrathecal oxytocin injection ($n = 44$) *vs.* saline injection ($n = 46$) | Prescribed opioid requirement inpatient | Not reported |
| Fleischman *et al.* 2019, USA | Patients undergoing hip replacement | 3-arm RCT: (I) opiate-sparing policy ($n = 77$) *vs.* (C) MMPR ($n = 79$), (C) no standard dose regimen ($n = 79$) | Prescribed opioid requirement inpatient | Not reported |
| Flowers *et al.* 2021, USA | Patients undergoing spinal surgery | RCT: conditioning with open label placebo ($n = 26$), *vs.* usual care ($n = 25$) | Self-reported opioid use | Not reported |
| Girgiss *et al.* 2022, USA | Patients undergoing nephrolithotomy | Quality improvement project: ERAS ($n = 55$) *vs.* no-ERAS protocol ($n = 66$) | Opioid requirement at discharge | At transition: ERAS patients received lower OME than non-ERAS cohort upon discharge (64.23 OME *vs.* 123.62 OME, $P = .0005$); at discharge |
| Hamrick *et al.* 2019, USA | Trauma patients | Retrospective, pre–post cohort study: multimodal analgesic protocol order set ($n = 62$) *vs.* no order set ($n = 65$) | Prescribed inpatient opioid requirement | Not reported |
| Hannon *et al.* 2019, USA | Patients undergoing hip or knee replacement | Prospective, single-centre, single-blinded RCT: (I) 30 pills of 5 mg oxycodone ($n = 200$) *vs.* (C) 90 pills of 5 mg oxycodone ($n = 218$) | Proportion requiring opioids and self-reported opioid consumption postdischarge | At transition: at 30 days postdischarge, difference in OME consumption was (455.8 ± 320.9 OME *vs.* 461.9 OME ± 387.3, $P = .881$); 90 days |
| Joo *et al.* 2020, USA | Patients undergoing spinal surgery | Retrospective cohort study: (I) opioid tapering protocol ($n = 38$) *vs.* (C) preprotocol cohort ($n = 45$) | Prescribed opioid requirement at discharge and self-reported opioid consumption postdischarge | At transition: total OME in the preintervention group discharge scripts had 630 (400–900) compared with 280 (90–450) in the postintervention group ($P < .01$) Post-transition: from discharge through to 6-weeks postop, the preintervention group had a total oral OME |

**TABLE 1** (Continued)

| Author, year, country | Target cohort | Study design: intervention (I) *vs.* comparator (C) | Outcomes measured | Reduction of opioid: pretransition, at transition, or post-transition; longest time to follow-up |
|---|---|---|---|---|
| | | | | of 900 compared to 300 in the postintervention group ($P < .01$); 6 weeks |
| Li *et al*. 2021, USA | Patients undergoing knee surgery | Prospective 2-arm RCT: (I) multimodal pain management (MMPM; $n = 111$) *vs*. (C) opioid-only (OO) regimen ($n = 105$) | Proportion requiring opioids and self-reported opioid consumption postdischarge | Post-transition: at 30-days postop, OME consumption in the OO group was 582.5 OME, whilst the MMPM cohort was 386.4 OME ($P = .0006$). The average number of opioid pills consumed at 30 days was 91.8 and 60.4 for OO and MMPM cohorts respectively ($P = .0004$); 30 days |
| Motov *et al*. 2018, USA | Patients with renal colic presenting to ED | 2-goup, 3-phase study: in the ED, 1746 patients in preimplementation phase, 823 patients during an implementation phase and 1224 patients in postimplementation phase. At discharge, 1716 patients in preimplementation phase, 804 during an implementation phase and 1013 patients in postimplementation phase | Prescribed opioid requirement at discharge and proportion prescribed opioids postdischarge | At transition: there was a 25.49% reduction in total prescriptions of opioids and 23.2% in only opioid prescriptions; at discharge |
| Munoz-Leyva *et al*. 2022, Canada | Patients undergoing knee replacement | Prospective DB-RCT: (I) preoperative additional analgesic interventions preoperative iPACK block, intraoperative IV dexmedetomidine and ketamine, postoperative adductor canal block injections, postoperative IV dexamethasone ($n = 39$) *vs*. (C) usual care ($n = 39$) | Self-reported opioid consumption postdischarge | Not reported |
| Osmundson *et al*. 2018, USA | Women undergoing caesarean | RCT: (I) individualized prescription ($n = 94$) *vs*. (C) standard discharge prescription ($n = 96$) | Opioid prescribed postdischarge | Post-transition: intervention cohort used approximately 50% fewer oxycodone tablets after discharge (8 *vs*. 15, $P < .001$); 14 days |
| Padilla *et al*. 2019, USA | Patients undergoing hip replacement | Retrospective, pre–post observational cohort study: (I) opioid-tapering protocol ($n = 366$) *vs*. (C) usual care ($n = 303$) | Opioid requirement prescribed in hospital and postdischarge | Post-transitions: similarly, from the time of discharge to 90 days after surgery, the opioid-sparing cohort received significantly fewer opioids than the traditional cohort (13.9 ± 24.2 *vs*. 80.1 ± 55.9 OME, $P < .001$); 90 days |
| Pettersson *et al*. 2005, Sweden | Patients undergoing coronary artery bypass graft surgery | Prospective RCT: (I) intravenous paracetamol ($n = 40$) *vs*. (C) oral paracetamol ($n = 40$) | Opioid requirement prescribed in hospital | Not reported |
| Reagan *et al*. 2017, USA | Patients undergoing pelvic surgery | RCT: (I) multimodal pain management ($n = 68$) *vs*. (C) usual care ($n = 70$) | Proportion prescribed opioid after discharge | Post-transition: patients in the multimodal arm used fewer narcotics (121.3 + 103.7 mg *vs*. 153.0 + 113.8 mg, $P = .139$). After 1-week postoperative, patients in the multimodal arm used fewer narcotics than the usual arm patients (195.9 + 147.2 mg *vs*. 304 + 162.1 mg, $P < .001$; 9 days |
| Sadatsune *et al*. 2016, Brazil | Patients undergoing wrist surgery | Prospective DB-RCT: (I) 600 mg gabapentin presurgery ($n = 20$) *vs*. (C) placebo presurgery ($n = 20$) | Proportion prescribed opioid after discharge | Not reported |
| | Trauma patients | | | Not reported |

(Continues)

**TABLE 1** (Continued)

| Author, year, country | Target cohort | Study design: intervention (I) *vs.* comparator (C) | Outcomes measured | Reduction of opioid: pretransition, at transition, or post-transition; longest time to follow-up |
|---|---|---|---|---|
| Singer *et al.* 2021, USA | | Retrospective, single-centre, pre–post cohort study: (I) multimodal pain management protocol ($n = 325$) *vs.* (C) preprotocol cohort ($n = 295$) | Opioid prescribed as inpatient and proportion prescribed opioid after discharge | |
| Swenson *et al.* 2022, USA | Patients undergoing knee surgery | RCT: (I) blisterpack with scheduled analgesia ($n = 50$) *vs.* (C) rescue analgesia ($n = 49$) | Self-reported opioid consumption | Not reported |
| Walters *et al.* 2018, USA | Patients with rib fractures | Retrospective case–control study: (I) low-dose ketamine ($n = 15$) *vs.* (C) usual care ($n = 15$) | Self-reported opioid consumption | Not reported |
| Weisz *et al.* 2020, USA | Orthopaedic trauma patients | DB-RCT: (I) intravenous ibuprofen ($n = 53$) *vs.* (C) placebo ($n = 44$) | Opioid requirement prescribed in hospital | Not reported |
| **Mixed** | | | | |
| Berube *et al.* 2022, Canada | Trauma patients | 2-arm, pilot RCT: (I) tapering opioids prescription programme ($n = 25$) *vs.* (C) usual care with educational pamphlet ($n = 24$) | Prescribed opioid requirement inpatient and postdischarge | Post-transition: experimental group used less mean OME/day than the control group at 6 (1.2 *vs.* 12.2) and 12 weeks (0.4 *vs.* 4.1); 12 weeks |
| Buys *et al.* 2020, USA | Patients undergoing orthopaedic surgery | Retrospective cohort study: (I) transitional pain service ($n = 164$) *vs.* (C) preservice cohort ($n = 172$) | Prescribed opioid requirement at discharge and cessation of opioid use | At transition: there was a reduction in the number of opioid tablets prescribed to patients (post-transitional pain service: 45 [25,60] *vs.* pretransitional pain service: 80 [60,90]; $P < .001$); at discharge |
| Ciriello *et al.* 2022, USA | Patients with vaso-occlusive crisis | Retrospective, pre–post observational cohort study: (I) pain management protocol ($n = 60$) *vs.* preprotocol cohort ($n = 138$) | Opioid requirement prescribed in hospital | Not reported |
| Featherall *et al.* 2022, USA | Patients undergoing joint replacement | Historical control, interventional study: (I) multidisciplinary transitional pain management programme ($n = 137$) *vs.* (C) no programme ($n = 71$) | Opioid requirement prescribed at discharge and after discharge | At transition: Transitional Pain Service (TPS) group were prescribed fewer opioid tablets on discharge than the non-TPS group (24 *vs.* 85 tabs, $P < .001$)<br>Post-transition: mean number of tablets prescribed within the 90-day postdischarge interval was fewer in the TPS group (49 tabs *vs.* 119 tabs, $P < .001$); 6 months |
| Gazendam *et al.* 2022, Canada | Patients undergoing knee or shoulder replacement | Multicentre, parallel, superiority RCT: (I) multimodal opioid-sparing protocol ($n = 95$) *vs.* (C) standard care group ($n = 98$) | Opioid requirement prescribed at discharge, postdischarge and proportion of people requiring opioid refills postdischarge | At transition: the opioid-sparing group had fewer OME (mean, 40.4 mg; 95%CI, 39.6–41.2) compared with the standard care group (mean, 341.2 mg; 95%CI, 310.2–372.2), with a mean dose of 300.8 mg (95%CI, 269.4–332.3; $P < .001$)<br>Post-transition: the mean number of OME consumed at 6 weeks after surgery in the standard care group was 72.6 mg, compared to 8.4 mg in the opioid-sparing group ($P < .001$); 6 weeks |
| Hartford *et al.* 2018, Canada | Patients undergoing cholecystectomy | Prospective, pre–post study: (I) the STOP Narcotics intervention ($n = 192$) *vs.* (C) preprotocol cohort ($n = 224$) | Opioid requirement prescribed at discharge, proportion of people requiring | At transition: the median total OME for prescriptions filled in the postintervention group were significantly |

**TABLE 1** (Continued)

| Author, year, country | Target cohort | Study design: intervention (I) *vs.* comparator (C) | Outcomes measured | Reduction of opioid: pretransition, at transition, or post-transition; longest time to follow-up |
|---|---|---|---|---|
| | | | opioid refills postdischarge and proportion that ceased opioid use | less (100; IQR 75 to 116 preintervention *vs.* 50; IQR 50 to 50 post intervention; $P < .001$); at discharge |
| Holeman *et al.* 2022, USA | Patients undergoing elective surgery | Retrospective cohort study: (I) transitional pain service ($n = 341$), no comparator | Proportion that ceased opioid use | Not reported |
| Holland *et al.* 2019, USA | Patients undergoing caesarean | Pre–post study: (I) quality improvement bundle ($n = 206$) *vs.* (C) preprotocol cohort ($n = 208$) | Opioid requirement prescribed inpatient, proportion requiring opioids on discharge and opioid prescribed at discharge | At transition: those discharged with a prescription from a median of 157.5 mg of OME in the preintervention group to a median of 112.5 mg of OME in the postintervention period ($P < .001$); at discharge |
| Holman *et al.* 2014, USA | Patients undergoing orthopaedic surgery | Retrospective surgeon-controlled cohort study: (I) preoperative counselling + 6 weeks of opiate supply ($n = 292$) *vs.* no counselling + 12 weeks of opiate supply ($n = 321$) | Proportion that ceased opioid use | Not reported |
| Jildeh *et al.* 2021, USA | Patients undergoing shoulder replacement | Prospective RCT: (I) multimodal nonopioid analgesic protocol + education pamphlet ($n = 17$) *vs.* (C) usual care ($n = 23$) | Opioid requirement in hospital | Post-transition: in the control group, highest opioid consumption was reported on POD 1–3 (ranged from 21.2 MME to 28.3 MME) and lowest on POD8–10 (5.4 MME to 8.3 MME). In the nonopioid group, POD 1–3 ranged from 2.8MME to 3.7 MME and 2.1MME to 3 MME on POD8–10, nil significant |
| Kaimakliotis *et al.* 2021, USA | Patients admitted with Irritable bowel syndrome | Single-centre interventional study: (I) analgesic decision support tool ($n = 41$) *vs.* (C) pretool cohort ($n = 40$) | Opioid requirement in hospital and proportion prescribed opioid at discharge | Not reported |
| Kay *et al.* 2022, USA | Patients admitted to trauma | Retrospective cohort study: (I) multimodal pain regimen ($n = 1723$) *vs.* (C) preprotocol cohort ($n = 1755$) | Opioid requirement prescribed at discharge and proportion that ceased opioid use | At transition: median opioid OME prescribed on hospital discharge decreased from 15 in the PRE group to 1.2 in the POST group ($P < .0001$). The median number of prescribed tablets decreased from 15 to 10 ($P < .0001$); at discharge |
| Laksono *et al.* 2022, Canada | Patients undergoing caesarean | Quality improvement project: (I) intervention bundle targeting healthcare professionals, patients and educational handout($n = 1226$) *vs.* (C) prebundle ($n = 1352$) | Opioid requirement prescribed at discharge | At transition: opioids prescribed decreased from a mean of 97.6 OME in 2018 to a mean of 35.8 OME in 2019 ($P < .001$); at discharge |
| Lamm *et al.* 2022, USA | Patients undergoing general surgery | 3-arm cohort study: (I) opioid-sparing ($n = 42$), (I) zero-opioid ($n = 29$), (C) control ($n = 58$) | Opioid requirement prescribed postdischarge | Post-transition: total OME after discharge were significantly reduced from Control (46 [37.5–75]) to (15 [11–22.5]) in the opioid-sparing cohort and further reduced to zero in the zero-opioid cohort ($P = .0001$); 30 days |
| Landau *et al.* 2021, USA | Hospital obstetric and anaesthesia providers | Multisite retrospective cohort study: (I) multimodal opioid-sparing analgesic computerized order set + provider education at Intervention hospitals (preintervention = 246 and | Opioid requirement prescribed in hospital and at discharge | At transition: the intervention group had a mean reduction in the number of oxycodone pills prescribed (from 45 OME preintervention to 27 OME postintervention); at discharge |

(Continues)

**TABLE 1** (Continued)

| Author, year, country | Target cohort | Study design: intervention (I) *vs.* comparator (C) | Outcomes measured | Reduction of opioid: pretransition, at transition, or post-transition; longest time to follow-up |
|---|---|---|---|---|
| | | postintervention = 224). (C) Usual care at control hospitals (preintervention = 728 and postintervention = 2255) | | |
| Layson *et al*. 2022, USA | Patients undergoing joint replacement | Pre–post study: (I) the Michigan Arthroplasty Registry collaborative quality initiative ($n = 84\,988$), comparing opioid-tolerant *vs*. opioid-naïve knee replacement and hip replacement | Opioid requirement prescribed at discharge | At transition: in January 2018, the mean OME on discharge for total hip arthroplasty opioid-naive patients were 530.2 compared to 280.3 in December 2019. For total hip arthroplasty opioid-tolerant patients, the mean OME began at 684.6 in January 2018 and decreased to 319.1 by December 2019. During this same period, total knee arthroplasty opioid-naive patients went from an average of 608.5 OME per prescription and decreased to 315.4. Total knee arthroplasty opioid-tolerant patients went from 756.2 OME to an average of 390.5 at discharge |
| Lin *et al*. 2023, Australia | Patients undergoing knee or hip replacement | Multicentre prospective observational study: (I) multidisciplinary programme ($n = 1444$), no comparator | Proportion requiring prescription opioids postdischarge | Not reported |
| Lindner *et al*. 2023, USA | Patients undergoing pancreas transplant | Single-centre, retrospective study: (I) multidisciplinary, multimodal pain management protocol ($n = 21$), *vs*. (C) preprotocol ($n = 31$) | Proportion of people prescribed opioids at discharge | Not reported |
| Loomis *et al*. 2022, USA | Patients undergoing caesarean | Single group pre/post survey: (I) patient-centred shared-decision process ($n = 51$), no comparator | Opioid requirement prescribed in hospital | Not reported |
| Malec *et al*. 1981, USA | Patients with chronic benign pain | Pre–post study: (I) pain management programme ($n = 32$), no comparator | Proportion prescribed opioids on discharge and proportion that ceased opioid use | Not reported |
| Murphy *et al*. 2022, Canada | Patients undergoing rehabilitation | Retrospective cohort study: (I) patient-centred multidisciplinary collaboration ($n = 448$) *vs*. no comparator | Opioid requirement in hospital, | Not reported |
| Oyler *et al*. 2018, USA | Patients with trauma injuries | Single-centre, retrospective cohort study: (I) opioid-minimizing pain strategy ($n = 424$) *vs*. (C) prestrategy cohort ($n = 489$) | Opioid requirement prescribed in hospital and at discharge | At transition: patients in the preintervention cohort had a significantly higher median daily OME than those in the postintervention cohort (90 OME *vs*. 45 OME, $P < .001$); at discharge |
| Oyler *et al*. 2022, USA | Patients with orthopaedic injury | Retrospective, pre–post observational cohort study: (I) multidisciplinary, multimodal analgesic protocol, personalized plan on discharge ($n = 378$) *vs*. (C) usual care ($n = 393$) | Opioid requirement prescribed in hospital and at discharge, proportion requiring opioid refills postdischarge and opioid requirement prescribed postdischarge | At transition: total days' supply of the discharge prescription issued (5.7 + 4.1 days *vs*. 8.1 + 6.2 days) was lower in the intervention cohort<br>Post-transition: total OME from prescriptions through postdischarge day 30 was lower in the intervention cohort 369 total OME *vs*. 809 total OME, $P < .001$); 90 days |

