

Role of Clinical Pharmacists in Deprescribing Potentially Inappropriate Medications and Managing Polypharmacy among Cancer Patients Receiving Palliative Care: A Narrative Review

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ABSTRACT

Polypharmacy and the use of potentially inappropriate medications (PIMs) are highly prevalent among patients with advanced cancer receiving palliative care. As the disease progresses and treatment goals shift from disease modification to symptom control and quality of life, many preventive and long-term medications may no longer provide meaningful clinical benefit. Continued use of these medications contributes to medication burden, adverse drug reactions, drug-drug interactions, reduced adherence and increased healthcare costs. Deprescribing, defined as the planned and supervised withdrawal or dose reduction of medications that are no longer beneficial or may cause harm, has emerged as an important strategy for optimizing medication use in this population. The review was conducted by searching PubMed, Scopus, Web of Science, ScienceDirect and Google Scholar for articles published between January 2014 and March 2025 and 22 eligible studies, including original research articles and systematic reviews were included. This narrative review summarizes the current evidence on the role of clinical pharmacists in identifying and deprescribing potentially inappropriate medications and managing polypharmacy among cancer patients receiving palliative care. A comprehensive literature review was conducted using studies evaluating pharmacist-led deprescribing interventions, medication appropriateness assessments, palliative care deprescribing tools and clinical outcomes associated with deprescribing in oncology and palliative care settings. The available evidence demonstrates that clinical pharmacists play a pivotal role in medication reconciliation, identification of potentially inappropriate medications, implementation of evidence-based deprescribing strategies, patient and caregiver education, and interdisciplinary collaboration. Pharmacist-led interventions, guided by tools such as the Oncological Palliative Care Deprescribing Guideline (OncPal), the Screening Tool of Older Persons' Prescriptions in Frail Adults with Limited Life Expectancy (STOPPfrail) and the Potentially Inappropriate Prescribing in Older Adults with Cancer Receiving Palliative Care (PIP-CPC) criteria, have consistently been associated with high physician acceptance rates, reduced medication burden, improved medication appropriateness, decreased healthcare expenditure and enhanced patient-centred care. Clinical pharmacists are therefore integral members of the palliative care team and significantly contribute to safe and effective deprescribing practices, facilitating medication optimization, minimizing polypharmacy-related harms and improving the quality of care for patients with advanced cancer. Further multicentre studies are warranted to establish standardized deprescribing models and evaluate long-term patient outcomes.

Keywords: Cancer, Clinical Pharmacist, Deprescribing, Oncology, Palliative Care, Polypharmacy, Potentially Inappropriate Medications.

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INTRODUCTION

Advances in the diagnosis and treatment of cancer have dramatically improved survival rates worldwide. However, patients with advanced malignancies often endure multiple comorbidities, progressive symptom burden and increasing medication use along the disease trajectory. Therefore, polypharmacy is a common occurrence in oncology practice, especially in palliative care patients (McNeil *et al.*, 2016; LeBlanc *et al.*, 2015).



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Polypharmacy is often defined as the concurrent use of five or more medications and has been reported in as many as 75% of patients receiving palliative care (World Health Organisation -WHO, 2019). Increased medication use increases the risk of adverse drug reactions, drug-drug interactions, medication nonadherence, falls, hospitalization and mortality. Medications intended for long-term prevention may no longer provide meaningful benefit, rather it contribute to unnecessary treatment burden in patients with limited life expectancy (McNeil *et al.*, 2016).

Potentially Inappropriate Medications (PIMs) are drugs that are more likely to cause adverse effects than to provide clinical benefits (Mc Adam *et al.*, 2025). The prevalence of PIMs in patients with advanced cancer has been reported to range from 12% to 95%, depending on the criteria used for assessment (Lindsay *et al.*, 2014; Kim *et al.*, 2023).

One of the methods to reduce PIMs is deprescription. Deprescribing is an evidence-based approach to addressing inappropriate use of medications. It's the process of planned and supervised reduction or cessation of medications that are no longer of benefit or may be causing harm. Clinical Pharmacists are uniquely positioned to lead the way in deprescribing among healthcare professionals involved in medication management due to their expertise in pharmacotherapy, medication safety, pharmacoeconomics and patient counselling. Pharmacists routinely reconcile medications, identify PIMs, assess medication appropriateness and collaborate with physicians and patients to implement deprescribing plans. Although deprescribing has gained increasing attention in palliative care, evidence regarding the specific role of clinical pharmacists in identifying potentially inappropriate medications and managing polypharmacy among cancer patients remains limited and dispersed. A comprehensive synthesis of the available evidence is therefore needed to highlight pharmacist-led interventions, evaluate current deprescribing tools and support evidence-based medication optimization in palliative oncology. Given the growing recognition of deprescribing as a fundamental component of palliative care, this review explores the role of clinical pharmacists in identifying, evaluating and deprescribing potentially inappropriate medications and managing polypharmacy among cancer patients receiving palliative care.

METHODOLOGY

A narrative review of the literature was conducted to evaluate the role of clinical pharmacists in deprescribing Potentially Inappropriate Medications (PIMs) and managing polypharmacy among cancer patients receiving palliative care.

Data Sources and Search Period

A comprehensive search of electronic databases including PubMed, Scopus, Google Scholar, Web of Science and

ScienceDirect was performed. The search included articles published between 2014 and 2025.

Search Strategy

A combination of Medical Subject Headings (MeSH) terms and free-text keywords was used. Boolean operators AND and OR were applied to broaden and refine the search.

Inclusion Criteria

- Original research articles, systematic reviews, observational studies and clinical practice guidelines.
- Studies involving adult cancer patients receiving palliative care.
- Studies evaluating deprescribing interventions, polypharmacy management or potentially inappropriate medications.
- Studies assessing the role of clinical pharmacists in medication optimization.

Exclusion Criteria

- Articles not related to oncology or palliative care settings.
- Conference abstracts, editorials, letters to the editor, commentaries and unpublished reports.
- Non-English publications.
- Duplicate publications.

Rationale for study selection

Despite increasing recognition of deprescribing as an essential component of palliative care, the evidence regarding the specific role of clinical pharmacists in identifying potentially inappropriate medications and managing polypharmacy among cancer patients remains fragmented. Existing studies have primarily focused on individual deprescribing interventions or assessment tools, with limited synthesis of pharmacist-led strategies, clinical outcomes and implementation challenges in palliative oncology. Therefore, this narrative review aims to comprehensively summarize the current evidence on the role of clinical pharmacists in deprescribing potentially inappropriate medications and optimizing medication use among cancer patients receiving palliative care, while highlighting existing knowledge gaps and future research priorities.

DISCUSSION

Polypharmacy and Potentially Inappropriate Medications in Palliative Oncology

Polypharmacy poses a significant challenge in palliative oncology practice. Cancer patients often receive medications for

symptom control, supportive care, treatment-related toxicities and management of chronic comorbid conditions. As the disease progresses, medication regimens often become more and more complex. Several studies have reported high rates of polypharmacy in patients with advanced cancer. The terminally ill cancer patients were taking an average of 7 to 10 medications per day (Kierner *et al.*, 2016). And studies also found significant medication burden among patients nearing end of life with many prescriptions that were not clearly providing therapeutic benefit (McNeil *et al.*, 2016).

The problem with polypharmacy is not merely how many drugs are involved. Higher medication burden has been linked to adverse drug reactions, cognitive impairment, falls, decreased adherence, reduced quality of life and greater healthcare utilization (Schenker *et al.*, 2019). Showed an association of polypharmacy with symptom burden in patients with advanced illness. PIMs are of special concern in palliative care (Schenker *et al.*, 2019). Often these medications are continued despite limited prognosis and changing treatment goals. Statins, Vitamin supplements, proton pump inhibitors, antihypertensive medications and antithrombotic agents are consistently reported as the most frequently prescribed PIMs in studies of advanced cancer populations (Mc Adam *et al.*, 2025).