**TABLE 1** (Continued)

| Author, year, country | Target cohort | Study design: intervention (I) *vs.* comparator (C) | Outcomes measured | Reduction of opioid: pretransition, at transition, or post-transition; longest time to follow-up |
|---|---|---|---|---|
| Parker *et al.* 2023, USA | Patients undergoing orthopaedic surgery | Quality improvement initiative: (I) multidisciplinary, transition of care nurses, weaning set, education ($n = 706$) *vs.* preintervention ($n = 841$) | Opioid requirement in hospital and physician prescribing | Not reported |
| Patel *et al.* 2021, USA | Patients undergoing knee or hip replacement | Retrospective cohort study: (I) pharmacist-led standardized protocol ($n = 52$) *vs.* (C) preprotocol care ($n = 46$) | Opioid requirement prescribed at discharge | At transition: the standardized protocol cohort were prescribed 46% less cumulative OME at discharge per patient (560 *vs.* 300, $P < .001$); at discharge |
| Rendon *et al.* 2020, USA | Patients undergoing breast surgery | Retrospective, pre–post observational cohort study: (I) ERAS ($n = 59$) *vs.* (C) pre-ERAS cohort ($n = 46$) | Opioid requirement prescribed at discharge | At transition: the median total outpatient opioid use in the ERAS group was less than in the pre-ERAS group (337.5 OME *vs.* 668.8 OME, respectively; $P = .016$); at discharge |
| Rome *et al.* 2004, USA | Patients with chronic noncancer pain | Retrospective, 2-group pre–post design study: applying an intensive 3-week rehabilitation to an (I) opioid maintenance cohort ($n = 135$) *vs.* (C) nonopioid users ($n = 221$) | Proportion that ceased opioid use | Not reported |
| Syed *et al.* 2018, USA | Patients undergoing shoulder surgery | Prospective RCT: (I) preoperative narcotic education ($n = 70$) *vs.* (C) normal preoperative education ($n = 70$) | Opioid requirement prescribed postdischarge | Post-transition: at 2 weeks, the control group consumed on average 35.1 + 31.6 pills compared to 25.5 + 19.5 pills in the preoperative education group, a reduction of 19%. At 6 weeks, the control group consumed 60.6 + 61.2 pills compared to 40.4 + 39.1 in the preoperative education group, a reduction of 33%. At 3 months, the control group consumed 87.2 + 98.3 pills compared to 51.2 + 57.7 pills in the study group, a reduction of 42%; 3 months |
| Tabibian *et al.* 2015, USA | Patients undergoing bariatric surgery | Retrospective case–control study: (I) interdisciplinary intensive, outpatient 3-week programme ($n = 106$) *vs.* (C) pain rehab centre with no bariatric surgery patients ($n = 106$) | Opioid requirement prescribed in hospital and at discharge | At transition: mean morphine equivalent use was 95.1 + 137 ($n = 10$) for cases compared to 58.8 mg + 69.9 ($n = 7$, $P = .47$) for controls, including noncompleters; at discharge |
| Tamboli *et al.* 2020, USA | Patients undergoing hip replacement | Retrospective cohort study: (I) multidisciplinary patient-specific discharge protocol ($n = 24$) *vs.* (C) preprotocol cohort ($n = 25$) | Opioid requirement prescribed at discharge and postdischarge | At transition: the median dosage of opioid prescribed in OME was 675 (57–1035) PRE *vs.* 180 (18–534) POST ($P = .003$). This represented a mean difference of 387 (156–618) OME. The mean number of tablets prescribed at discharge was 82 (57) PRE *vs.* 34 (30) POST ($P < .001$). This mean difference was 48 (22–75) tablets<br>Post-transition: the total median OME dosage including discharge up to 6 weeks after surgery was 900 (57–2082) PRE *vs.* 295 (69–741) POST ($P = .007$); 6 weeks |
| Tan *et al.* 2023, USA | Patients undergoing bariatric surgery | Retrospective cohort study: (I) multimodal pain management protocol, pain education ($n = 167$) *vs.* (C) standard care ($n = 192$) | Opioid requirement prescribed in hospital and proportion requiring opioids at discharge | Not reported |

(Continues)

**TABLE 1** (Continued)

| Author, year, country | Target cohort | Study design: intervention (I) *vs.* comparator (C) | Outcomes measured | Reduction of opioid: pretransition, at transition, or post-transition; longest time to follow-up |
|---|---|---|---|---|
| Townsend *et al.* 2008, USA | Patients with chronic noncancer pain | Prospective, cohort study: intensive 3-week outpatient rehabilitation on (I) patients not taking opioids ($n = 160$) *vs.* (C) patients taking opioids ($n = 213$) | Opioid requirement prescribed in hospital and proportion of people requiring opioids on discharge | Not reported |
| Tran-McCaslin *et al.* 2022, USA | Patients undergoing colorectal surgery | Retrospective cohort study: (I) same-day discharge enhanced recovery pathway ($n = 37$) *vs.* no comparator | Opioid requirement prescribed postdischarge | Post-transition: mean total narcotic usage was 5.2 tabs of 5 mg oxycodone; 7 days postop |
| Uhrbrand *et al.* 2022, Denmark | Patients undergoing spine surgery | Investigator-initiated, prospective, single-centre RCT: (I) opioid-tapering plan with telephone counselling ($n = 55$) *vs.* (C) standard care, no tapering plan and no telephone call ($n = 55$) | Proportion of people that ceased opioid use | Not reported |
| Urban *et al.* 2021, USA | Patients undergoing knee replacement | Retrospective cohort study: (I) multimodal pain protocol with cryoneurolysis ($n = 169$) *vs.* (C) multimodal pain protocol without cryoneurolysis ($n = 98$) | Opioid requirement prescribed in hospital, at discharge and postdischarge | At transition: the mean total OME between the cryoneurolysis group and the control group was 660 (593–736) *vs.* 1154 (1044–1277; $P < .0001$) Post-transition: at week 2, the total OME between the cryoneurolysis group was 203 (114–361) *vs.* the control group 115 (64–208; $P = .0509$), cumulative OME was 855 (765–957) *vs.* 1312 (1182–1457; $P < .0001$). At week 6, the total OME between the cryoneurolysis group was 34(19–62)) *vs.* the control group 87 (48–159; $P = .0012$), cumulative OME was 894 (795–1004) *vs.* 1406 (1260–1570; $P < .0001$); 6 weeks |
| Van Horne *et al.* 2020, USA | Patients undergoing knee replacement or hip replacement | Retrospective cohort study: (I) ERAS programme ($n = 251$), *vs.* no comparator | Proportion requiring opioid refills postdischarge | Not reported |
| Wood *et al.* 2022, New Zealand | Patients undergoing knee replacement or hip replacement | Pilot study: (I) prescriber and patient education on discharge analgesia ($n = 201$) *vs.* preintervention usual care ($n = 211$) | Proportion prescribed opioids as inpatient | Not reported |
| Yao *et al.* 2023, China | Patients with ankle fractures | Retrospective cohort study: (I) ERAS programme ($n = 80$) *vs.* (C) non-ERAS ($n = 80$) | Opioid requirement prescribed in hospital | Not reported |
| Zorrilla-Vaca *et al.* 2021, USA | Patients with pulmonary resection | Retrospective observational study: (I) ERAS programme ($n = 111$) *vs.* (C) pre-ERAS cohort ($n = 111$) | Opioid requirement prescribed at discharge | At transition: the single chest drain group received significantly fewer opioid prescriptions at discharge compared with those treated with 2 chest drain (147 + 284 mg OME *vs.* 340 + 559 OME, $P < .01$); at discharge |

**TABLE 1** (Continued)

| Author, year, country | Target cohort | Study design: intervention (I) *vs.* comparator (C) | Outcomes measured | Reduction of opioid: pretransition, at transition, or post-transition; longest time to follow-up |
|---|---|---|---|---|
| Nonpharmacological | | | | |
| Bjørnnes *et al.* 2017, Norway | Patients undergoing cardiac surgery | RCT: (I) educational pain management booklet and supportive telephone follow-up ($n = 208$) *vs.* (C) usual care ($n = 208$) | Self-reported opioid use postdischarge | Not reported |
| Bloom *et al.* 2021, USA | Patients undergoing shoulder surgery | Single-centre randomized trial: (I) preoperative video-based opioid education ($n = 72$) *vs.* (C) usual care ($n = 72$) | Proportion requiring opioid refills postdischarge and opioid consumption postdischarge | Post-transition: at postop 1 week, the study group consumed 102.75 + 77.25 OME and the control group consumed 105 + 72.75OME ($P = .60$); 90 days |
| Chalmers *et al.* 2021, USA | Patients undergoing knee replacement | Prospective study comparing 2 states: (I) mandatory statewide opioid guidelines ($n = 72$) *vs.* (C) no guidelines ($n = 72$) | Proportion requiring opioid refills postdischarge and proportion that ceased opioid use | Not reported |
| Chapman *et al.* 1981, USA | Patients with chronic pain | Retrospective observational study: (I) rehabilitation ($n = 100$) *vs.* no comparator | Self-reported opioid consumption postdischarge | Post-transition: for propoxyphene, the mean daily intake (mg) was 42.45 *vs.* 40.8 at follow-up. For codeine, the mean daily intake was 19.5 at pretreatment *vs.* 6.75 at follow-up. For meperidine (Demerol), the mean daily intake at pretreatment was 8.3 *vs.* 2.5 at follow-up. For oxycodone (Percodan), the mean daily intake at pretreatment was 54 *vs.* 12 at follow-up; 30 months |
| Colloca *et al.* 2022, USA | Patients admitted with trauma injuries | Pre–post interventional study: (I) educational brochure ($n = 28$) *vs.* no comparator | Opioid requirement prescribed at discharge | At transition: opioid intake significantly dropped from an average of 42.26 OME (standard error of the mean = 5.55) per day, to an average of 16.98 (standard error of the mean = 4.08) prescribed OME per day (unadjusted $P = .047$); at discharge |
| Hill *et al.* 2018, USA | Prescribers | Pre–post nonrandomized interventional cohort study: (I) provider education ($n = 246$) *vs.* (C) pre-education cohort ($n = 642$) | Proportion requiring opioids refills postdischarge, self-reported opioid consumption postdischarge and proportion that ceased opioid use | Post-transition: the mean number of pills taken by patients prescribed by the pre-education doctors ranged from 4.5 OME to 14.7 OME *vs.* 2.7 OME to 11.25 in the posteducation doctors; 30 days |
| Hopkins *et al.* 2020, Australia | Prescribers and pharmacists | A cluster randomized controlled trial: In 2018, Pharmacist-led intervention unit ($n = 1369$) and control ($n = 1014$). In 2019: pharmacist-led intervention unit ($n = 973$) and control ($n = 706$) | Proportion requiring opioids at discharge and opioid refills postdischarge | Not reported |

(Continues)

**TABLE 1** (Continued)

| Author, year, country | Target cohort | Study design: intervention (I) *vs.* comparator (C) | Outcomes measured | Reduction of opioid: pretransition, at transition, or post-transition; longest time to follow-up |
|---|---|---|---|---|
| Kene *et al.* 2022, USA | Patients admitted through ED | Retrospective cohort study: (I) ED Opioid Safety Initiative ($n = 1\,587\,726$) *vs.* (C) preinitiative care ($n = 1\,013\,130$) | Proportion requiring opioids at discharge | Not reported |
| Lam *et al.* 2021, USA | Women undergoing caesarean | Prospective, RCT: (I) counselling and analgesia education handout ($n = 97$) *vs.* (C) usual care ($n = 99$) | Proportion requiring opioid refills postdischarge and opioid consumption postdischarge | Post-transition: the observed difference in reported use of opioids between study and control groups was not statistically significant (7.5 OME [IQR, 2 = 15] *vs.* 10.0 OME [IQR, 2 = 16]; P = 0.55). The difference in the proportion of prescribed opioids consumed between the study and control group was not significant (25.0% [6.7–50.0] *vs.* 33.3% [6.7–53.3]; P = 0.55); 42 days |
| Lung *et al.* 2022, USA | Patients undergoing knee replacement | Retrospective cohort study: (I) kinematic alignment ($n = 44$) *vs.* (C) mechanical alignment ($n = 57$) | Opioid consumption postdischarge | Post-transition: cumulative morphine equivalents consumption between KA *vs.* MA group was 578.1 + 397.3 *vs.* 1252.8 + 998 ($P < .001$); 3 months |
| Pritchard *et al.* 2021, USA | Patients undergoing hip and knee replacement | Retrospective cohort study: (I) occupational and physical therapy ($n = 14\,068$) *vs.* no comparator | Time to cessation of opioid use | Not reported |
| Rodriguez-Monguio *et al.* 2022, USA | Patients undergoing elective procedures. | Retrospective, observational quasi-experimental study: (I) medication reconciliation ($n = 379$) *vs.* (C) no medication reconciliation ($n = 23$) | Proportion that had opioid ceased | Not reported |
| Smith *et al.* 2023, USA | Patients undergoing hysterectomy | DB-RCT: (I) pneumoperitoneum pressure of 15 mmHg ($n = 13$) *vs.* (C) pneumoperitoneum pressure of 12 mmHg ($n = 13$) | Opioid requirement prescribed in hospital | Not reported |
| Tran *et al.* 2022, Australia | Patients undergoing knee replacement | Pre–post interventional cohort study: (I) postdischarge pharmacist review ($n = 52$) *vs.* (C) usual care ($n = 110$) | Proportion requiring opioid refills postdischarge | Not reported |
| Tseng *et al.* 2021, USA | Patients with trauma injuries | Prospective, pragmatic, cluster-randomized pilot study: (I) video-based opioid education programme ($n = 98$) *vs.* (C) no video ($n = 98$) | Opioid requirements prescribed in hospital, proportion requiring opioids on discharge, opioids prescribed at discharge and proportion requiring opioid refills postdischarge | At transition: the OME prescribed at discharge between the video education group and no video group was 210 *vs.* 210 ($P = .264$); at discharge |
| Urton *et al.* 2017, USA | Patients undergoing rehabilitation | Retrospective observational study: (I) clinical nurse pain specialist (CNS) programme ($n = 35$) *vs.* (C) no programme ($n = 37$) | Opioid requirement prescribed postdischarge | Post-transition: the most pronounced group difference in opioid change occurred from week 2 to week 3 (SMD, 0.47), where the CNS group experienced a greater decline in opioid consumption relative to the no CNS group; 3 weeks |

*Note*: Data are sorted by author alphabetically, year, country, target cohort, study design, intervention (sample), comparator (sample).
Abbreviations: CI, confidence interval; DB, double-blind; ED, emergency department; ERAS, enhanced recovery after surgery; IQR, interquartile range; MME, morphine mg equivalent; OME, oral morphine equivalents; POD, postoperative day; RCT, randomized controlled trial; SMD, standardized mean difference.

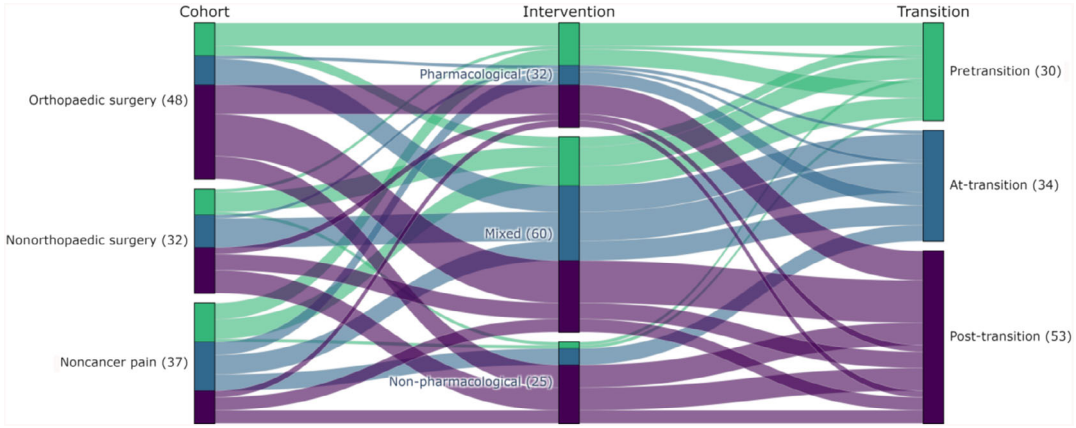


**FIGURE 2** Parallel categories diagram featuring the frequency of outcomes measured at different phases during transitions of care based on intervention type and target cohort. There was a total frequency of 117 outcomes captured.

assessing level of compliance to an intervention, ensuring viewership of video education,[53] and exercise programme compliance.[70] No studies investigated the *Maintenance* of interventions at the individual or organizational level, but captured long-term outcomes between 6 months and up to 30 months.[47,54,61,64,70,77,80,115–117] Noncancer pain studies reported on more RE-AIM domains than surgical studies.

### 3.3 | Risk of bias assessment

Among the randomized studies, only 8 studies were assessed as having low risk of bias, other studies had some concerns or high risk of bias due to difficulty in the blinding condition of certain interventions. Observational studies reported an overall serious risk of bias, mainly due to bias in classification in the measurement of outcomes, see Appendix 5 for ROB2 assessment and Appendix 6 for ROBINS-I assessment.

## 4 | DISCUSSION

To our knowledge, this is the first scoping review to characterize opioid deprescribing interventions at transitions of care and report on the implementability of interventions. Our review identified that complex interventions are the predominant approach applied during transitions of care. Of the 79 included studies, most focused on the hospital to home transition. The most common interventions tested, used both pharmacological interventions (e.g. multimodal analgesic protocols) and nonpharmacological interventions (e.g. educational aids). Further, mixed interventions integrated these components into multidisciplinary interventions or pain programmes, and were typically more complex than pharmacological and nonpharmacological interventions alone. The implementability of these interventions is required to assist in translating research into evidence-based practice; however, there was a lack of reporting across RE-AIM across the studies.

Previous research suggested that the more complex an intervention is, the more effective it is at improving appropriate opioid prescribing.[23] However, complex interventions contain components that can act independently or interdependently from each other, rendering the *active component(s)* difficult to specify.[118] This further highlights the challenge in establishing if intervention components create an additive, or synergistic effect to reduce or cease opioids during transitions of care or even a dis-synergistic effect[119] on a range of opioid use measures (Appendix 4). These highly complex interventions not only challenge researchers and clinicians to determine each component's level of effect[120] on the cessation of opioids, but also how implementable they are during transitions of care. Low complexity interventions that are nonpharmacological or pharmacological in nature may appear feasible if they are single-component interventions; however, the lack of implementation assessments highlighted in this review does not quantify their feasibility in real-world settings. This emphasizes that real-world effectiveness of complex interventions is significantly shaped by their implementability.

Furthermore, deprescribing is a complex clinical intervention and research shows the success and effectiveness of complex interventions is influenced by many factors including context,[121] patient characteristics, resources, patient education and staff training.[122] Our review found that mixed interventions reported a reduction of opioid use at transitions of care in intervention groups compared to their comparison groups. Similarly, pharmacological approaches such as electronic analgesia protocols appeared to reduce opioid consumption at-transition in postintervention groups compared to the preintervention groups. This could be attributed to their integration into electronic order sets, which restricts[123] the need for practitioners to manually enter a dosing regimen. Therefore, this intervention may not be as labour-intensive for clinicians to implement.[102] Further, only 1 randomized study reported that a nonpharmacological intervention involving video education aimed at patients, appeared to be ineffective at educating or persuading[123] them in reducing opioid consumption at transition point or post-transition when comparing the intervention to the control group. This may be due to the delivery of video education

requiring additional resources to implement such as available technology and trained staff.[124,125] Another study examining video education reported that this approach was also not an effective modality.[52]

Multidisciplinary or mixed interventions are commonly used to deprescribe opioids[12,23,24,126–128]; however, this review identified that their implementability assessment at transitions of care is lacking. Implementation evaluation of deprescribing trials is growing in the literature, and a previous review[129] highlighted the need to develop deprescribing implementation outcomes. This review suggests future deprescribing trials to measure the complexity inherent within deprescribing interventions, to further understand how context and intervention components influence implementability. The implementability of various intervention components can have varying effects on opioid use outcomes and makes it difficult to evaluate effectiveness. Additionally, given the broad scope of the review, it is possible that different interventions need to be tailored to the type of care transition and condition which could be further examined by future research. An expert consensus group should be convened to standardize these components, so that future research and clinicians can undertake a robust evaluation of the effect of interventions across different timepoints during transitions of care.

### 4.1 | Strengths and limitations

This scoping review is the first to evaluate the characteristics of interventions to deprescribe opioids at transitions of care. Other strengths include the use of a systematic search strategy with citation tracking, the application of the iCAT_SR tool to determine complexity of the interventions and use of the RE-AIM implementation framework. However, there are some limitations to this review. Given that the studies were conducted in different countries, the way patients transition through care could vary and limit generalisability across health care settings. The review identified a diverse range of opioid use measures captured at varying timepoints, including inpatient opioid consumption reduction, opioid prescription dose at discharge and postdischarge opioid consumption. However, the heterogeneity of these outcome measures did not include measures of durability of changes or longer-term outcomes which challenged the interpretation of sustained prescribing or clinical outcomes. Therefore, future studies should consider measuring the durability of changes and longer-term outcomes to inform the sustainability of interventions. While our study did not aim to evaluate the safety of interventions, included studies did report safety endpoints and found no reduction in pain scores or change in adverse events. Future studies are needed to evaluate the safety of these interventions at transitions of care. Additionally, studies should consider evaluating the cost-effectiveness of interventions, particularly in relation to their complexity and implementation requirements. Opioid weaning effects of anaesthetic blocks and intrathecal injections at transitions of care should also be explored in future studies. The search was limited to the English language, potentially missing important international studies, and grey literature was not considered, hence increasing risk of publication bias.