Studies found high rates of inappropriate medication use among patients with terminal cancer using validated deprescribing criteria and also found a high prevalence of potentially inappropriate prescribing among older adults accessing specialist palliative care services (Kim *et al.*, 2023; Murphy *et al.*, 2023). There are many reasons why PIMs persist. These include therapeutic inertia, lack of clarity around deprescribing, poor communication between healthcare providers, patient preferences and lack of standardized deprescribing protocols (Mc Adam *et al.*, 2025). Thus, structured medication review and deprescribing interventions have gained increased importance in palliative oncology practice.

Deprescribing in Palliative Oncology: Principles and Frameworks

Concept of Deprescribing in Palliative Care

Deprescribing means systematically identifying and stopping medications when the potential harms outweigh the expected benefits. This process considers the patient's care goals, functional status, life expectancy, values and preferences. In palliative oncology, deprescribing has become an important part of improving medication use.

Many medications prescribed for chronic disease prevention take years to show meaningful benefits. Patients with advanced cancer often have a limited life expectancy, making these preventive treatments less useful. As a result, continuing such medications

can lead to more pills, increased treatment complexity, negative drug reactions and higher healthcare costs without offering significant clinical value (Lindsay *et al.*, 2014).

Several studies have shown that deprescribing leads to a lighter medication load, better medication use, fewer negative drug reactions and higher patient satisfaction (Shrestha *et al.*, 2020). found that deprescribing interventions for patients with life-limiting illnesses significantly reduced the use of potentially inappropriate medications while keeping patients safe (Shrestha *et al.*, 2020; Etherton-Beer *et al.*, 2023; Whitman *et al.*, 2018). Showed that pharmacist-led deprescribing reduced polypharmacy in older adults with cancer and improved medication management (Whitman *et al.*, 2018).

The deprescribing process typically involves five steps:

- Comprehensive medication review.
- Identification of potentially inappropriate medications.
- Assessment of risks and benefits.
- Shared decision-making with patients and caregivers.
- Monitoring and follow-up after medication discontinuation.

OncPal Deprescribing Guideline

The OncPal Deprescribing Guideline was created for cancer patients receiving palliative care and is one of the most commonly used deprescribing tools in oncology. Lindsay *et al.* developed and validated this guideline to help healthcare professionals identify medications that may no longer provide meaningful benefits for patients with advanced cancer (Lindsay *et al.*, 2014). The guideline suggests considering deprescribing for the medications listed in Table 1.

One of the main strengths of the OncPal guideline is its focus on oncology. Unlike general deprescribing tools for older adults, OncPal takes into account the disease trajectory and prognosis of patients with advanced cancer (McAdam *et al.*, 2025). Showed how OncPal can be applied in specialist palliative care settings. Using this guideline, pharmacists found 86.7% of all potentially inappropriate medications during medication reviews. The most frequently identified potentially inappropriate medications included vitamins, proton pump inhibitors and lipid-lowering agents. Physicians accepted pharmacist recommendations 71.7% of the time, which highlights the usefulness of the guideline (Mc Adam *et al.*, 2025).

Despite its strengths, OncPal does not cover all medication classes seen in palliative care. Recent studies have pointed out that antithrombotic agents and some urological medications are also candidates for deprescribing, which emphasizes the importance of pharmacist judgment beyond the guideline recommendations.

STOPPFrail Criteria

The Screening Tool of Older Persons Prescriptions in Frail Adults with Limited Life Expectancy (STOPPFrail) was created for frail older adults nearing the end of life. STOPPFrail spots medications that may not be suitable when; Life expectancy is limited, symptom control is prioritized over disease prevention, functional dependence is severe.