## 5 | CONCLUSION

This scoping review highlighted that the most common transition setting to implement opioid deprescribing interventions was from hospital to home with mixed interventions being the most common strategy employed. The interventions were complex in nature and used a combination of pharmacological and nonpharmacological components to deprescribe opioids, but it was challenging to elucidate which components were most effective in reducing and ceasing opioids. Furthermore, the lack of implementation assessment hinders the ability to evaluate the effectiveness and sustainability of these interventions. Implementability of interventions should also evaluate their complexity to further understand the feasibility of implementing individual intervention components and its impact on outcome measures. This will facilitate clinicians and organizations to understand the implementation challenges and develop more tailored and strategic interventions.

### AUTHOR CONTRIBUTIONS

**Jeffery Wang:** Study concept and design; data acquisition, data analysis and interpretation; writing and critical revision of the manuscript. **Carl Schneider:** Study concept and design; data analysis and interpretation; critical revision of the manuscript. **Aili V. Langford:** Study concept and design; data analysis and interpretation; critical revision of the manuscript. **Mouna Sawan:** Data analysis and interpretation; critical revision of the manuscript. **Antonius Nugraha Widhi Pratama:** Data visualization; critical revision of the manuscript. **Chung-Wei Christine Lin:** Study concept and design; data analysis and interpretation; critical revision of the manuscript. **Danijela Gnjidic:** Study concept and design; data analysis and interpretation; writing and critical revision of the manuscript.

### CONFLICT OF INTEREST STATEMENT

No conflict of interest to declare.

### DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request. Some data may not be made available because of privacy or ethical restrictions.

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## APPENDIX 1: AN EXAMPLE OF THE SEARCH TERMS FROM OVID

| Concept | Search terms |
|---|---|
| 1.Opioids | 1 Analgesics, Opioid/ (57652)<br>2 opioid*.mp. (143160)<br>3 opiates*.mp. (9415)<br>4 Controlled Substances/or controlled substance*.mp. [mp = title, book title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms] (2109)<br>5 Codeine/ (4722)<br>6 codeine*.mp. (7423)<br>7 Fentanyl/ (14934)<br>8 fentanyl*.mp. (25204)<br>9 morphine derivatives/ or codeine/ or dihydromorphine/ or ethylmorphine/ or heroin/ or hydromorphone/ or morphine/ or oxymorphone/or thebaine/ (51676)<br>10 morphine*.mp. (63780)<br>11 Oxycodone/ (2799)<br>12 oxycodone*.mp.<br>13 exp buprenorphine/or exp buprenorphine, naloxone drug combination/<br>14 buprenorphine*.mp.<br>15 Methadone/<br>16 methadone*.mp.<br>17 Tramadol/<br>18 tramadol*.mp.<br>19 Heroin/<br>20 heroin*.mp.<br>21 (Panadeine* or Nurofen* or Endone* or Oxycontin* or Subutex* or Suboxone* or Naloxone* or Norspan* or Temgesic* or Tramal* or Dilaudid* or Jurnista* or Durogesic* or Abstral* or Actiq* or Sevredol* or Momex SR* or MS Contin* or Kapanol* or MS Mono* or Oxynorm* or Targin* or Pethidine* or Palexia* or Zaldiar* or Tramedo SR* or Zydol SR* or Medication* or drug* Pharmaceutical opioid*).tw.<br>22 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 |
| 2.Transitions of care | 23 deprescriptions/<br>24 deprescri*.mp.<br>25 medication cessation*.mp.<br>26 medication withdrawal*.mp.<br>27 medication discontinu*.mp.<br>28 Inappropriate Prescribing/<br>29 inappropriate prescri*.mp.<br>30 inappropriate medication/or inappropriate medicat*.mp.<br>31 unnecessary prescri*.mp.<br>32 detox*.mp.<br>33 Drug Tolerance/<br>34 drug tolerance*.mp.<br>35 (ceas* or decreas* or eliminat* or taper* or wean* or reduc* or stop* or terminat*).tw.<br>36 23 or 24 or 25 or 26 or 27 or 28 or 29 or 30 or 31 or 32 or 33 or 34 or 35 |
| 3.Deprescribing | 37 "transition* of care".mp.<br>38 health transition/<br>39 health transition*.mp.<br>40 care coordination*.mp.<br>41 transition* care management*.mp.<br>42 hospital discharge plan*.mp.<br>43 exp continuity of patient care/<br>44 ("continuity of patient care" or Aftercare or "hospital to home transition*" or patient transfer* or "retention in care*" or transitional care* or hospital discharge* or care transition* or transitional care*).mp.<br>45 37 or 38 or 39 or 40 or 41 or 42 or 43 or 44<br>46 unnecessary medicati*.mp.<br>47 36 or 46<br>48 exp Patient Handoff/<br>49 patient handoff*.mp.<br>50 37 or 38 or 39 or 40 or 41 or 42 or 43 or 44 or 48 or 49<br>51 21 and 47 and 50<br>52 exp Polypharmacy/ |

(Continues)

| Concept | Search terms |
|---|---|
| | 53 polypharmacy*.mp.<br>54 47 or 52 or 53<br>55 22 and 50 and 54<br>56 limit 55 to (English language and humans and ("young adult (19 to 24 years)" or "adult (19 to 44 years)" or "young adult and adult (19–24 and 19–44)" or "middle age (45 to 64 years)" or "middle aged (45 plus years)" or "all aged (65 and over)" or "aged (80 and over)")) |

## APPENDIX 2: ICAT_SR ASSESSMENT OF INCLUDED STUDIES

| Author and year | Type of intervention | Dimension 1: active components | Dimension 2: behaviour or actions | Dimension 3: organizational levels and categories | Dimension 4: the degree of tailoring intended | Dimension 5: the level of skill required by those delivering the intervention | Dimension 6: the level of skill required for the targeted behaviour |
|---|---|---|---|---|---|---|---|
| Berube *et al.* 2022 | Mixed | | | | | | |
| Buys *et al.* 2020 | Mixed | | | | | | |
| Ciriello *et al.* 2022 | Mixed | | | | | | |
| Featherall *et al.* 2022 | Mixed | | | | | | |
| Gazendam *et al.* 2022 | Mixed | | | | | | |
| Hartford *et al.* 2018 | Mixed | | | | | | |
| Holeman *et al.* 2022 | Mixed | | | | | | |
| Holland *et al.* 2019 | Mixed | | | | | | |
| Holman *et al.* 2014 | Mixed | | | | | | |
| Jildeh *et al.* 2021 | Mixed | | | | | | |
| Kaimakliotis *et al.* 2021 | Mixed | | | | | | |
| Kay *et al.* 2022 | Mixed | | | | | | |
| Laksono *et al.* 2022 | Mixed | | | | | | |
| Lamm *et al.* 2022 | Mixed | | | | | | |
| Landau *et al.* 2021 | Mixed | | | | | | |
| Layson *et al.* 2022 | Mixed | | | | | | |
| Lin *et al.* 2023 | Mixed | | | | | | |
| Lindner *et al.* 2023 | Mixed | | | | | | |

| Author and year | Type of intervention | Dimension 1: active components | Dimension 2: behaviour or actions | Dimension 3: organizational levels and categories | Dimension 4: the degree of tailoring intended | Dimension 5: the level of skill required by those delivering the intervention | Dimension 6: the level of skill required for the targeted behaviour |
|---|---|---|---|---|---|---|---|
| Loomis *et al.* 2022 | Mixed | | | | | | |
| Malec *et al.* 1981 | Mixed | | | | | | |
| Murphy *et al.* 2022 | Mixed | | | | | | |
| Oyler *et al.* 2018 | Mixed | | | | | | |
| Oyler *et al.* 2022 | Mixed | | | | | | |
| Parker *et al.* 2023 | Mixed | | | | | | |
| Patel *et al.* 2021 | Mixed | | | | | | |
| Rendon *et al.* 2020 | Mixed | | | | | | |
| Rome *et al.* 2004 | Mixed | | | | | | |
| Syed *et al.* 2018 | Mixed | | | | | | |
| Tabibian *et al.* 2015 | Mixed | | | | | | |
| Tamboli *et al.* 2020 | Mixed | | | | | | |
| Tan *et al.* 2023 | Mixed | | | | | | |
| Townsend *et al.* 2008 | Mixed | | | | | | |
| Tran-McCaslin *et al.* 2022 | Mixed | | | | | | |
| Uhrbrand *et al.* 2022 | Mixed | | | | | | |
| Urban *et al.* 2021 | Mixed | | | | | | |
| Van Horne *et al.* 2020 | Mixed | | | | | | |
| Wood *et al.* 2022 | Mixed | | | | | | |
| Yao *et al.* 2023 | Mixed | | | | | | |
| Zorrilla-Vaca *et al.* 2021 | Mixed | | | | | | |
| Bjørnnes *et al.* 2017 | Nonpharmacological | | | | | | |
| Bloom *et al.* 2021 | Nonpharmacological | | | | | | |
| Chalmers *et al.* 2021 | Nonpharmacological | | | | | | |

(Continues)

| Author and year | Type of intervention | Dimension 1: active components | Dimension 2: behaviour or actions | Dimension 3: organizational levels and categories | Dimension 4: the degree of tailoring intended | Dimension 5: the level of skill required by those delivering the intervention | Dimension 6: the level of skill required for the targeted behaviour |
|---|---|---|---|---|---|---|---|
| Chapman *et al.* 1981 | Nonpharmacological | | | | | | |
| Colloca *et al.* 2022 | Nonpharmacological | | | | | | |
| Hill *et al.* 2018 | Nonpharmacological | | | | | | |
| Hopkins *et al.* 2020 | Nonpharmacological | | | | | | |
| Kene *et al.* 2022 | Nonpharmacological | | | | | | |
| Lam *et al.* 2021 | Nonpharmacological | | | | | | |
| Lung *et al.* 2022 | Nonpharmacological | | | | | | |
| Pritchard *et al.* 2021 | Nonpharmacological | | | | | | |
| Rodriguez-Monguio *et al.* 2022 | Nonpharmacological | | | | | | |
| Smith *et al.* 2023 | Nonpharmacological | | | | | | |
| Tran *et al.* 2022 | Nonpharmacological | | | | | | |
| Tseng *et al.* 2021 | Nonpharmacological | | | | | | |
| Urton *et al.* 2017 | Nonpharmacological | | | | | | |
| Boekel *et al.* 2023 | Pharmacological | | | | | | |
| Burton *et al.* 2022 | Pharmacological | | | | | | |
| Carver *et al.* 2018 | Pharmacological | | | | | | |
| Davidson *et al.* 2020 | Pharmacological | | | | | | |
| Donthula *et al.* 2021 | Pharmacological | | | | | | |
| Eisenach *et al.* 2023 | Pharmacological | | | | | | |
| Fleischman *et al.* 2019 | Pharmacological | | | | | | |
| Flowers *et al.* 2021 | Pharmacological | | | | | | |
| Girgiss *et al.* 2022 | Pharmacological | | | | | | |
| Hamrick *et al.* 2019 | Pharmacological | | | | | | |
| Hannon *et al.* 2019 | Pharmacological | | | | | | |

| Author and year | Type of intervention | Dimension 1: active components | Dimension 2: behaviour or actions | Dimension 3: organizational levels and categories | Dimension 4: the degree of tailoring intended | Dimension 5: the level of skill required by those delivering the intervention | Dimension 6: the level of skill required for the targeted behaviour |
|---|---|---|---|---|---|---|---|
| Joo *et al.* 2020 | Pharmacological | | | | | | |
| Li *et al.* 2021 | Pharmacological | | | | | | |
| Motov *et al.* 2018 | Pharmacological | | | | | | |
| Munoz-Leyva *et al.* 2022 | Pharmacological | | | | | | |
| Osmundson *et al.* 2018 | Pharmacological | | | | | | |
| Padilla *et al.* 2019 | Pharmacological | | | | | | |
| Pettersson *et al.* 2005 | Pharmacological | | | | | | |
| Reagan *et al.* 2017 | Pharmacological | | | | | | |
| Sadatsune *et al.* 2016 | Pharmacological | | | | | | |
| Singer *et al.* 2021 | Pharmacological | | | | | | |
| Swenson *et al.* 2022 | Pharmacological | | | | | | |
| Walters *et al.* 2018 | Pharmacological | | | | | | |
| Weisz *et al.* 2020 | Pharmacological | | | | | | |

Red, highly complex; yellow, moderately complex; green, low complex; grey, no information.

## APPENDIX 3: STUDIES MAPPED TO THE RE-AIM FRAMEWORK

| Article info | RE-AIM domain | | | | |
|---|---|---|---|---|---|
| Author and year | Reach | Effectiveness | Adoption | Implementation | Maintenance |
| Berube *et al.* 2022 | C | C | NC | C | NC |
| Bjørnnes *et al.* 2017 | NC | C | NC | NC | NC |
| Bloom *et al.* 2021 | NC | C | NC | NC | NC |
| Boekel *et al.* 2023 | NC | C | NC | NC | NC |
| Burton *et al.* 2022 | NC | C | NC | NC | NC |
| Buys *et al.* 2020 | NC | C | NC | NC | NC |
| Carver *et al.* 2018 | NC | C | NC | NC | NC |
| Chalmers *et al.* 2021 | NC | C | NC | NC | NC |
| Chapman *et al.* 1981 | NC | C | NC | NC | NC |
| Ciriello *et al.* 2022 | NC | C | NC | NC | NC |
| Colloca *et al.* 2022 | NC | C | NC | NC | NC |
| Davidson *et al.* 2020 | NC | C | NC | NC | NC |
| Donthula *et al.* 2021 | NC | C | NC | NC | NC |
| Eisenach *et al.* 2023 | NC | C | NC | NC | NC |
| Featherall *et al.* 2022 | NC | C | NC | NC | NC |
| Fleischman *et al.* 2019 | NC | C | NC | NC | NC |
| Flowers *et al.* 2021 | NC | C | NC | NC | NC |
| Gazendam *et al.* 2022 | NC | C | NC | NC | NC |
| Girgiss *et al.* 2022 | NC | C | NC | NC | NC |
| Hamrick *et al.* 2019 | NC | C | NC | NC | NC |
| Hannon *et al.* 2019 | NC | C | NC | NC | NC |
| Hartford *et al.* 2018 | NC | C | C | NC | NC |
| Hill *et al.* 2018 | NC | C | NC | NC | NC |
| Holeman *et al.* 2022 | NC | C | NC | NC | NC |
| Holland *et al.* 2019 | NC | C | NC | NC | NC |
| Holman *et al.* 2014 | NC | C | NC | NC | NC |
| Hopkins *et al.* 2020 | NC | C | NC | NC | NC |
| Jildeh *et al.* 2021 | NC | C | NC | NC | NC |
| Joo *et al.* 2020 | NC | C | NC | NC | NC |
| Kaimakliotis *et al.* 2021 | NC | C | NC | NC | NC |
| Kay *et al.* 2022 | NC | C | NC | NC | NC |
| Kene *et al.* 2022 | C | C | NC | NC | NC |
| Laksono *et al.* 2022 | NC | C | NC | NC | NC |
| Lam *et al.* 2021 | NC | C | NC | NC | NC |
| Lamm *et al.* 2022 | NC | C | NC | NC | NC |
| Landau *et al.* 2021 | NC | C | NC | C | NC |
| Layson *et al.* 2022 | NC | C | NC | NC | NC |
| Li *et al.* 2021 | NC | C | NC | NC | NC |
| Lin *et al.* 2023 | NC | C | NC | NC | NC |
| Lindner *et al.* 2023 | NC | C | NC | NC | NC |
| Loomis *et al.* 2022 | NC | C | NC | NC | NC |
| Lung *et al.* 2022 | NC | C | NC | NC | NC |
| Malec *et al.* 1981 | NC | C | NC | C | NC |
| Motov *et al.* 2018 | NC | C | C | NC | NC |

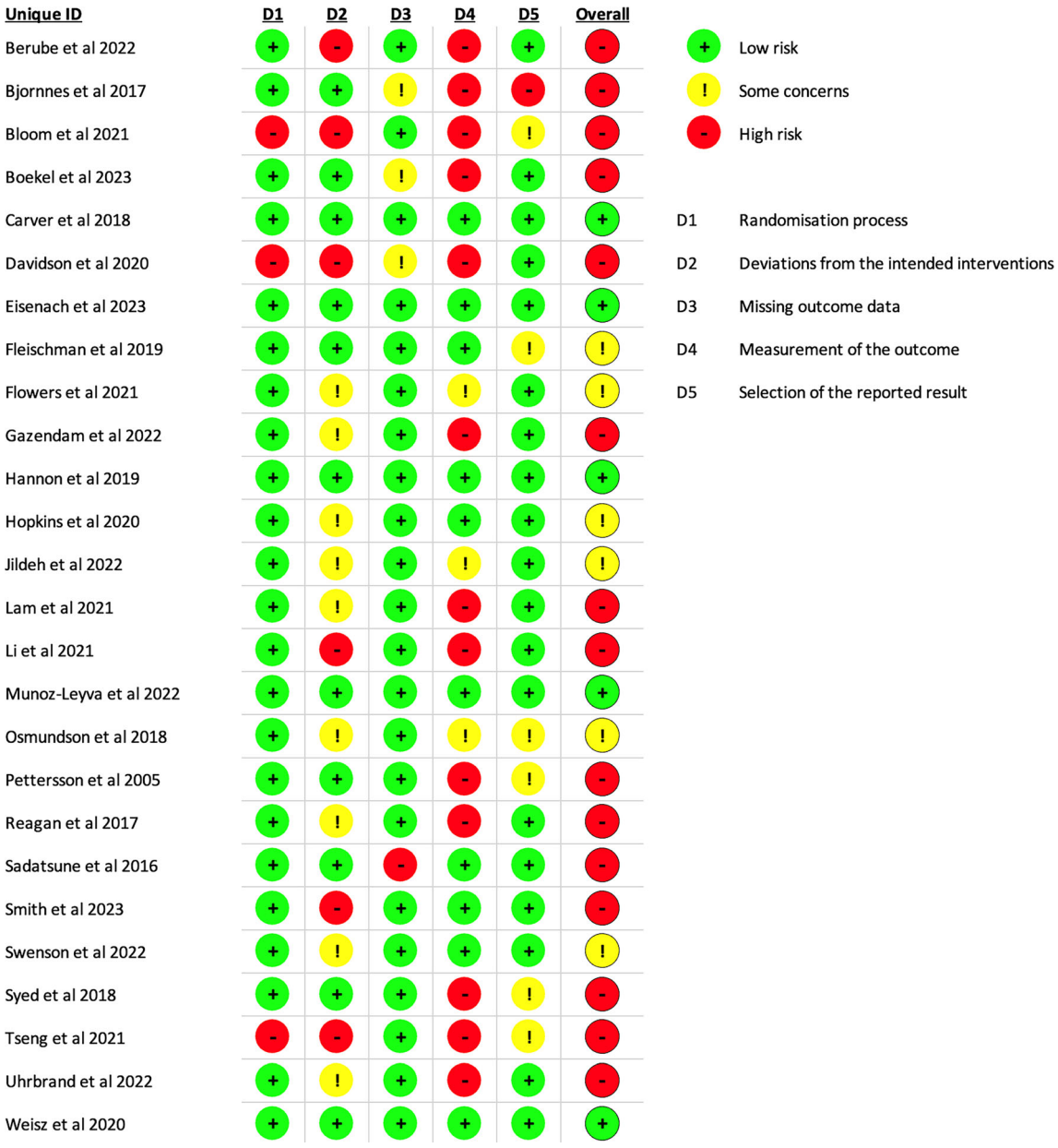
| Article info | RE-AIM domain | | | | |
|---|---|---|---|---|---|
| Author and year | Reach | Effectiveness | Adoption | Implementation | Maintenance |
| Munoz-Leyva *et al.* 2022 | NC | C | NC | NC | NC |
| Murphy *et al.* 2022 | NC | C | NC | NC | NC |
| Osmundson *et al.* 2018 | NC | C | NC | NC | NC |
| Oyler *et al.* 2018 | NC | C | NC | NC | NC |
| Oyler *et al.* 2022 | NC | C | NC | NC | NC |
| Padilla *et al.* 2019 | NC | C | NC | NC | NC |
| Parker *et al.* 2023 | NC | C | NC | NC | NC |
| Patel *et al.* 2021 | NC | C | NC | NC | NC |
| Pettersson *et al.* 2005 | NC | C | NC | NC | NC |
| Pritchard *et al.* 2021 | C | C | NC | NC | NC |
| Reagan *et al.* 2017 | NC | C | NC | NC | NC |
| Rendon *et al.* 2020 | NC | C | NC | NC | NC |
| Rodriguez-Monguio *et al.* 2022 | NC | C | NC | NC | NC |
| Rome *et al.* 2004 | C | C | NC | NC | NC |
| Sadatsune *et al.* 2016 | NC | C | NC | NC | NC |
| Singer *et al.* 2021 | NC | C | NC | NC | NC |
| Smith *et al.* 2023 | NC | C | NC | NC | NC |
| Swenson *et al.* 2022 | NC | C | NC | NC | NC |
| Syed *et al.* 2018 | NC | C | NC | NC | NC |
| Tabibian *et al.* 2015 | NC | C | NC | NC | NC |
| Tamboli *et al.* 2020 | NC | C | NC | NC | NC |
| Tan *et al.* 2023 | NC | C | NC | NC | NC |
| Townsend *et al.* 2008 | C | C | NC | NC | NC |
| Tran *et al.* 2022 | NC | C | NC | NC | NC |
| Tran-McCaslin *et al.* 2022 | NC | C | NC | NC | NC |
| Tseng *et al.* 2021 | NC | C | NC | C | NC |
| Uhrbrand *et al.* 2022 | NC | C | NC | NC | NC |
| Urban *et al.* 2021 | NC | C | NC | NC | NC |
| Urton *et al.* 2017 | NC | C | NC | NC | NC |
| Van Horne *et al.* 2020 | NC | C | NC | NC | NC |
| Walters *et al.* 2018 | NC | C | NC | NC | NC |
| Weisz *et al.* 2020 | NC | C | NC | NC | NC |
| Wood *et al.* 2022 | NC | C | NC | NC | NC |
| Yao *et al.* 2023 | NC | C | NC | NC | NC |
| Zorrilla-Vaca *et al.* 2021 | NC | C | NC | NC | NC |

C, captured; NC, not captured.

## APPENDIX 4: Opioid use measures identified across transitions of care

| | Intrahospital transition | Hospital to home |
|---|---|---|
| Pretransition | • Inpatient reduction of opioid use[89,93]<br>• Mean daily or total inpatient OME use[91,92] | • Inpatient reduction of opioid consumption in morphine mg equivalent (MME) or oral morphine equivalent (OME)[41,89,93]<br>• Mean daily MME or total inpatient OME consumption[40,44,53,54,58,60–62,64,71,74,76,77,88,91,92,100,106–108,112–114,117,129]<br>• Percentage of people receiving opioids as an inpatient.[86,112] |
| At transition | • None identified | • Percentage of people receiving opioids at discharge[49,53,60,62,69,76,108,111–113,129]<br>• Total MME prescribed at discharge[53,102,103]<br>• Number of opioid tablets prescribed at discharge[63,65,75,88]<br>• OME per day at discharge[46,71]<br>• Median total OME prescribed at discharge[58,66,81,112,113]<br>• Mean OME prescribed at discharge[56,68,74,77,80,87,88]<br>• Percentage of opioid prescriptions[80,114]<br>• Number of days' supply at discharge[61]<br>• Cumulative MED at discharge[84]<br>• Median total outpatient opioid use at discharge[81] |
| Post-transition | • None identified | • Daily opioid use at weeks 1, 2 and 3.[51]<br>• Mean total narcotic consumption at 7 days postop[82]<br>• Number of tablets prescribed at 90 days[65]<br>• Total OME after discharge[59] or at day 30 [61], or within 30 days[44]<br>• Mean total OME prescribed at week 2 [77]<br>• Mean total OME prescribed at week 6 [77]<br>• Total OME per day at 6 weeks[54]<br>• Total OME per day at 12 weeks[54]<br>• Total narcotic consumption postop 1 week[52,107]<br>• Total OME consumption up to 90 days postop[85,106]<br>• Analgesia requirement at postdischarge 8 days[41]<br>• Opioid use at 1 month post-treatment[115]<br>• Opioid refills at 30 days postop[52]<br>• Opioid refills at 90 days postop[44,52]<br>• Mean number of tablets prescribed at 90 days postdischarge[65]<br>• Opioid consumption at 6 weeks[56,85,103]<br>• Opioid refill requests up to 6 weeks postdischarge[56,75]<br>• Daily opioid consumption between postoperative day 1 to 10[57]<br>• Total narcotic consumption during 42 days postpartum[48]<br>• Total OME consumption at 60 days postdischarge[61]<br>• Average opioid consumption at postop day 30 [105]<br>• Number of unused opioid tablets postdischarge[105] |

## APPENDIX 5: ROB-2 assessment of individual studies.



**APPENDIX 6: ROBINS-I assessment of individual studies.**

| Study | Bias due to confounding | Bias in selection of participants into the study | Bias in classification of interventions | Bias due to deviations from intended interventions | Bias due to missing data | Bias in measurement of outcomes | Bias in selection of the reported result | Overall bias |
|---|---|---|---|---|---|---|---|---|
| Burton *et al.* 2022 | Serious | Low | Moderate | Low | Low | Serious | Serious | Serious |
| Buys *et al.* 2020 | Serious | Low | Serious | NI | Low | Serious | Low | Serious |
| Chalmers *et al.* 2021 | Serious | Serious | Serious | NI | Low | Serious | Low | Serious |
| Chapman *et al.* 1981 | Serious | Critical | Critical | NI | Critical | Serious | Serious | Critical |
| Ciriello *et al.* 2022 | Serious | Low | Moderate | NI | Low | Serious | Serious | Serious |
| Colloca *et al.* 2022 | Low | Moderate | Low | NI | Low | Serious | Low | Serious |
| Donthula *et al.* 2021 | Serious | Low | Critical | NI | Low | Critical | Low | Critical |
| Featherall *et al.* 2022 | Low | Serious | Low | Moderate | Low | Moderate | Low | Serious |
| Girgiss *et al.* 2022 | Low | Low | Serious | NI | Low | Moderate | Low | Serious |
| Hamrick *et al.* 2019 | Serious | Serious | Serious | NI | Low | Serious | Low | Serious |
| Hartford *et al.* 2018 | Moderate | Moderate | Serious | Low | Low | Serious | Low | Serious |
| Hill *et al.* 2018 | Serious | Serious | Serious | Low | Low | Serious | Low | Serious |
| Holeman *et al.* 2022 | Low | Serious | Low | Low | Low | Moderate | Low | Serious |
| Holland *et al.* 2019 | Serious | Serious | Serious | NI | Low | Serious | Moderate | Serious |
| Holman *et al.* 2014 | Moderate | Low | Low | NI | Low | Serious | Low | Serious |
| Joo *et al.* 2020 | Serious | Serious | Serious | NI | Low | Serious | Low | Serious |
| Kaimakliotis *et al.* 2021 | Moderate | Moderate | Serious | NI | Low | Serious | Low | Serious |
| Kay *et al.* 2022 | Serious | Serious | Low | NI | Low | Serious | Serious | Serious |
| Kene *et al.* 2022 | Low | Moderate | Serious | NI | Low | Serious | Low | Serious |
| Laksono *et al.* 2022 | Serious | Low | Low | Low | Serious | Serious | Low | Serious |
| Lamm *et al.* 2022 | Low | Serious | Serious | NI | Low | Serious | Low | Serious |
| Landau *et al.* 2021 | Serious | Low | Serious | NI | NI | Serious | Serious | Serious |
| Layson *et al.* 2021 | Serious | Low | Low | NI | NI | Serious | Serious | Serious |
| Lin *et al.* 2023 | Low | Low | Low | NI | Serious | Serious | Low | Serious |
| | Low | Moderate | Low | NI | Low | Moderate | Low | Moderate |

| Study | Bias due to confounding | Bias in selection of participants into the study | Bias in classification of interventions | Bias due to deviations from intended interventions | Bias due to missing data | Bias in measurement of outcomes | Bias in selection of the reported result | Overall bias |
|---|---|---|---|---|---|---|---|---|
| Lindner *et al.* 2023 | | | | | | | | |
| Loomis *et al.* 2022 | Low | Serious | Low | NI | Serious | Moderate | Low | Serious |
| Lung *et al.* 2022 | Low | Moderate | Serious | NI | Low | Moderate | Low | Serious |
| Malec *et al.* 1981 | Serious | Serious | Critical | NI | Serious | Serious | Low | Critical |
| Motov *et al.* 2018 | Moderate | Low | Serious | NI | Low | Serious | Moderate | Serious |
| Murphy *et al.* 2022 | Low | NI | Serious | NI | Low | Serious | Low | Serious |
| Oyler *et al.* 2018 | Moderate | Low | Serious | NI | Serious | Serious | Low | Serious |
| Oyler *et al.* 2022 | Serious | Low | Low | NI | Low | Serious | Low | Serious |
| Padilla *et al.* 2019 | Serious | Low | Serious | NI | Low | Serious | Low | Serious |
| Parker *et al.* 2023 | Low | Low | Serious | NI | Low | Moderate | Moderate | Serious |
| Patel *et al.* 2021 | Moderate | Serious | Serious | NI | Moderate | Serious | Low | Serious |
| Pritchard *et al.* 2021 | Moderate | Moderate | NI | NI | Low | Moderate | Low | Moderate |
| Rendon *et al.* 2020 | Serious | Moderate | Serious | NI | Low | Serious | Low | Serious |
| Rodriguez-Monguio *et al.* 2022 | Low | Low | Moderate | Low | Low | Serious | Low | Serious |
| Rome *et al.* 2004 | Serious | Low | Critical | Critical | Serious | Serious | Moderate | Critical |
| Singer *et al.* 2021 | Serious | Serious | Serious | NI | Low | Serious | Low | Serious |
| Tabibian *et al.* 2015 | Serious | Serious | Serious | NI | Serious | Serious | Low | Serious |
| Tamboli *et al.* 2020 | Moderate | Serious | Serious | NI | Low | Moderate | Low | Serious |
| Tan *et al.* 2023 | Low | Low | Moderate | NI | Low | Moderate | Low | Moderate |
| Townsend *et al.* 2008 | Low | Low | Moderate | Serious | Serious | Moderate | Low | Serious |
| Tran *et al.* 2022 | Moderate | Low | Serious | NI | Low | Serious | Low | Serious |
| Trans-McCaslin *et al.* 2022 | Low | Low | NI | NI | Low | Moderate | Moderate | Moderate |
| Urban *et al.* 2021 | Serious | Serious | Serious | NI | Low | Serious | Low | Serious |
| Urton *et al.* 2017 | Serious | Moderate | Low | NI | Low | Moderate | Low | Serious |
| Van Horne *et al.* 2020 | Critical | Critical | Critical | Serious | Critical | Serious | Low | Critical |

(Continues)

| Study | Bias due to confounding | Bias in selection of participants into the study | Bias in classification of interventions | Bias due to deviations from intended interventions | Bias due to missing data | Bias in measurement of outcomes | Bias in selection of the reported result | Overall bias |
|---|---|---|---|---|---|---|---|---|
| **Walters *et al.* 2018** | Low | Moderate | Moderate | NI | Low | Low | Moderate | Moderate |
| **Wood *et al.* 2022** | Serious | Serious | Serious | NI | Low | Serious | Low | Serious |
| **Yao *et al.* 2023** | Low | Serious | Serious | NI | Low | Moderate | Low | Serious |
| **Zorrilla-Vaca *et al.* 2021** | Moderate | Moderate | Serious | NI | Low | Serious | Low | Serious |

NI, no information.

The following corrections from the thesis examiner are applicable as the review article has been published.

Page 39-69: I noticed that the manuscript contains a mix of British and American English (e.g., the British spelling ‘orthopaedic’ and the American term ‘categorized’). Please ensure consistency by using one language convention throughout.

Page 42, Figure 1: The PRISMA flow diagram appears to cut off the “identification” title (top left). Please ensure the figure is fully visible.

Page 42: In the sentence beginning “As per the RE-AIM framework, Reach was evaluated in 6.0% (n = 5) of studies…”, please insert “a” before “number of methods” so the phrase reads: “…via a number of methods, such as recording attendance of training physicians of an opioid safety initiative…”

Page 43-51, Table 1: Please review whether the intervention (I) and comparator (c) groups have been consistently identified (see Carver et al., Davidson et al., Donthula et al., Eisanach et al., Flowers et al., Girgiss et al., Hamrick et al., Ciriello et al., Holman et al., Layson et al., Parker et al., Wood et al., Hopkins et al.).

Page 44 and 47, Table 1: Please check for omissions in opening and/or closing brackets (see Reagan et al. 2017, Oyler et al. 2022).

Page 47, Table 1: For Oyler et al. 2022, it is unclear what is meant by + 4.1 days. Should this be +/- 4.1 days? Please note that this also applies to Syed et al., Tabibian et al., Zorrilla-Vaca et al.

Page 48, 49, Table 1: Please ensure all units are expressed (see Tabibian et al. 2022, Vorrilla-Va et al. 2021 and Urban et al.).

Page 49, Table 1: Add a space between “34” and “(19-62)” for Urban et al. 2021.

Page 50, Table 1: Add a space between “72.75” and “OME” for Bloom et al.,

Page 54, references 13, 35, 36: For clarity, consider using the full name for the authoring organisation in these references.

Page 55, reference 42: Consider changing ‘Total’ to lowercase (‘total’) for consistency with other references.

Page 55, reference 45: Please consider using the uppercase “a” in “James A. Rand”.

Page 55, reference 54: Consider revising the title to sentence case for consistency with other references. For example: “Association of occupational and physical therapy with duration of prescription opioid use after hip or knee arthroplasty: a retrospective cohort study of Medicare enrollees.”

Page 58: Although Palexia was included in the search strategy, the active ingredient ‘tapentadol’ was not listed as a separate term. Consider adding ‘tapentadol’ to ensure a more comprehensive and accurate search.

Page 65: In Appendix 4 (page 65), there were numbers in square brackets presented. It is not clear what these numbers refer to. Please review.

Page 68: In Appendix 6: Mapping for Lindner et al. has been presented on the previous page. If possible, please ensure the study reference is aligned with the mapping.

## Chapter 3 - Survey of Australian healthcare professionals' support required to deprescribe opioids at transitions of care

**Declaration for thesis chapter**

Chapter 3 of this thesis submitted for publication as: Exploring the support required by Australian Healthcare Professionals to deprescribe opioids at transitions of care: a survey study. Manuscript was submitted on the 25th of July 2025.

I co-designed the study with Danijela Gnjidic, Carl R Schneider, Aili V Langford, and Chung-Wei Christine Lin who have all assisted in the study concept and design, data analysis and interpretation, and critical revision of the manuscript. Mouna Sawan assisted with data analysis and interpretation, and critical revision of the manuscript.

As supervisor for the candidature upon which this thesis is based, I can confirm that the authorship attribution statements above are correct.

Lead Supervisor: Danijela Gnjidic

Signature:

Date: 25 September 2025

## 3.1 Introduction to survey study

The survey study was conducted to understand the support required by Australian Healthcare Professionals, by exploring their confidence and perspectives on existing support to deprescribe opioids. As highlighted in Chapter 2, despite mixed interventions appearing to successfully reduce and cease opioids, there was an overall lack of implementability assessment of opioid deprescribing interventions at transitions of care. Building on these findings, it is important to explore what support healthcare professionals require to implement these interventions effectively in practice, particularly within an Australian context. There is a growing body of global literature (150-154) that explores varying healthcare professionals' attitudes, beliefs and perceptions of deprescribing in different population groups, primarily focusing on care settings that are static. This highlights the need to explore and understand further the support healthcare professionals require to deprescribe opioids at transitions of care. Furthermore, deprescribing practices appear to vary considerably within and between countries and regions in Europe (155). Given the differences in healthcare systems, professional roles, and prescribing practices, there is a clear need to generate evidence that is specific to the Australian healthcare professional workforce.

## 3.2 Original article

This manuscript has been submitted and is currently awaiting review for publication in Internal Medicine. It presents the aims, methods, results, and conclusions of a survey exploring the support required by Australian healthcare professionals to deprescribe opioids during transitions of care. The ethics approval for the survey is in Appendix 2.

INTERNAL MEDICINE JOURNAL RACP

Original Article

# Exploring the support required by Australian Healthcare Professionals to deprescribe opioids at transitions of care: a survey study

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## Additional Information

## Introduction

Opioids remain among the most commonly prescribed medicines globally for patients experiencing pain or undergoing surgery (156), particularly at hospital discharge. However, transitions between care settings, such as hospital to community, or between hospital wards, presents challenges in opioid management. During these transitions, opioids may be prescribed across many specialties and settings (157) without coordinated oversight, potentially contributing to long-term use. Between 2021-2022, almost 3.0 million (11.5%) Australians were taking opioids (23), and 31% (40, 158) of patients were discharged from hospital with more than the required supply of opioids, increasing the risk of long-term dependence, and non-medical use (40).

Transitions of care, referring to the movement between different care settings or providers (159), can also represent an opportunity to review opioid use. These transition points, whether from hospital to community or between wards, enable a reassessment of the opioids prescribed, and can serve as a reminder for healthcare professionals (HCPs) to review and reduce the risk of prolonged or inappropriate use. A 2023 scoping review found that interventions at transitions of care using a multidisciplinary approach (e.g., multimodal analgesic protocols or pain programmes) can support opioid deprescribing (the supervised reduction or cessation of a medicine by a healthcare professional) (160). However, the review also identified gaps in implementing and sustaining these interventions in everyday practice, which may contribute to ongoing long-term opioid use. Furthermore, it remains uncertain whether HCPs are adequately supported to implement opioid deprescribing in routine practice.

In Australia, several strategies exist to address opioid-related harm, including regulatory reforms, public health campaigns, and education initiatives (161). Within this broader context, the Australian Commission on Safety and Quality in Health Care (ACSQHC) has developed resources as part of the Opioid Analgesic Stewardship in Acute Pain Clinical Care Standard. This standard outlines key components of care for acute pain management and transitions of care (122). In addition, the recently developed National Health and Medical Research Council (NHMRC) endorsed Opioid Deprescribing Guideline (66) recommends a tailored approach to deprescribing opioids, including the use of an opioid tapering algorithm for HCPs (162). However, it remains unclear if and how these are utilised by HCPs.

Despite growing evidence on opioid harms and new strategies to support appropriate opioid use, limited studies have explored HCPs' preferred supports to deprescribe opioids at transitions of care. This study aimed to identify the support required by Australian HCPs to deprescribe opioids during transitions of care.

## Method

We report our study in accordance with the Checklist for Reporting Results of Internet E-Surveys (CHERRIES) (163).

### Design

An anonymous online survey was conducted between September 2024 and February 2025. Participation was voluntary, and was promoted via social media, distribution of paper flyers (Appendix 4) and outreach via personal contacts through key professional conferences, events, and emails to key professional societies (e.g. Royal Australian College of General Practitioners, Advanced Pharmacy Australia, Australian Nursing and Midwifery Federation, Australian Physiotherapy Association, Australian Psychological society, see Appendix 6 for full list) asking them to distribute the survey advertisement to their members. A reminder email was sent twice to the organisation to send to their members to increase the completion rate. The survey was administered using the Research Data Electronic Capture (REDCap) platform hosted by the University of Sydney.

De-identified basic demographic data including their current professional role, gender, years of clinical experience, geographical location by postcode and setting of primary place of work (e.g., aged care facility, hospital, community) were collected.