Certain antihypertensive medications were updated to STOPPFrail Version 2 to make it more useful in clinical settings and to include expert consensus recommendations (Curtin *et al.*, 2021). The criteria give healthcare professionals a clear framework for reviewing medications while allowing for individualized clinical judgment (Table 2). Clinical pharmacists often use STOPPFrail during medication reconciliation to find patients suitable for deprescribing in cancer patients receiving palliative care.

PIP-CPC Criteria

The Potentially Inappropriate Prescribing in Older Adults with Cancer Receiving Palliative Care (PIP-CPC) criteria were created to address the limitations of existing deprescribing tools (Cadogan *et al.*, 2021). Developed the PIP-CPC criteria based on expert consensus and evidence specifically for older cancer patients in palliative care (Cadogan *et al.*, 2021). The criteria include: Potentially inappropriate medications, potential prescribing omissions, medication appropriateness indicators and Patient-centered considerations.

Compared to OncPal and STOPPFrail, PIP-CPC offers a wider framework that looks at both overprescribing and under prescribing. These specialized tools have greatly improved pharmacist's ability to conduct thorough medication reviews and apply evidence-based deprescribing strategies in oncology practice.

Role of Clinical Pharmacists in Deprescribing

Clinical pharmacists are well-equipped to lead deprescribing initiatives since medication management is their primary area of expertise. Their role goes beyond just dispensing medications; they actively participate in patient care with a team of healthcare professionals. The main responsibilities of pharmacists in deprescribing include:

Medication Reconciliation

Medication reconciliation is the first step in deprescribing. Pharmacists review all prescribed medications, over-the-counter products, herbal treatments and supplements to spot discrepancies and avoid unnecessary therapies. Research shows that pharmacist-led medication reconciliation improves the accuracy of medications and helps identify potentially inappropriate medications.

Identification of Potentially Inappropriate Medications

Pharmacists use validated tools like OncPal, STOPPFrail and PIP-CPC, along with their clinical judgment, to find medications with poor risk-benefit ratios. Commonly identified potentially inappropriate medications include: Statins, vitamin supplements, antihypertensives proton pump inhibitors etc.

Patient and Caregiver Education

Patients often feel anxious about stopping medications. Pharmacists provide counselling on: Expected benefits of deprescribing, possible withdrawal effects, monitoring plans and alternative ways to manage symptoms. This educational role encourages patient acceptance and supports shared decision-making.

Collaboration with Multidisciplinary Teams

Successful deprescribing depends on teamwork among physicians, nurses, pharmacists, patients and caregivers. Several studies show that pharmacist recommendations are more likely to be implemented when included in collaborative care plans.

Monitoring and Follow-Up

After deprescribing, pharmacists should monitor patients for, symptom recurrence, withdrawal effects, disease progression and adverse events. Regular monitoring helps ensure that stopping medications is safe and suitable.

Evidence from Original Research Studies

Pharmacist-Led Deprescribing Interventions

The evidence supporting the role of pharmacists in deprescribing continues to grow (Whitman *et al.*, 2018). Carried out a pilot study assessing the impact of pharmacist-led medication evaluations and deprescribing in older adults diagnosed with cancer and experiencing polypharmacy. Pharmacists discovered numerous chances for optimizing medications, highlighting the viability of pharmacist-driven deprescribing interventions in oncology environments (Whitman *et al.*, 2018).

In a similar vein (Takahashi *et al.*, 2021), reviewed pharmacist recommendations for older patients with advanced cancer who were receiving palliative care. The interventions by pharmacists led to marked decreases in the use of potentially inappropriate medications, along with high rates of acceptance from physicians (Takahashi *et al.*, 2021).

Impact on Medication Burden

Reducing the burden of medications is one of the most consistent results linked to pharmacist-led deprescribing initiatives (McAdam *et al.*, 2025). Found that after incorporating pharmacist recommendations, the average number of medications per patient decreased from 9.4 to 7.7 and also found that pharmacist-led

Table 1: Medications under OncPal Guideline (Adapted from Lindsay *et al.*, 2014; McAdam *et al.*, 2025).