The fourteen-question survey (Appendix 7) was designed based on a review of current opioid deprescribing interventions at transitions of care (160), and pilot tested by all study investigators via an iterative approach for content validity. The development of questions was also informed by other studies (164-166), and guided by the Theoretical Domains Framework (167). Additionally, we sought input on questionnaire content from working clinicians (n = 7) including doctors, pharmacists, nurses, and physiotherapists for face validity. The survey contained the following key components: clinical vignettes to assess confidence and understanding of guideline-concordant practices, questions to assess training and knowledge, future support needs, currently available resources and satisfaction with resources.

The first two questions of the survey included two clinical vignettes, presented to HCPs to reflect on simulated scenarios, and understand their confidence and knowledge of implementing evidence-based recommendations and actions. The first vignette contained opioid management actions informed by the first recommendation of the NHMRC-approved Opioid Deprescribing Guideline (66), which is '*We suggest developing and implementing a deprescribing plan for persons being prescribed opioids at the point of opioid initiation*'. Participants were presented with a scenario involving a 52-year-old opioid naïve patient with acute pain post-surgery. The second vignette contained opioid management actions related to Quality Statement 9 of the ACSQHC's Opioid Analgesic Stewardship in Acute Pain Clinical Care Standard (122), which is '*Transfer of care'* (see Appendix 10 for full Quality Statement). Participants were presented with a scenario involving a 70-year-old presenting to hospital with acute onset of severe back pain. Following each vignette, participants were asked to self-rate their confidence in developing and implementing the recommended actions using a Likert scale (0 = not confident at all, and 10 = extremely confident) and provide their reasoning through free-text responses.

The next component of the survey asked about participants' current practices, confidence, training and knowledge. Participants were asked how frequently they consider opioid deprescribing at transitions of care in practice using an ordinal Likert scale (from not at all to very frequently), whether they received any training or education and describe their examples, and to self-assess overall confidence in deprescribing opioids at transitions of care using the same Likert scale as previously described.

The survey also assessed participants' satisfaction towards current resources, and explored future support needs. Participants were asked to rank six predefined future support mechanisms in order of preference (1 = most preferred, 6 = least preferred), and describe other support required via free-text response. Subsequently, participants were asked to reflect on their current workplace, select predefined support mechanisms currently available to them and rate their level of satisfaction with these using a Likert scale (very dissatisfied to very satisfied). Additional survey items through free-text responses captured health service(s) or healthcare professional(s) required by participants' workplace, and understanding what support needs would build their confidence to initiate opioid deprescribing conversations with patients at transitions of care.

Data collection and statistical analysis

Using a precision sampling approach, we calculated that a sample size of 97 HCPs was needed to capture the perspectives of Australian HCPs and their support needs. This calculation was based on an Australian healthcare professional size of 688,000 (168), assuming a 95% confidence level and a 5% margin of error (169). Data was reported using descriptive statistics and quantifying number of responses as percentages, and by also excluding partially completed responses. The number of unique site visitors was determined by the number of participants who partially completed and fully completed the survey. Chi-square tests were conducted to determine statistically significant associations between categorical variables. SPSS version 29 and Excel version 16.94 was used.

To simplify interpretation of the participants' self-reported confidence levels from the clinical vignettes among a diverse sample of respondents in the survey, response values of 1, 2, and 3 were grouped into "low confidence", 4, 5, 6, and 7 were grouped into "moderate confidence", and 8, 9, and 10 were grouped into "high confidence" category. This categorisation mirrors previous survey-based research in which HCPs' confidence in deprescribing opioids and sedative-hypnotics was assessed using a 0 – 10 scale, with scores ≥7 indicating higher confidence levels (165).

In addition to quantitative analyses, qualitative data from free-text responses were triangulated to understand the depth of HCPs' perspectives. Free-text responses from the clinical vignettes were thematically analysed manually using a two-phase approach. Firstly, JW conducted an inductive analysis to identify key themes from participants' responses, which involved open coding of the data, then grouping similar codes into broader themes. Secondly, these themes were deductively mapped by JW and MS to the Theoretical Domains Framework (TDF) (167). The TDF is a validated framework used to identify and understand the factors that influence HCPs' behaviours to implement evidence-based recommendations. It was used in this study to explore the behavioural determinants from participants' responses to the clinical vignettes, and to identify specific barriers to opioid deprescribing at transitions of care. This mapping process enabled a consistent interpretation of the data in relation to known influences on clinical behaviour, including medication, patient, prescriber, and health system factors (157). This combined inductive-deductive approach aligns with established methods for applying the TDF in qualitative research (146). Additionally, the remaining free-text response questions underwent quantitative content analysis to identify the types of training, and education

participants have undertaken, and the health service or HCP support required to deprescribe opioids at transitions of care.

The study was approved by the University of Sydney Human Research Ethics Committee (Approval #2024/HE000654).

## Results

A total of 229 unique site visitors accessed the survey landing page. The participation rate was 99.5% (n=228) and 46% (n=105) completed the entire survey. The majority of respondents were female (68.6%), and participants consisted of pharmacists (48.6%), doctors (32.4%) and nurses (16.2%) (Table 3.1).

With respect to the clinical vignette scenarios, when participants were asked how confident they were in developing and implementing the recommended actions, 65% self-reported high confidence (score between 7-10). When participants were asked how often they consider deprescribing opioids at transitions of care (e.g. during hospitalisation or at the point of discharge), 59% considered this practice at least weekly (Table 3.2). Another 59% of the cohort reported that they received no prior training or education on opioid deprescribing at transitions of care.

When participants were asked in general how confident they were in deprescribing opioids at transitions of care, 41% reported moderate confidence, 35% reported high confidence, and 24% reported low confidence (Table 3.2). HCPs who reported higher general confidence in deprescribing opioids were significantly more likely to consider deprescribing at transitions of care more frequently ($P < 0.001$), or to have received prior training ($P < 0.001$).

When participants were asked to identify future support mechanisms required to deprescribe opioids at transitions of care, 26% preferred a locally approved opioid management policy, and 23% preferred access to evidence-based guidelines and clinical decision support tools (Figure 3.1). Furthermore, when participants were asked to reflect on the current support mechanisms within their primary place of work, 31.4% reported dissatisfaction, 52.4% were neutral, and 16.2% reported satisfaction (Table 3.2). When participants were asked about available supports, 49.5% reported alternative pain management options such as physiotherapy and cognitive behavioural therapy, followed by 41.9% reporting evidence-based guidelines and clinical decision support tools (Figure 3.2). Availability of a locally approved opioid policy was

reported by 21.9% of participants, 21.0% reported stakeholder support, 19.0% had access to education and training materials, 12.4% had integrated digital resources, while 27.6% indicated no available support. A statistically significant association was observed between clinicians' confidence levels and their satisfaction with local support mechanisms (P = 0.007).

Participants were asked to describe via free-text the types of health services or HCPs required in their workplace to deprescribe opioids at transitions of care. The most commonly reported service was a pain management service, and the most frequently mentioned HCPs were doctors and pharmacists (Table 3.2). Additionally, participants reported the need to improve communication between hospital, General Practitioners (GPs), primary care settings and residential aged care facilities. When asked to select other support mechanisms to build confidence in initiating opioid deprescribing with patients at transitions of care, 71% selected deprescribing conversation guides, and 67.6% selected consumer resources (Figure 3.3).

A thematic analysis using the TDF of free-text responses revealed that opioid deprescribing at transitions of care is constrained by environmental, knowledge-based, and belief-related barriers (Appendix 11). Participants described rushed discharge processes, limited access to multidisciplinary input, and inconsistent workflows, particularly in high-pressure environments such as emergency departments as key challenges to implementing effective deprescribing plans. Many HCPs expressed uncertainty about formal deprescribing processes and a lack of confidence in developing weaning strategies, often relying on institutional policies or senior oversight. As one participant noted, "*it was laborious to have to search for evidence to then try and convince prescribers of your 'opinion'. Policy is much more efficient*," (P105) highlighting a strong preference for structured, authoritative guidance. Beliefs about consequences, such as fragmented follow-up with GPs and unrealistic patient expectations about pain, further contributed to clinician hesitation in deprescribing opioids at transitions of care.

## Discussion

This study highlights the complex challenges faced by Australian HCPs when deprescribing opioids at transitions of care. While HCPs are generally confident in deprescribing, they encounter barriers such as time constraints, inconsistent workflows, and are dissatisfied with the existing support mechanisms. This suggests that there is a gap between the utility of

available support and its integration within the operations of healthcare settings for opioid deprescribing at transitions of care.

Our findings report that many HCPs have not received deprescribing education or training or understand how to implement a deprescribing plan. There is evidence that education can increase participants' deprescribing knowledge and improve self-efficacy (170), however, the ability to apply the knowledge in clinical settings, especially at transitions of care is critical. Given that HCPs are constrained by time pressures and inconsistent workflows, opportunities to apply deprescribing knowledge may be limited. This underscores the need for education to not only be informative, but also embedded into work settings to support HCPs in implementing deprescribing actions during transitions of care. Moreover, embedding standardised deprescribing education and conversation guides could strengthen implementation, as HCPs continue to call for these resources for medicines such as antidepressants (171).

Our study is the first to report that Australian HCPs are dissatisfied with locally available support mechanisms for opioid deprescribing, highlighting a disconnect between frontline needs and the tools necessary for safe opioid deprescribing. Additionally, our findings report higher clinician confidence when responding to resource-structured clinical vignettes, compared to their general confidence in real-world practice. This suggests that access to structured resources (as provided in the vignettes) may enhance clinicians' perceived capability which is supported by other literature (172). This mismatch between what is perceived as helpful and what is accessible underscores a critical gap in current system readiness for opioid deprescribing interventions. These findings emphasise the importance of tailoring resource availability to HCPs' needs and workflow operations and compatibility. When HCPs feel unsupported—due to factors such as lack of access to evidence-based guidelines, insufficient training, or unclear policies, they may be less likely to initiate or follow through with deprescribing, even when clinically appropriate (173). This dissatisfaction can contribute to inconsistent practices, reduced confidence, and potential patient safety risks. It also signals to researchers the need to further understand how developed tools and resources are currently applied in practice, especially during transitions of care.

Several participants expressed that not all patients on opioids require multidisciplinary or pain specialist involvement, suggesting a potential shift towards complexity-based referral screening as the initial approach, before deferring to a multidisciplinary care strategy (117, 160,

174) to deprescribe opioids. Similar studies have examined the referral pathway approach, but have differing scope. For example, one study developed a referral guidance tool for a musculoskeletal complex pain management service (175), and another focused on persistent pain (176). Clinicians and multidisciplinary teams should assess local resources, determine their utility and consider a risk-based referral system to guide opioid deprescribing, and integrating the tool into local policy. These findings underscore the importance of embedding practical deprescribing tools and policies into clinical workflows to better support clinicians during transitions of care. The supports need to be further tested to determine if they lead to enhanced capability and reduction and cessation of opioids whilst maintaining patient safety.

## Limitations

This study draws on a sample of Australian HCPs, enhancing its relevance across diverse clinical settings and roles. The clinical vignettes were informed by national opioid stewardship standard (122) and deprescribing guidelines (66), providing participants with contextually relevant scenarios to guide their responses. The combination of quantitative and qualitative data offers practical insights during the transitions of care phase to inform policy, training, and resource development.

The study does contain limitations. Firstly, responses may be subject to reporting bias, with participants potentially more engaged or interested in opioid deprescribing than the broader clinician population. The sample may not be representative of all Australian HCPs involved in opioid deprescribing at transitions of care. While the survey captured disciplines involved in medication management, respondents were primarily pharmacists and doctors, and mostly early-career clinicians, and it did not capture additional disciplines that support via non-pharmacological interventions, such as psychologists, which limits the generalisability of findings across the healthcare system. Additionally, while we assessed HCPs' perceptions, we did not assess practice, and the use of clinical vignettes may not fully reflect the complexities of real-world practice. Policy-related perspectives reported in the study may be influenced by the governing jurisdiction and local regulatory context, which could restrict the generalisability of findings to other states or international settings, where policies and implementation frameworks differ. Lastly, the survey captures HCPs' perspectives at a single point in time, and may not account for evolving practices, policies, or guideline implementation over time. Future studies should consider co-designing resources with HCPs who are actively involved during transitions of care to enhance the relevance and utility of deprescribing tools. Additionally,

further research is needed to explore how existing resources can be effectively utilised within different workflows and care settings, where support for opioid deprescribing during care transitions may be limited.

## Conclusion

Efforts to deprescribe opioids at transitions of care must balance workflow feasibility and HCPs' support preferences. As this study demonstrates, Australian HCPs are confident to deprescribe, but are constrained by time and lack of practical support needs. Local care settings can consider the development of clinical pathways and resourceful policies in collaboration with local clinicians to optimise opioid management during patients' transition of care.

Table 3.1: Demographics of participants

| Characteristics | Total number of participants (n = 105) |
|---|---|
| | Number (%) |
| Gender: | |
| Female | 72 (68.6%) |
| Male | 31 (29.5%) |
| Other | 2 (1.9%) |
| Years of clinical experience: | |
| 0-9 | 42 (40.0%) |
| 10-19 | 31 (29.5%) |
| 20 years or more | 32 (30.5%) |
| Profession: | |
| Pharmacist | 51 (48.6%) |
| Medical doctor | 34 (32.4%) |
| Nurse | 17 (16.2%) |
| Physiotherapist | 3 (2.9%) |
| Geographical location: | |
| NSW | 40 (38.10%) |
| VIC | 13 (12.38%) |
| QLD | 12 (11.43%) |
| Other states/territories | 19 (18.09%) |
| Unknown/prefer not to say | 21 (20.0%) |

| | |
|---|---|
| Primary place of work: | |
| Community | 21 (20.0%) |
| Hospital | 71 (67.6%) |
| Aged care | 7 (6.7%) |
| Other | 6 (5.7%) |

Table 3.2: Responses to the survey questions

| Question | Responses | N (%) |
|---|---|---|
| How confident are you in your ability to deprescribe opioids at transitions of care (e.g. during hospitalisation or at the point of discharge)? | High confidence (7-10) | 37 (35%) |
| | Moderate confidence (4-6) | 43 (41%) |
| | Low confidence (1-3) | 25 (24%) |
| How often do you consider deprescribing opioids at transitions of care (e.g. during hospitalisation or at the point of discharge)? | Frequently (weekly to daily) | 62 (59.0%) |
| | Monthly | 21 (20.0%) |
| | Rarely or never | 22 (21.0%) |
| Have you received any training or education on how to deprescribe opioids at transitions of care? | No | 62 (59%) |
| | Yes<br>• Professional development course (15 counts) | 43 (41%) |

| | | |
|---|---|---|
| | • Formal education training programs (14 counts)<br>• Guidelines (9 counts)<br>• Interdisciplinary training (6 counts)<br>• Other (4 counts) | |
| Reflecting on your primary place of work, how satisfied are you with the current support mechanisms to deprescribe opioids at transitions of care? | Dissatisfied | 33 (31.4%) |
| | Neither dissatisfied nor satisfied | 55 (52.4%) |
| | Satisfied | 17 (16.2%) |
| What health service(s) or healthcare professional(s) are required in your workplace to deprescribe opioids at transitions of care? | Doctor | 62 counts |
| | Pharmacist | 29 counts |
| | Pain management service | 18 counts |
| | Nurse | 13 counts |
| | Other variety | 32 counts |

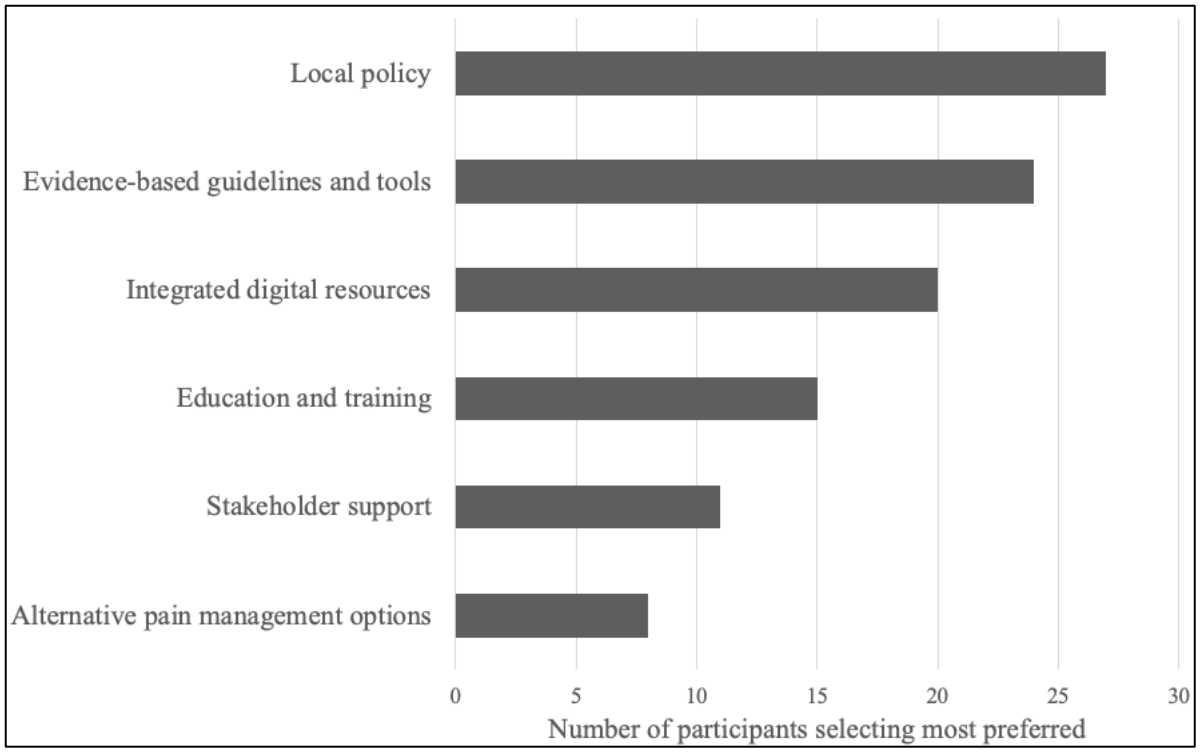


Figure 3.1: Number of participants selecting most preferred support mechanisms for opioid deprescribing at transitions of care.

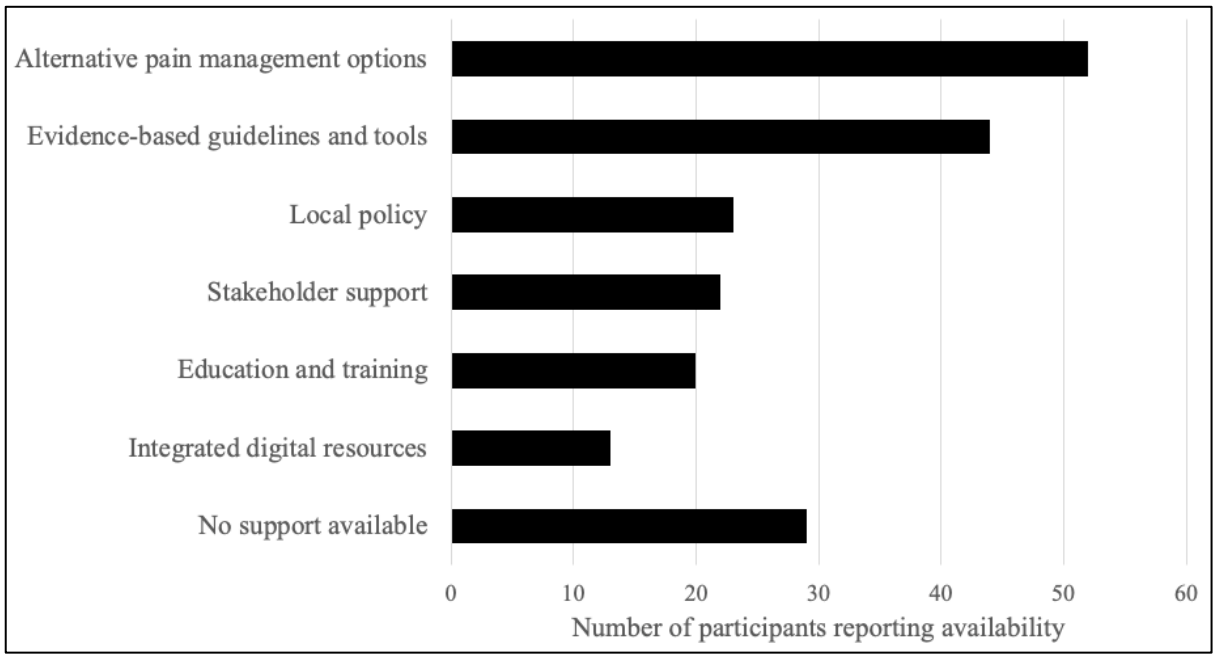


Figure 3.2: Number of participants reporting the availability of support mechanisms for opioid deprescribing at transitions of care.

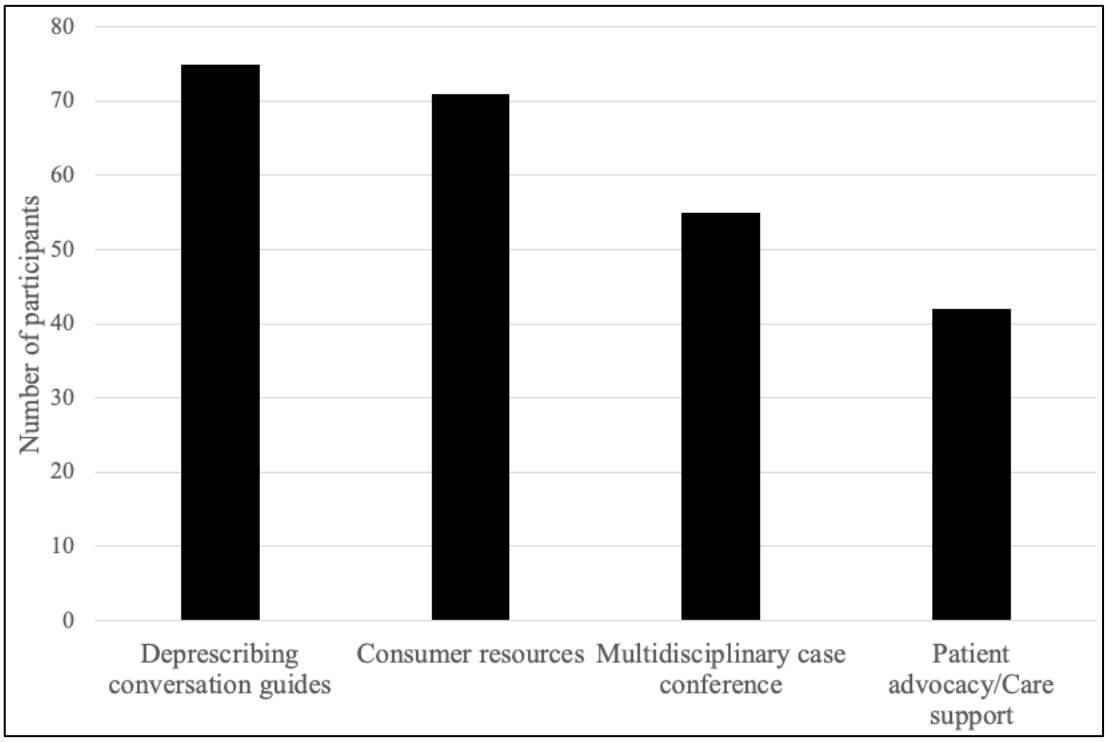


Figure 3.3: Resources selected by participants to enhance confidence in initiating deprescribing discussions with patients. The number of participants are not mutually exclusive.

# Chapter 4 – Discussion and Conclusion

## 4.1 Discussion and conclusions

I explored the implementability of opioid deprescribing interventions at transitions of care by combining a scoping review of existing interventions with data from a national survey of Australian healthcare professionals. The scoping review identified that the most common opioid deprescribing interventions at transitions of care were multicomponent and highly complex compared to single component interventions, with limited implementation assessment to translate research into evidence-based practice. The survey of Australian healthcare professionals identified that they are confident in deprescribing opioids at transitions of care, but existing support is not fit for purpose within current workflows. The scoping review and the survey together show that multicomponent or multidisciplinary approaches are key to reducing opioids at transitions of care, but are limited by the implementation reporting, and healthcare professionals are confident in deprescribing but require better designed supports that integrate within existing workflows and care settings.

Although the types of opioid deprescribing interventions reported in prior reviews (e.g., multidisciplinary approach, tapering protocols, and multimodal pain strategies) are broadly similar to those identified in this review, the main novel aspect addressed in the scoping review is the care setting and context in which these interventions are put into practice. In contrast, previous reviews have largely examined opioid deprescribing intervention in patients who remain within a single care setting (e.g., either hospital or community), rather than those actively moving between services, for example, from hospital to home, or ward to ward transition. This is essential to highlight that transitions of care can be characterised by fragmented responsibility, discontinuous information transfer, and competing clinical priorities. However, evidence on how opioid deprescribing strategies are implemented and sustained during these transitions remains lacking. This gap highlights the need for future studies to co-design opioid deprescribing interventions with clinicians and patients to ensure they are feasible and relevant to the end users, and sustainable within transitions of care. Recent evidence highlights the importance of implementation considerations from different stakeholders when designing and implementing multicomponent intervention at transitions of care. A qualitative systematic review of transitional care interventions found that early involvement of healthcare professionals, patients, and family members in pre-discharge

planning, alongside attention to stakeholders' needs post-discharge, is essential for successful implementation (177). Although this review did not specifically focus on medications or opioids, the results align with the findings of the thesis and reinforce the need for strong collaborative relationships between hospital and primary care clinicians, and between clinicians and patients, to support multicomponent opioid deprescribing interventions at transitions of care to mitigate medication-related harm. The survey findings extend this point by demonstrating that while clinicians value collaboration, they are also seeking practical tools to make such collaboration more feasible. For example, clinicians expressed a desire for a risk-based screening tool to identify potentially complex patients most vulnerable to opioid-related harm. This reflects a need to target interventions towards those at highest risk, rather than applying a multidisciplinary approach indiscriminately to all patients prescribed opioids. Developing locally adapted risk-screening tools could therefore support clinicians to prioritise patients who most need multi-stakeholder involvement, making collaboration more efficient, sustainable, and avoid overwhelming an under-resourced system.

The role of policy in supporting opioid deprescribing requires careful consideration. Within Australia, healthcare professionals appear to identify locally approved policies as a preferred support mechanism. Policies can provide structure and legitimacy, supporting the uptake of best practice across large populations, however, they often entail a rigid standardised approach to clinical care, and may not offer as much flexibility compared to mixed interventions, as the latter could provide patients with choice. For uniquely different cohorts of patients who take opioids, policies may not be suitable, and perhaps manifest more harm than benefits, which challenges the principles of patient-centred deprescribing (148). Furthermore, when patients transition across different organisations and care settings, local policies may diverge, creating fragmentation and uncertainty in care. While mixed interventions may provide adaptability and patient choice, and policies viewed as the preferred support mechanism by survey participants, embedding these together requires clinicians and organisations to ensure that opioid deprescribing decisions are aligned with each patient's personal goals, values, and needs (148), while remaining practical to implement at transitions of care.

National frameworks can provide an important platform to guide opioid deprescribing at transitions of care. The Australian Commission on Safety and Quality in Health Care recently released the *Medication Management at Transitions of Care Stewardship Framework* (178), encouraging hospitals to consider using the framework to develop their own systematic and

patient-centred approach to optimise medication management at transitions of care. When used in conjunction with the *Opioid Analgesic Stewardship in Acute Pain Clinical Care Standard (122)*, this framework could provide a pathway to embedding opioid deprescribing practices at transitions of care. However, feedback from clinicians has highlighted implementation challenges in applying the opioid analgesic stewardship standards consistently in practice [8], and these challenges are likely to be similar when implementing the *Medication Management at Transitions of Care Stewardship Framework*. Therefore, tailoring to the local context will likely be important considerations when combining and implementing both the opioid analgesic stewardship and the transitions of care stewardship resources.

The survey findings highlight that during intra-hospital transitions of care (e.g., emergency department to ward), healthcare professionals face competing clinical priorities that place deprescribing a low priority (79). Deprescribing may need to be initiated at different points depending on the clinical context, such as immediately after surgery versus later in the recovery trajectory, which reinforces the earlier notion of addressing stakeholders' needs and expectations across different care settings. Future work should examine how workflow integration, sequencing of intervention components, and intra-hospital versus hospital-to-community transitions affect implementation outcomes.

Clinicians value the principle of opioid deprescribing at transitions of care but often struggle with its practical implementation. Australian healthcare professionals have expressed that a hospital-initiated deprescribing plan may not be consistently implemented in primary care (Appendix 11), potentially due to communication breakdowns, unclear responsibility, and prescribing inertia (179). In contexts involving multiple prescribers, opioids may be passively continued rather than actively reviewed. The scoping review indicates that mixed interventions appear effective and could be embedded within policy frameworks to provide a structured yet flexible approach. However, for such policies to succeed, co-design with clinicians, patients, and carers is essential to ensure that interventions are realistic, context-specific, and minimise the risk of unintended consequences such as unmanaged pain or inequitable access to care. A hybrid approach, whereby policies mandate key principles (e.g., shared decision-making, gradual tapering) while allowing for local adaptation, may offer a way forward. Other solutions may include improved communication pathways, integrated electronic health records.

There is a growing call to incorporate behaviour change principles and implementation science into the development of deprescribing interventions to support their integration into

mainstream practice (180). The scoping review shows that despite so many different interventions being tested to evaluate their impact on opioid use at transitions of care, implementation approaches are still lacking in the literature to understand their feasibility and sustainability. This aligns with existing research where very few trials reported implementation rates of deprescribing recommendations and reinforces the uncertainty in the implementation potential of deprescribing interventions (111). Continuing to understand the evolving support needs of healthcare professionals is fundamental to improving the implementation of opioid deprescribing interventions at transitions of care.

In conclusion, opioid deprescribing at transitions of care has been highlighted as a critical step in minimising opioid-related harm. The implementability of it is not only dependent on clinical rationale and effectiveness, but on operational feasibility tailored to local context. The process requires careful timing, collaboration, and adaptation to individual patient needs and clinical contexts. With many new strategies being tested to understand its effect on opioid use at transitions of care, their integration within policies and its implementation in practice should be explored, this may ensure that opioid deprescribing at transitions of care is not only clinically effective but also sustainable and patient-centred.

### 4.2 Future directions

Understanding the benefits and the challenges of deprescribing from patients, healthcare professionals, and the system is essential to designing and implementing practical interventions during transitions of care within any care setting across the world. Future studies should consider co-designing opioid deprescribing interventions with healthcare professionals and patients within the local context and test the impact of these interventions at different transitions of care. This understanding must be coupled with evidence from ongoing and future clinical trials and synthesised with systematic reviews. Triangulating these trial-based insights with implementation research is critical to inform scalable models of care across different countries.

While the scoping review identified some studies capturing long-term outcomes (e.g., 6 months and up to 30 months, none assessed the sustainability of the intervention across multiple care settings. This highlights an important methodological gap as well as successful implementation gap. Measuring long-term opioid consumption alone may not be sufficient to capture whether deprescribing interventions are sustained across transitions, or whether tapering plans are

consistently implemented by different clinicians. Future interventions should therefore incorporate predefined cross-setting evaluation points and assess both clinical and implementation outcomes across each phase of care. This will help embed safe deprescribing practice into routine transitions of care and help capture any inappropriate continuation of opioid therapy between care settings, and aim to reduce opioid prescribing and consumption on a global level.

Importantly, comparing the views of healthcare professionals and health systems across different international settings can reveal both shared barriers and context-specific challenges, helping to distinguish what interventions are universally applicable and what requires local adaptation. Other research (78, 99, 181) also report that while healthcare practitioners widely acknowledge the need to reduce opioid prescribing, translating this recognition into practice remains complex and challenging.

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## Appendices

# Appendix 1 – Scoping review protocol and data search strategy

Study Information

1. The impact and complexity of interventions for deprescribing opioids at transitions of care: A scoping review.

2. Authors: Jeffery Wang (JW), Carl Schneider (CS), Aili Langford (AL), Christine Lin (CL), Danijela Gnjidic (DG).

3. Description (optional)

   3.1. Opioid related harm is a serious public health issue both in Australia and globally. In 2017, a substantial proportion of opioid-related mortality (35% in the United States and 70% in Australia) is attributed to pharmaceutical opioids (1). The World Health Organisation has identified the transition of care as an area of high clinical risk for patients taking opioids (2). Patients taking opioids across transitions of care are at higher risk of addiction, dependence, fatal overdose, or hospitalisation(3), and among the older adult population, they are prone to increased risk of falls, fall injuries and fractures (4). Thus, the continuation of opioid therapy is not always warranted at transition of care, and may increase the risk of adverse events (5). Studies have shown that the complexity of interventions is associated with increased effectiveness on improving appropriate opioid use(6).

   3.2. Transitions of care is defined as the movement of a patient from one healthcare provider or setting to another(5), for example when a patient is discharged from the hospital to the community or intra-hospital between wards, or transfer of care between clinicians. This is a critical point in determining if opioids would be continued or deprescribed (ceased or reduced) (7). Deprescribing is the process of withdrawal of an inappropriate medication, supervised by a health care professional with the goal of managing polypharmacy and improving outcomes(8). While numerous interventions such as medication reconciliation have been developed to drive improvements in the quality of care transitions (9), a Cochrane Review highlighted that the impact of these transitional care interventions is uncertain(10), and have limited evidence to assess the ongoing need for opioid analgesia (6, 11). Other opioid deprescribing interventions trialled include a complex combination of pharmacological, behavioural and non-pharmacological, however the evidence is of very low quality(12), no intervention stood out for recommendation (13), and have not focused on transition of care.

3.3. Deprescribing is a complex intervention consisting of 'a number of components, which may act both independently and inter-dependently', and interventions are often inherently heterogenous (14). Previous reviews (12, 15-18) have mainly evaluated the impact of opioid deprescribing interventions whilst patients were in hospital or in the community setting, and only one review assessed the complexity of interventions in optimising opioid use in hospital inpatients (6). Community-based clinicians also express a discontinuity in the health system, seek greater clarity and guidance on weaning of analgesics after hospital discharge, and improved communication between hospital and community prescribers during transition of care (7, 19).

3.4. To our knowledge, no review has been conducted examining the impact and complexity of opioid deprescribing interventions at transitions of care. The present scoping review aims to provide a comprehensive understanding of existing literature by summarising opioid deprescribing interventions at transitions of care. It aims to assess the impact and complexity of opioid deprescribing interventions at transitions of care by evaluating the effectiveness and implementability of these interventions, and provide clinicians an understanding of what interventions are suitable to be implemented in their own practice when patients undergo care transition.

4. Hypotheses (required)

4.1. Not applicable.

Design Plan

5. Study type (required)

5.1. A scoping review with a systematic review search strategy.

6. Blinding (required)

6.1. Not applicable.

7. Is there any additional blinding in this study?

7.1. Not applicable.

8. Study design (required)

8.1. The proposed scoping review will be conducted in accordance with the Joanna Briggs Institute (JBI) methodology for scoping reviews (20).

8.2. Objectives:

8.2.1. To evaluate the complexity of opioid deprescribing interventions at transitions of care.

8.2.2. To assess the effectiveness, and implementation of opioid deprescribing at transitions of care.

8.3. *Concept:* To evaluate the impact of opioid deprescribing interventions at transitions of care.

8.4. *Context:* Patients transitioning from one care setting to another and prescribed opioid analgesics.

8.5. *Types of sources included and published:*

8.5.1. Experimental studies,

8.5.2. Quasi-randomised,

8.5.3. Quasi-experimental,

8.5.4. Observational studies.

8.6. *Inclusion criteria:*

8.6.1. Patients aged 18 or above transitioning from one care setting to another (e.g. intra hospital or from hospital to the community)

8.6.2. Any deprescribing interventions with an intention to reduce or cease opioids targeting patients, clinicians, or health system level (e.g. behavioural interventions, outpatient programs, clinician education, opioid reduction protocols, interdisciplinary pain programs)(21).

8.7. *Exclusion criteria:*

8.7.1. Palliative care patients.

8.7.2. Patients who experience cancer-related pain.

8.7.3. Studies published in a language other than English.

8.8. We will perform a comprehensive search through the following databases: MEDLINE, EMBASE, Cochrane Library, CINAHL, PsycINFO, Cochrane Central Register of Controlled Trials, ClinicalTrials.gov, World Health Organisation International Clinical Trials Registry Platform and International Pharmaceutical Abstracts. In addition, we will perform citation tracking, by scanning the reference list of included studies.

9. Randomization (optional)

9.1. Not applicable.

Sampling Plan

10. Existing data (required)

10.1. Registration prior to analysis of the data.

11. Explanation of existing data (optional)

11.1. All studies cited in this protocol are publicly available.

12. Data collection procedures (required)

12.1. Our search strategy will be developed with assistance by an experienced academic librarian at the University of Sydney. The main three concepts:

12.1.1. Concept 1): "deprescrib*" OR "deprescriptions"[MeSH Terms] OR (("medication*" OR "prescribing") AND "inappropriate") OR "polypharmacy" OR "discontinu*" OR ("withdraw*" AND "medication*") OR (("medication*" OR "drugs" OR "prescribing" OR "inappropriate") AND "reduc*") OR "inappropriate prescribing"[MeSH Terms] OR ("review*" AND "medication") OR ("dose reduction" OR "taper*") OR "unnecessary prescription" OR "unnecessary prescriptions" OR "detox" OR "tolerance" OR "ceas*" OR "cessation" OR "stop*" OR "terminat*" OR "decreas*" OR "eliminat*". (15, 22-25)

12.1.2. Concept 2) "Transitions of care" OR "Transition of care" OR "hospital discharge" OR "care transitions" OR "care transition" OR "transitional care" OR "health transition" OR "health transitions" OR "care coordination" OR "transitional care management" OR "patient discharge" OR "post discharge" OR "hospital discharge planning" OR "continuity of care" OR "transition point" OR "transfer" OR "transfer of care" OR "handoff" OR "patient handoff" (26, 27).

12.1.3. Concept 3) Opioid analgesic OR opiates OR opioid OR buprenorphine OR tapentadol OR tramadol OR oxymorphone OR oxycodone OR morphine OR hydromorphone OR hydrocodone OR codeine OR fentanyl OR phentanyl OR methadone OR heroin OR alfentanil OR butorphanol OR dihydrocodeine OR meperidine OR pentazocine OR remifentanil OR sufentanil OR ketobemidone OR phenylpiperidine OR pethidine OR diphenylpropylamine OR dextromoramide OR piritramide OR dextropropoxyphene OR bezitramide OR benzomorphan OR pentazocine OR phenazocine OR oripavine OR etorphine OR tilidine OR ezocine OR meptazinol OR nicomorphine OR nalbuphine Panadeine or Nurofen Plus or Endone or Oxycontin or Subutex or Suboxone or Naloxone or Norspan or Temgesic or Tramal or Dilaudid or Jurnista or Durogesic or Abstral or Actiq or Sevredol or Momex SR or MS Contin or Kapanol or MS Mono* or Oxynorm* or Targin or Pethidine or Palexia or Zaldiar or Tramedo SR or Zydol SR (15, 28-30)

12.1.4. Studies identified by a combination of these terms which satisfy the inclusion criteria will be considered for the initial title and abstract screening.