Medication Category	Examples	Reason for Deprescribing
Aspirin / Antiplatelets	Aspirin, Clopidogrel	Preventive benefit not useful in end-of-life care; bleeding risk
Lipid-lowering agents	Atorvastatin, Rosuvastatin	Long-term cardiovascular prevention benefits unlikely
Antihypertensives	Ramipril, Amlodipine	Strict Blood Pressure (BP) control may no longer improve Quality of Life (QoL)
Oral hypoglycaemics	Gliclazide, Glimepiride	Increased hypoglycaemia risk
Osteoporosis medications	Alendronate	Benefit requires long duration
PPIs / Gastro-Oesophageal Reflux Disease (GORD) medications	Pantoprazole, Omeprazole	Reassess if no active Gastro-Intestinal symptoms
Vitamins and supplements	Folic acid, Vitamin D	Minimal short-term benefit
Mineral supplements	Calcium, Magnesium	Limited palliative benefit
Complementary medicines	Herbal preparations	Limited evidence of effectiveness

deprescribing led to a medication cost reduction of €948.27 over 28 days for cancer patients in specialized palliative care. The annualized savings were estimated to be €257.59 per patient after implementing deprescribing recommendations (McAdam *et al.*, 2025). Similarly, studies showed that palliative care consultations involving medication assessments significantly boosted deprescribing rates in cancer patients. Lessening the medication burden leads to better adherence, more streamlined treatment plans and diminished treatment fatigue.

Impact on Quality of Life

Numerous studies have indicated enhancements in patient-reported outcomes after implementing deprescribing initiatives. Decreasing medication burden simplifies treatment regimens and reduces the likelihood of adverse drug reactions that could negatively impact quality of life (Whitman *et al.*, 2018). Noted positive patient reactions after pharmacist-led medication optimization. Likewise, person-centered prescribing strategies examined by Ferro-(Urigen *et al.*, 2022). Enhanced pharmacotherapeutic metrics while promoting individualized patient care. Although the evidence is still limited, existing data imply that deprescribing can enhance comfort and overall well-being without sacrificing symptom management (Whitman *et al.*, 2018; Ferro-Urigen *et al.*, 2022).

Impact on Adverse Drug Reactions and Patient Safety

Polypharmacy significantly contributes to harmful drug events in patients with advanced cancer (LeBlanc *et al.*, 2015). Emphasized the link between polypharmacy and medication-related complications in patients towards the end of their lives. Deprescribing minimizes exposure to unneeded medications, thereby lowering the chances of adverse drug reactions and interactions. Research on pharmacist-led initiatives consistently shows enhancements in the appropriateness of medications and

safety outcomes. Additionally, decreasing the use of inappropriate medications may lower the risks of falls, bleeding incidents, low blood pressure, hypoglycemia and cognitive decline (LeBlanc *et al.*, 2015).

Physician Acceptance of Pharmacist Recommendations

Acceptance of recommendations made by pharmacists serves as a key indicator of the success of interventions. Reported acceptance rates among physicians include:

- **McAdam *et al.* 2025:** 71.7%.
- **Takahashi *et al.* 2021:** around 70%.
- **O'Sullivan *et al.* 2015:** over 60%.
- **Kimura *et al.* 2017:** notable adoption of pharmacist suggestions.

These results illustrated a high level of trust among interdisciplinary teams and underscore the importance of pharmacist expertise in optimizing medication use. Notably, physician acceptance is generally highest when recommendations are backed by validated deprescribing criteria and are incorporated within multidisciplinary palliative care teams.

Barriers and Challenges to Deprescribing

Despite increasing evidence supporting deprescribing, several barriers continue to limit its implementation in routine oncology and palliative care practice.