12.2. Following the search, all identified citations will be collated and imported into Endnote and duplicates removed. Titles and abstracts will be screened independently using the inclusion and exclusion criteria by JW. A second independent reviewer will conduct a 10% audit regarding the eligibility of articles. The reasons for exclusion for articles excluded after full text screening will be reported. The results of the search and the study inclusion process will be reported in full in the final scoping review and presented in Preferred Reporting Items for Systematic Reviews and Meta-analyses extension for scoping review (PRISMA-ScR) flow diagram(31), which is presented in figure 1 (32):

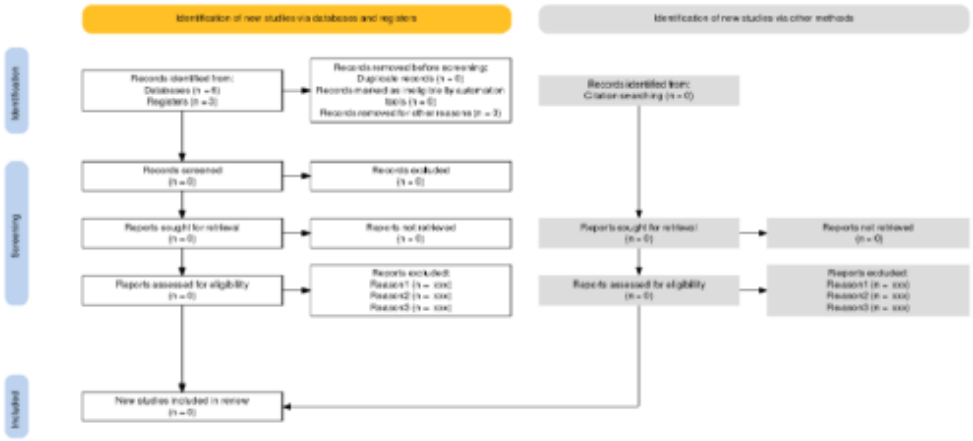


Figure 1: PRISMA flow chart of study selection process.

13. Sample size (required)
    13.1. Dependent on the number of elegible articles identified.

14. Stopping rule (optional)
    14.1. Not applicable.

Variables

15. Manipulated variables (optional)
    15.1. Not applicable.

16. Measured variables (required)

16.1. The 'Cochrane Intervention Complexity Assessment Tool for Systematic Reviews' (iCAT_SR)(33) will be used to assess the complexity of the intervention from the data extracted.

16.1.1. The iCAT_SR tool will be applied to the papers included in the scoping review by JW, and a second independent reviewer will conduct a 10% audit. Both JW and the reviewer will apply the assessment criteria that include the following:

16.1.1.1. The number of active components included in the intervention,

16.1.1.2. The behaviour or actions of intervention recipients or participants in which the intervention is directed,

16.1.1.3. The organisational levels targeted,

16.1.1.4. The degree of tailoring or flexibility permitted across sites or individuals in applying or implementing the intervention,

16.1.1.5. The level of skill required by those delivering the intervention to conduct the intervention's objectives,

16.1.1.6. The level of skill required for those to receive the intervention's objectives.

16.1.2. Criteria under which studies will be grouped for synthesis are:

16.1.2.1. Intra-hospital transition of care.

16.1.2.2. Hospital to community (e.g. rehabilitation, nursing home, or patient's own home) transition of care.

16.1.2.3. Hospital to hospital transition of care.

16.1.3. The results of the search will be presented following the PRISMA-ScR recommendations.

16.1.4. Results from applying the iCAT_SR tool will be tabulated as below (6):

| Author, year, country | Study size | Study design | Study population | Intervention | Outcomes |
|---|---|---|---|---|---|
| | | | | | |

16.2. The RE-AIM (Reach, Effectiveness, Adoption, Implementation, Maintenance)(34) framework will evaluate the outcomes of each study's intervention, and address two levels of assessment: individual and organisation (35).

| RE-AIM element | Definition | Level of Assessment |
|---|---|---|
| Reach | The absolute number, proportion, and representativeness of individuals or organisation who are willing to partake in a given intervention. | Individual |
| Effectiveness (or | The impact of the intervention relative to | Individual |

| | | |
|---|---|---|
| efficacy) | important outcomes. | |
| Adoption | The absolute number, proportion, and representativeness of organisations and intervention agents who are willing to initiate the intervention. | Organisational |
| Implementation | At the individual level, implementation refers to the client's use of the intervention and implementation strategies. At the setting level, the intervention agents' fidelity to components and aspects of an intervention's protocol. | Individual and Organisational. |
| Maintenance | The extent to which an opioid deprescribing policy at transition of care becomes institutionalised or part of the routine organisational practices and policies. | Individual and organisational |

16.2.1. The data from the included papers will be mapped to the RE-AIM framework by JW, and a second independent reviewer will conduct a 10% audit. The variables extracted from the data collection will include the first author details, year of publication, country of study, sample size, study design, study population, study intervention, duration of the intervention, outcome measures, results.

16.2.2. Mapping of the studies to the RE-AIM framework will be tabulated as below:

| Study Author | R | E | A | I | M |
|---|---|---|---|---|---|
| | | | | | |

16.3. Risk of bias (quality assessment):

16.3.1. The "Cochrane Risk of Bias Assessment Tool" (ROB-2) (36) will be used to assess the risk of bias in randomised controlled trials and the "Risk Of Bias In Non-randomised Studies of Interventions" (ROBINS-I) (37) tool will be applied to non-randomised studies.

16.3.2. The ROB-2 and ROBINS-I tool will be applied to the papers included in the scoping review by JW, and a second independent reviewer will conduct a 10% audit.

*Data analysis and presentation*

All extracted data will be presented in tabular or diagrammatic form. Firstly, a flow diagram of a table with the details of all included papers will be provided. Subsequently, the results will be presented in the following main categories that are based on the research question that form the basis of this scoping review (38):

- iCAT_SR (33).
- RE-AIM (34).
- ROB-2 (36).
- ROBINS-I (37).

17. Indices (optional)
    17.1. Not applicable.

Analysis Plan

18. Statistical models (required)
    18.1. No statistical methods will be required for this scoping review.

19. Transformations (optional)
    19.1. Not applicable.

20. Inference criteria (optional)
    20.1. Not applicable.

21. Data exclusion (optional)
    21.1. Studies looking at patients under the age of 18, palliative care patients and cancer-pain.

22. Missing data (optional)
    22.1. Not applicable.

23. Exploratory analysis (optional)
    23.1. Not applicable.

Other

24. Other (Optional)
    24.1. Acknowledgements and authors

24.1.1. Mr Jeffery Wang, Mphil student, School of Pharamcy, Faculty of Medicine and Health, The University of Sydney

24.1.2. Associate Professor Danijela Gnjidic, School of Pharamcy, Faculty of Medicine and Health, The University of Sydney

24.1.3. Professor Christine Lin, Institute of Musckuloskeletal Health and School of Public Health, The University of Sydney

24.1.4. Dr Carl Schneider, School of Pharamcy, Faculty of Medicine and Health, The University of Sydney

24.1.5. Ms Aili Langford., PhD Candidate, School of Pharamcy, Faculty of Medicine and Health, The University of Sydney.

24.2. Conflicts of interest

24.2.1. None

24.3. Appendices.


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## Appendix 2 – Survey ethics approval

THE UNIVERSITY OF SYDNEY

RESEARCH INTEGRITY
& ETHICS ADMINISTRATION

# HUMAN RESEARCH ETHICS APPROVAL

The University of Sydney confirms that this project meets the requirements of the National Statement on Ethical Conduct in Human Research.

| | |
|---|---|
| **Project identifier:** | 2024/HE000654 |
| **Project title:** | Survey of Australian healthcare professionals' needs and support required to deprescribe opioids at transitions of care |
| **Application version:** | 0.03 |
| **Chief Investigator:** | Associate Professor Danijela Gnjidic |
| **Project team:** | Dr Aili Veronica Langford<br>Associate Professor Carl Schneider<br>Professor Chung-Wei Lin<br>Mr Jeffery Wang |
| **Project start date:** | 09 Sep 2024 |
| **Project end date:** | 08 Sep 2028 |
| **Date of issue:** | Monday, 9 September, 2024 |

**Project summary**

The main aim of the study is to understand the availability of resources and support tools that Australian healthcare professionals have to safely reduce or deprescribe opioid analgesics (pain medications) at transitions of care. Additionally, we will seek to identify their level of confidence in opioid deprescribing at transitions of care and the gaps in resource needs and support mechanisms required to successfully deprescribe opioids. This will be done by disseminating an online survey amongst key healthcare professional organisations in Australia. The findings of this study are critical to informing future policy and practice that will equip healthcare professionals to improve opioid deprescribing processes and ensuring patient safety during transitions of care.

**Documents approved**

| Document type | File name | Document version | Application version |
|---|---|---|---|
| Recruitment or advertising material | Appendix 6 - caption.docx | 1 | 0.02 |
| Other | Appendix 3 – E-mail to Organisation(s).docx | 1 | 0.02 |
| Application Attachment | Jeff's Survey Protocol (Final).docx | 2 | 0.02 |
| Participant Information Statement (PIS) | Appendix 1 - Participant Information Statement_FINAL version 3.docx | 3 | 0.03 |
| Other | Appendix 4 - Reminder e-mail.docx | 1 | 0.02 |
| Recruitment or advertising material | Appendix 5 - study ad .docx | 1 | 0.02 |
| Survey or questionnaire | Appendix 2 - Survey Questionnaire (Final).docx | 1 | 0.02 |

**Conditions of Approval**

- Research must be conducted according to the approved proposal.
- An annual progress report must be submitted on or before the anniversary of approval and a final report on completion of the project.
- You must report as soon as practicable anything that might warrant review of ethical approval of the project including:
  - Serious or unexpected adverse events (which should be reported within 72 hours).
  - Unforeseen events that might affect continued ethical acceptability of the project.
- Any changes to the proposal must be approved prior to their implementation (except where an amendment is undertaken to eliminate *immediate* risk to participants).
- Researchers working on this project must be sufficiently qualified by education, training, and experience for their role, or adequately supervised. Changes to the project team must be reported and approved.
- Researchers must disclose any actual, potential of perceived conflicts of interest, including any financial or other interest or affiliation, as relevant to this project.
- Research data and primary materials must be retained and stored in accordance with relevant legislation and University guidelines.
- Ethics approval is dependent upon ongoing compliance of the research with the *National Statement on Ethical Conduct in Human Research*, the *Australian Code for the Responsible Conduct of Research*, applicable legal requirements, and with University policies, procedures, and governance requirements.
- If your research project is a clinical trial and is being sponsored by the University or is to be conducted on a University of Sydney site, you must comply with additional University governance requirements prior to commencing your Clinical Trial.
- The University may conduct audits on approved projects.
- The Chief Investigator has ultimate responsibility for the conduct of the research and is responsible for ensuring all others involved will conduct the research in accordance with the above.

**Ethics Committee Representative**

Chair
On behalf of the University of Sydney

**The University of Sydney HRECs are constituted and operate in accordance with the National Statement on Ethical Conduct in Human Research and the Australian Code for the Responsible Conduct of Research (NHMRC). All personnel named on the project should be acquainted with these documents.**

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## Appendix 3 – Survey Participant Information Statement

### Participant Information Statement

*For online surveys*

***Research study: Survey of healthcare professionals' needs and support required to deprescribe opioids at transitions of care***

---

1. **What is this study about?**

   We are conducting a research study about the resource needs and support healthcare professionals require to deprescribe (reduce) opioid analgesics at transitions of care (the movement between different care settings or providers). Participation is optional.

   Please read this sheet carefully. If you have questions about anything you don't understand or want to know more about, please contact Associate Professor Danijela Gnjidic, +61 2 9351 2298, danijela.gnjidic@sydney.edu.au.

2. **Who is running this study?**

   The study is being carried out by the following researchers:

   - Associate Professor Danijela Gnjidic (Chief Investigator)
   - Professor Chung-Wei Christine Lin (Principal Investigator)
   - Associate Professor Carl R Schneider (Principal Investigator)
   - Dr Aili Langford (Principal Investigator)

   Jeffery Wang is conducting this study as a basis for a Masters of Philosophy (Research) at the University of Sydney.

3. **Who can take part in the study?**

   We are seeking any registered healthcare professionals who are currently practising in Australia. You have been selected as a Healthcare Professional to participate in this study as you may have experience in looking after patients taking opioids in different care settings.

4. **What will the study involve for me?**

   If you decide to take part in this study, you will be asked to complete an anonymous online survey involving a series of questions about the resource needs and support you require to deprescribe opioids at transitions of care.

The survey should take approximately 15 minutes to complete.

## 5. Can I withdraw once I have started?

Being in this study is completely voluntary and you do not have to take part.

Your decision will not affect your current or future relationship with the researchers or anyone else at The University of Sydney.

We do not anticipate your decision will affect your relationship with your current workplace or the University of Sydney.

By submitting your survey, you are consenting to take part in the study. You can withdraw any time before submitting by exiting the survey. Once your responses are submitted, we won't be able to tell which one is yours because the survey is anonymous. This means you cannot withdraw after submitting the survey.

## 6. Are there any risks or costs?

Aside from giving up your time, we do not expect that there will be any risks or costs associated with taking part in this study.

## 7. Are there any benefits?

You will not receive any direct benefits from being in the study.

## 8. What will happen to information that is collected?

By providing your consent, you are agreeing to us collecting information from or about you for the purposes of this study.

Any identifiable information you provide us will be stored securely and will only be disclosed with your permission unless we are required by law to release information.

We plan to publish the study findings, and you will not be individually identifiable in these publications.

We will store this information and dispose of it securely by following the University's Recordkeeping Policy. For more details about how your information will be handled please see the University's privacy webpage.

## 9. Will I be told the results of the study?

You have a right to receive feedback about the overall results of this study. If you are interested in receiving feedback, please provide your contact details at the end of the survey. This feedback will be in the form of a brief lay summary.

## 10. What if I would like more information?

When you have read this information, the following researcher(s) will be available to discuss it with you further and answer any questions you may have:

- A/Prof Danijela Gnjidic, Associate Professor, +61 2 9351 2298, danijela.gnjidic@sydney.edu.au

## 11. What if I have a complaint or any concerns?

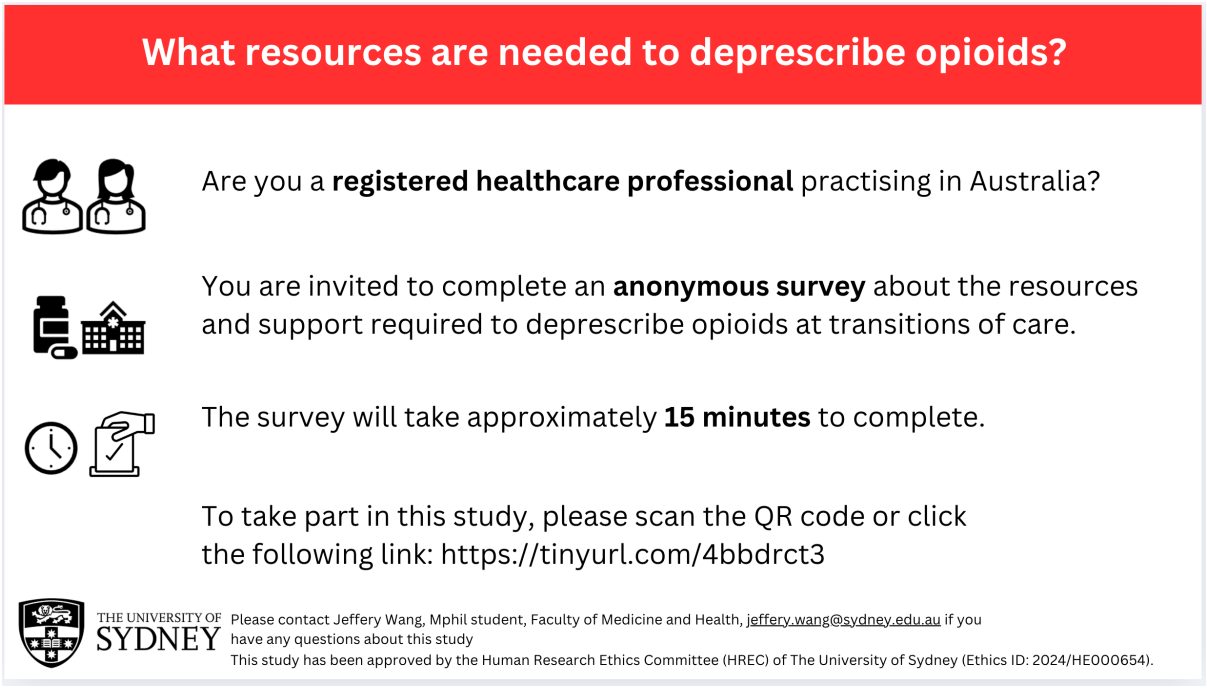
The ethical aspects of this study have been approved by the Human Research Ethics Committee (HREC) of The University of Sydney [ethics reference: 2024/HE000654] according to the National Statement on Ethical Conduct in Human Research.

If you are concerned about the way this study is being conducted or you wish to make a complaint to someone independent from the study, please contact the University:

Human Ethics Manager
human.ethics@sydney.edu.au
+61 2 8627 8176

*This information sheet is for you to keep*

## Appendix 4 – Survey study advertisement



**Appendix 5 – Survey study advertisement caption**

Are you a registered healthcare professional in Australia?

We would like to invite you to participate in our study on opioid deprescribing at transitions of care. Find out more by clicking on the following link: https://tinyurl.com/4bbdrct3
#opioids #deprescribing #transitionsofcare

## Appendix 6 – List of organisations contacted

| |
|---|
| Agency for Clinical Innovation Research Network |
| Alfred Health |
| Allied Health Professions Australia |
| Arthritis Australia |
| Assist Group |
| Austin Health |
| Australasian College of Pharmacy |
| Australasian Pharmaceutical Sciences Association |
| Australasian Professional Society on Alcohol and other Drugs, |
| Australasian Society of Clinical and Experimental Pharmacologists and Toxicologists |
| Australia & New Zealand Musculoskeletal Clinical Trials Network |
| Australian and New Zealand<br>Society for Geriatric Medicine |
| Australian and New Zealand Association of Paediatric Surgeons Inc. |
| Australian and New Zealand College of Anaesthetists |
| Australian Association of Gerontology |
| Australian Capital Territory Health |
| Australian College of Emergency Nursing |
| Australian College of Mental Health Nurses |
| Australian College of Nurse Practitioners |
| Australian College of Nursing |
| Australian Commission on Safety and Quality in Health Care |
| Australian Medical Association |
| Australian Nursing and Midwifery Federation |
| Australian Pain Society |
| Australian Physiotherapy Association |
| Australian Primary Health Care Nurses Association |
| Australian Psychological society |
| Australian Society of Cardiothoracic Surgeons (ASCTS) |
| Australian Society of Plastic Surgeons |
| College of Emergency Nursing Australasia |
| General Surgeons Australia |
| Geriatric Care Australia |
| Kolling Institute |
| Mental Health Professionals' Network |
| National Association of Practising Psychiatrists |
| National Prescribing Service (NPS) Medicine |
| Neurosurgical Society of Australasia |
| New South Wales Health |
| Northern Territory Health |
| Occupational Therapy Australia |
| Pain Clinic Australia |
| Pain Nurses Australia |
| Pain Specialists Australia |
| Pharmaceutical Society of Australia |
| Pharmaceutical Society of Australia (Australian Capital Territory Branch) |

| |
|---|
| Pharmaceutical Society of Australia (New South Wales Branch) |
| Pharmaceutical Society of Australia (Queensland Branch) |
| Pharmaceutical Society of Australia (South Australia & Northern Territory Branch) |
| Pharmaceutical Society of Australia (Tasmania Branch) |
| Pharmaceutical Society of Australia (Victoria Branch) |
| Pharmaceutical Society of Australia (Western Australia Branch) |
| Pharmacy Daily |
| Primary Health Network Adelaide |
| Primary Health Network Australian Capital Territory |
| Primary Health Network Brisbane North |
| Primary Health Network Brisbane South |
| Primary Health Network Central and Eastern Sydney |
| Primary Health Network Country South Australia |
| Primary Health Network Darling downs |
| Primary Health Network Eastern Melbourne |
| Primary Health Network Gippsland |
| Primary Health Network Gold Coast |
| Primary Health Network Hunter New England and Central Coast |
| Primary Health Network Murray |
| Primary Health Network Murrumbidgee |
| Primary Health Network Nepean Blue Mountains |
| Primary Health Network North Coast |
| Primary Health Network North Western Melbourne |
| Primary Health Network Northern Queensland |
| Primary Health Network Northern Territory |
| Primary Health Network South Eastern Melbourne |
| Primary Health Network South Eastern NSW |
| Primary Health Network South Western Sydney |
| Primary Health Network Sunshine coast |
| Primary Health Network Sydney North |
| Primary Health Network Tasmania |
| Primary Health Network WentWest |
| Primary Health Network Western NSW |
| Primary Health Network Western Perth North/Perth South/Country WA |
| Primary Health Network Western Queensland |
| Primary Health Network Western Victoria |
| Queensland Health |
| Royal Australasian College of Surgeons |
| Rural Doctors Association of Australia |
| Society of Hospital Pharmacists (now known as Advanced Pharmacy Australia) |
| Society of Hospital Pharmacists (NSW Branch) |
| South Australia Health |
| South Australia Health (Pharmacy) |
| Sydney Health Partners Musculoskeletal Clinical Academic Group |
| Sydney Pain Consortium |
| Tasmania Health |
| The Australian & New Zealand Mental Health Association |

| |
|---|
| The Australian and New Zealand Society for Vascular Surgery |
| The Australian Society of Otolaryngology Head and Neck Surgery |
| The Drug and Alcohol Nurses of Australasia |
| The Royal Australasian College of Physicians |
| The Royal Australian and New Zealand College of Psychiatrists |
| The Royal Australian College of General Practitioners |
| The Urological Society of Australia and New Zealand |
| Turning Point |
| University of Sydney  Health Marketing |
| University of Sydney Faculty of Medicine and Health news |
| University of Sydney Faculty of Medicine and Health Research support |
| Victoria Health |
| Western Australia Health |

## Appendix 7 – Survey questionnaire

Survey of Australian healthcare professionals' needs and support required to deprescribe opioids at transitions of care

**Screening question**

1. By selecting 'Yes', you confirm that you have read and understood the Participant Information Statement before commencing the survey (mandatory):
    a. Yes
2. Are you currently a registered healthcare professional in Australia?
    a. Yes -> please proceed
    b. No -> Survey will close with the following message: **Thank you for your interest. At this time, we are only seeking responses from registered healthcare professionals.**

**Background Information**

3. Please select your current role from the list: (Mandatory)
    a. Medical doctor
    b. Nurse
    c. Occupational therapist
    d. Pharmacist
    e. Physiotherapist
    f. Psychologist
    g. Other (please specify): (Mandatory free-text to: "Please specify your current role"

4. What do you identify as your gender? (Mandatory)
    - Female
    - Male
    - I identify my gender as: (Mandatory free text to: "I identify my gender as:"
    - Prefer not to say

5. How many years of clinical experience do you have? (Mandatory)
    - 0-4
    - 5-9
    - 10-19
    - 20-24
    - 25 years or more
    - Prefer not to say

6. What is the postcode of your primary place of work? (Mandatory)
    - Please specify: (Mandatory free-text to "Please enter your postcode:")
    - Prefer not to say

7. What is the setting of your primary place of work (i.e. type of healthcare setting)? (Mandatory)
    - Community setting
    - Hospital setting
    - Aged care

- Other: (Mandatory free-text to “Please describe the setting of your primary place of work:”)

The first few questions will walk you through two case studies, each based on the Evidence-Based Clinical Practice Guideline for Deprescribing Opioid Analgesics and the Opioid Analgesic Stewardship in Acute Pain Clinical Care Standard**.** These resources aim to assist healthcare professionals in the implementation and monitoring of opioid deprescribing practices in primary care and across transitions of care.

**Opioid deprescribing** is the process of reviewing a patient’s opioid regimen and creating a plan to reduce or cease the opioids whilst minimising harm to them. **Transitions of care** is the movement from one care setting to another (e.g., hospital to home), or from one healthcare provider to another.

In the Opioid Deprescribing Guideline, the first evidence-based recommendation is ‘*We suggest developing and implementing a deprescribing plan for persons being prescribed opioids at the point of opioid initiation.’* Please read the following case to answer questions 1.1 and 1.2.

**Case 1:**

Patient A, a 52-year-old school teacher, was admitted to hospital with a fractured ankle while playing basketball. They underwent surgery and were prescribed Oxycodone/Naloxone modified-release tablet 5 mg/2.5 mg orally twice daily and Oxycodone immediate-release tablet 5 mg orally every six hours when required for acute pain management. Their medical history includes migraine and hypertension, for which they take sumatriptan and perindopril. Patient A has never taken opioids before, and as they prepare for discharge, the surgical team has communicated a deprescribing plan to their General Practitioner, scheduled outpatient follow-up appointments to monitor their progress and optimised their pain management plan.

1.1 - On a scale of 1-10, how confident are you in *developing and implementing a deprescribing plan for Patient A at the point of opioid initiation*?
1 = not confident at all, and 10 = extremely confident

1 2 3 4 5 6 7 8 9 10

1.2 - Please provide any reason(s) to your response to implement this recommendation? (Mandatory - free text).

The Opioid Analgesic Stewardship in Acute Pain Clinical Care Standard lists a number of quality statements that target key areas for care improvement. One quality statement targets the 'Transfer of Care': *Planning for appropriate analgesic use at the transfer of care begins when a patient is started on an opioid analgesic during their hospital visit, according to an agreed opioid analgesic weaning and cessation protocol. The number of days' supply of an opioid analgesic on discharge is based on multiple factors, including the expected course of the patient's condition, appropriate arrangements for follow-up and opioid analgesic use in the last 24 hours before discharge.* Please read the following case to answer questions 2.1 and 2.2.

**Case 2:**

Patient B, a 70-year-old retiree presents to hospital with severe back pain. They have a history of experiencing back pain for the last 5 years, and manages it with two Paracetamol 665 mg modified-release tablets orally three times a day when required for acute onset of severe back pain. The Emergency Department (ED) doctor prescribes Oxycodone-Naloxone modified-release tablet 5 mg/2.5 mg orally twice a day and Oxycodone immediate-release tablet 2.5 mg to 5 mg orally every eight hours when required for their pain and they are transferred to the ward.

The Opioid Clinical Care Standards recommends the following actions to occur: at the transfer of care from ED to the ward, Patient B should be commenced on an opioid analgesic weaning protocol agreed between them, a multidisciplinary team and pain specialist. At discharge, the team would review Patient B's analgesic usage in the 24 hours prior, provide them with education on the safe use of opioids, a deprescribing plan at discharge, and contact their General Practitioner to ensure continuity of care.

2.1 - On a scale of 1-10, how confident are you in implementing the above actions?
1 = not confident at all, and 10 = extremely confident (Mandatory)

1 2 3 4 5 6 7 8 9 10

2.2 - Please provide any reason(s) to your response to implement this recommendation? (Mandatory - free text).

3. How often do you consider deprescribing opioids at transitions of care (e.g. during hospitalisation or at the point of discharge)? (Mandatory)
- Not at all
- Rarely (once every few months)
- Sometimes (once every month)
- Often (once every week)
- Very frequently (once everyday)

4. Have you received any training or education on how to deprescribe opioids at transitions of care? (Mandatory)
- Yes → then mandatory 'free-text' comment to "Please describe the training or education you have received"
- No → Move on to question 5

5. How confident are you in your ability to deprescribe opioids at transitions of care (e.g. during hospitalisation or at the point of discharge)? (Mandatory)
- Not at all confident
- Slightly confident
- Moderately confident
- Very confident
- Extremely confident

6.1 Which of the following support mechanisms **would you require in future** to deprescribe opioids at transitions of care? Rank the following in order of preference – **1 being most preferred** and **6 being least preferred**. (Mandatory)

☐ A locally approved opioid management policy
☐ Access to evidence-based guidelines and clinical decision support tools
☐ Alternative pain management options (e.g., heat packs, ice packs, exercise, and non-opioid pharmacotherapy)
☐ Integration of opioid deprescribing into electronic health records and clinical workflows
☐ Support from key stakeholders
☐ Education, training, and patient engagement resources

6.2 Please describe what **other support** you would require to deprescribe opioids at transitions of care? (Optional free text).

8. Reflecting on your primary place of work, how satisfied are you with the **current** support mechanisms to deprescribe opioids at transitions of care? (Mandatory)
- Very dissatisfied
- Dissatisfied
- Neither dissatisfied nor satisfied
- Satisfied
- Very satisfied

9. Which of the following support mechanisms are **currently available** to you to deprescribe opioids at transitions of care? (Tick all that apply) - (Mandatory)

☐ A locally approved opioid management policy → (Optional free text to describe)
☐ Access to evidence-based guidelines and clinical decision support tools → (Optional free text to describe)
☐ Alternative pain management options (e.g., heat packs, ice packs, exercise, and non-opioid pharmacotherapy) → (Optional free text to describe)
☐ Integration of opioid deprescribing into electronic health records and clinical workflows → (Optional free text to describe)
☐ Support from key stakeholders → (Optional free text to describe)
☐ Education, training, and resources on patient engagement → (Optional free text to describe)
☐ No support mechanisms currently available
☐ Other: (Optional free text to describe)

10. What health service(s) or healthcare professional(s) are required in your workplace to deprescribe opioids at transitions of care? (Mandatory free-text)

11. Which of the following would build your confidence to initiate opioid deprescribing discussions with patients at transitions of care? (Tick all that apply): (Mandatory)

☐ Consumer resources
☐ Patient advocacy/Care support
☐ Deprescribing conversation guides
☐ Multidisciplinary case conference
☐ Other: (Mandatory free text to "Please detail 'other':" )

12. Please add any additional comments that would be relevant:

***Thank you for your participation in this survey.***

**Appendix 8 – E-mail to organisation(s)**

Dear (organisation),

My name is Jeffery Wang and I am part of a research team from the School of Pharmacy at the University of Sydney. Myself and other researchers from the University of Sydney are conducting a research study to explore the needs and support required by Australian Healthcare Professionals to deprescribe opioids at transitions of care. This study is being conducted by A/Prof Danijela Gnjidic, A/Prof Carl R Schneider, and Dr Aili Langford from the School of Pharmacy at The University of Sydney and Prof Chung-Wei Christine Lin from the Institute for Musculoskeletal Health.

The research involves the completion of a short survey which is entirely voluntary and will take up to 15 minutes to complete. Would it be possible for your network to help spread the word to reach any individuals who may be a member of your organisation? If so, could you please ask them to complete the survey via the following link: https://tinyurl.com/4bbdrct3

It would be great if your network would be able to also help promote our survey on your social media platforms and include us in your next newsletters! A study ad has been also attached.

I have attached a Participant Information Statement that provides further detail on the study. If you have any questions, do not hesitate to contact A/Prof Danijela Gnjidic or myself. A/Prof Gnjidic's contact details are +61 2 9351 2298 and danijela.gnjidic@sydney.edu.au.

On behalf of the study team, we thank you for your time in considering this study.

**Appendix 9 – Reminder e-mail to organisation(s)**

Email Subject: Reminder: Survey of Australian healthcare professionals' needs and support required to deprescribe opioids at transitions of care.

Dear (organisation),

We are writing to provide you a gentle reminder about our research study "Survey of Australian healthcare professionals' needs and support required to deprescribe opioids at transitions of care".

Their perspectives are invaluable and will significantly contribute to improving clinical practice and patient care.

We kindly ask you to promote it on your social media platform or newsletters.

The survey link can be found here, otherwise a study ad is attached.

Kind regards

## Appendix 10 – Australian Commission on Safety and Quality in Health Care's Opioid Analgesic Stewardship in Acute Pain Clinical Care Standard Quality statement 9 – Transfer of Care

Planning for appropriate analgesic use at the transfer of care begins when a patient is started on an opioid analgesic during their hospital visit, according to an agreed opioid analgesic weaning and cessation protocol. The number of days' supply of an opioid analgesic on discharge is based on multiple factors, including the expected course of the patient's condition, appropriate arrangements for follow-up and opioid analgesic use in the last 24 hours before discharge.

**Appendix 11 - Barriers to opioid deprescribing by TDF-based items for Australian Healthcare Professionals. P = Participant.**

| Theoretical Domains Framework | Quote | System | Individual clinician | Patient factors | Medication factors |
|---|---|---|---|---|---|
| Behavioural regulation | 'Often as HCP we like something prescriptive' (P80)<br><br>'treating team do not have time to discuss and handover to a patient's GP' (P91) | - | Need for prescriptive recommendations<br><br>Lack of time | - | - |
| Beliefs about capabilities | 'Unsure whether GP and patient will remain compliant with plan'. (P211)<br><br>'It sounds good in theory, however access to specialist pain teams is | Uncertain if GP will remain compliant with plan<br><br>Limited specialist support | Single practitioner (pharmacist) is insufficient<br><br>Unconfident RMOs (resident medical officers) | Challenges in individualising pain management – unpredictable response | Opioid management plan should warrant additional training and senior oversight |

| Theoretical Domains Framework | Quote | System | Individual clinician | Patient factors | Medication factors |
|---|---|---|---|---|---|
| | limited on busy surgical wards and underconfident RMOs (or those who wish to appease their bosses), may be hesitant to action a weaning plan without senior oversight' (P214) | | | | |
| Beliefs about consequences | 'Prescribers are likely to use chronic pain as a reason for ongoing SR opioid.' (P16)<br><br>'difficult to assess patients ongoing pain and analgesia requirements'. (P80)<br><br>'may be reliant on meds so might be difficult for them | Outpatient monitoring is variable<br><br>Lack of trust and confidence in GP and community pharmacy to follow-up<br><br>Challenges in GP follow-up | Prescribing inertia.<br><br>Prescribers are likely to use chronic pain as a reason for ongoing SR pain.<br><br>Difficult to implement weaning plan for acute on chronic pain | Intolerable pain<br><br>Uncertain expectation of pain<br><br>Lack of understanding to reduce opioids over time | - |

| Theoretical Domains Framework | Quote | System | Individual clinician | Patient factors | Medication factors |
|---|---|---|---|---|---|
| | to wean off opioids if they have used it for a while.' (P95) | Transitions of care coordination issues | | Difficult to deprescribe opioids if chronic pain is present<br><br>Unrealistic expectations of pain and pain relief | |
| Emotion | 'Unsure of prerogative, fear of patient having uncontrolled pain' (P173)<br><br>'Many patients become disgruntled when discussing reducing opioids.' (P58) | - | Concern for patient's first-time use of opioids | Patient dissatisfaction | - |

| Theoretical Domains Framework | Quote | System | Individual clinician | Patient factors | Medication factors |
|---|---|---|---|---|---|
| Environmental context and resources | “ED workflow environment is different to ward based discharge as the length of time to review and monitor patients are much shorter which can impact ability to assess pain management and chance to trial non opioid pain analgesia. I feel that transition of care linkage by ed to community multidisciplinary clinicians can be improved as I don't feel this occurs frequently” (P21). | Challenging to develop a thorough weaning plan prior to ward transfer due to time and bed constraints, and executive to rush discharges<br><br>Lack of trust in system<br><br>No easily accessible recommendations available<br><br>Lack of process to implement deprescribing plan | Lack of time to discuss and handover to patient’s General Practitioner | Difficult to have deprescribing conversation once settled on a regime<br><br>Patient’s progress, response, and pain are variable and subjective<br><br>Patient’s pain history can be complex | Lack of familiarity with deprescribing plan for modified release opioid medications in community setting<br><br>Lack of guidelines surrounding analgesia requirements with particular surgeries. |

| Theoretical Domains Framework | Quote | System | Individual clinician | Patient factors | Medication factors |
|---|---|---|---|---|---|
| | | Need for improved standardised access to allied health support<br><br>Limited pain service staff<br><br>Workflow environment is different between Emergency Department and ward-based discharge<br><br>Transfer of care junctures are rushed and not streamlined. | | | Little evidence suggesting that long-acting opioids help with acute pain.<br><br>Analgesic use is decided on day of discharge due to bed pressures. |

| Theoretical Domains Framework | Quote | System | Individual clinician | Patient factors | Medication factors |
|---|---|---|---|---|---|
| | | Rural areas lack access to specialists<br><br>Require management and other discipline support<br><br>Impossible to have a multidisciplinary team, pain specialist and patient agree on plan | | | |
| Goals | 'I also feel this is an important medication plan to discuss with the patient as well' (P91). | - | Practice patient-centred care | Provide counselling on use of non-opioid as first line and only use the | Need plan for weaning. |

| Theoretical Domains Framework | Quote | System | Individual clinician | Patient factors | Medication factors |
|---|---|---|---|---|---|
| | 'having a strict plan may not be ideal, however having goals to work towards involving pt input will be important' (P103). | | | opioid when required. | |
| Intention | | - | - | | - |
| Knowledge | 'I would say I have a general idea of how to wean the pain medications but am not familiar with de prescribing plans as a concept' (P162).<br><br>'how many prn doses were they taking and how was their pain with / without medication Not confident making any suggestions | - | Lack of familiarity with developing and implementing deprescribing plan | - | Need to consider prn usage before making recommendation |

| Theoretical Domains Framework | Quote | System | Individual clinician | Patient factors | Medication factors |
|---|---|---|---|---|---|
| | without this information' (P117). | | | | |
| Memory, attention and decision processes | 'may be hesitant to action a weaning plan without senior oversight' (P214). | - | Needing senior consultant decision. | - | - |
| Optimism | 'With the help of the Pain team/specialist, I'd be more confident in a deprescribing plan. Otherwise again I'd be making it up and hoping for the best.' (P60). | - | More confidence in developing deprescribing plan with senior assistance | - | - |
| Reinforcement | 'it is important for the patient to understand the medication and how it works in order for them to make an informed decision on thier treatment' (P13). | Need for better standardised access to allied health support as part of deprescribing plan and comprehensive care | - | Need to ascertain patient's understanding of pain management before opioid commencement | Need to provide medication education surrounding risk of dependence, and side effects |

| Theoretical Domains Framework | Quote | System | Individual clinician | Patient factors | Medication factors |
|---|---|---|---|---|---|
| | 'here needs to be much better and standardised access to AH supports during the entire phase as part of a deprescribing plan and comprehensive care.' (P64). | | | Need for comprehensive and holistic education to desensitise pain with ongoing support and management. | for first-time opioid use.<br><br>Increased risk of falls. |
| Skill | | - | Not trained in deprescribing and management of patient's response to deprescribing<br><br>Need for education on different surgery types and their different | Need to have discussion about responsible use of opioids and how/when to reduce. | Need to have discussion about responsible use of opioids and how/when to reduce. |

| Theoretical Domains Framework | Quote | System | Individual clinician | Patient factors | Medication factors |
|---|---|---|---|---|---|
| | | | recovery times and pain expectations. | | |
| Social influences | 'would be difficult to organise having a thorough wean plan with input from pain team prior to ward transfer giving time and bed constraints.' (P74). | Need for consultation with other disciplines in the hospital. | - | - | - |
| Social/Professional role and identity | 'Prescribers job not nursing job' (P216).<br><br>'I currently do not prescribe/deprescribe as a physio I have no training in medication | - | Treating team or doctor's responsibility to develop deprescribing plan, and not by nursing, or physiotherapist. | - | - |

| Theoretical Domains Framework | Quote | System | Individual clinician | Patient factors | Medication factors |
|---|---|---|---|---|---|
| | prescription/deprescription' (P72).<br><br>'as an ED nurse I'd be more that confident in commencing and advocating for the opioid weaning plan' (P221). | | | | |