Patient and Caregiver Resistance

Many patients link the continuation of medication to active treatment and management of their condition. Stopping medication may be seen as a form of neglect. Caregivers may also voice worries about the return of symptoms after stopping medication. Research has shown that patients frequently favour the continuation of long-term treatments, even when the clinical

Table 2: STOPPFRAIL Version 2.

Section	System	STOPPFRAIL Version 2 Recommendations
General	STOPPFRAIL Version 2	STOPPFRAIL is a list of potentially inappropriate prescribing indicators designed to assist physicians with deprescribing decisions. It is intended for older people with limited life expectancy for whom the goal of care is to optimise quality of life and minimise the risk of drug-related morbidity. Goals of care should be clearly defined, and, where possible, medication changes should be discussed and agreed with patient and/or family.
	Appropriate candidates	Appropriate candidates for STOPPFRAIL-guided deprescribing typically meet ALL of the following criteria: 1. Activities of daily living dependency (i.e., assistance with dressing, washing, transferring, walking) and/or severe chronic disease and/or terminal illness. 2. Severe irreversible frailty, e.g., high risk of acute medical complications and clinical deterioration. 3. Physician overseeing care of patient would not be surprised if the patient died in the next 12 months.
Section A	General	- Any drug that the patient presently fails to take or tolerate despite adequate education and consideration of all appropriate formulations. - Any drug without a clear clinical indication. - Any drug for symptoms which have now resolved (e.g., pain, nausea, vertigo, pruritus).
Section B	Cardiology system	- Lipid-lowering therapies (statins, ezetimibe, bile acid sequestrants, fibrates, nicotinic acid, lomitapide and mipomersen). - Antihypertensive therapies: Carefully reduce or discontinue drugs if patients with Systolic Blood Pressure (SBP) persistently <130 mmHg. An appropriate SBP target in frail older people is 130-160 mmHg. Before stopping, consider whether the drug is treating additional conditions (e.g., beta-blocker for rate control in atrial fibrillation, diuretics for symptomatic heart failure). - Anti-anginal therapy (especially nitrates, nicorandil, ranolazine): None of these anti-anginal drugs have been proven to reduce cardiovascular mortality or the rate of myocardial infarction. Aim to carefully reduce and discontinue these drugs in patients who have had no reported anginal symptoms in the previous 12 months AND who have no proven or objective evidence of coronary artery disease.
Section C	Coagulation system	- Anti-platelets: No evidence of benefit for primary (as distinct from secondary) cardiovascular prevention. - Aspirin for stroke prevention in atrial fibrillation: Aspirin has little or no role for stroke prevention in frail older people who are not candidates for anticoagulation therapy and may significantly increase bleeding risk.
Section D	Central nervous system	- Neuroleptic antipsychotics in patients with dementia: Aim to reduce dose and discontinue these drugs in patients taking them for longer than 12 weeks if there are no current clinical features of behavioural and psychiatric symptoms of dementia (BPSD). - Memantine: Discontinue and monitor in patients with moderate to severe dementia, unless memantine has clearly improved BPSD.
Section E	Gastrointestinal system	- Proton pump inhibitors: Reduce dose of proton pump inhibitors when used at full therapeutic dose ≥ 8 weeks, unless persistent dyspeptic symptoms at lower maintenance dose. - H₂ receptor antagonists: Reduce dose of H₂ receptor antagonists when used at full therapeutic dose for ≥ 8 weeks, unless persistent dyspeptic symptoms at lower maintenance dose.
Section F	Respiratory system	- Theophylline and aminophylline: These drugs have a narrow therapeutic index, have doubtful therapeutic benefit and require monitoring of serum levels and interact with other commonly prescribed drugs putting patients at an increased risk of Adverse Drug Events (ADEs). - Leukotriene antagonists (montelukast, zafirlukast): These drugs have no proven role in chronic obstructive pulmonary disease; they are indicated only in asthma.
Section G	Musculoskeletal system	- Calcium supplements: Unlikely to be of any benefit in short-term use unless proven symptomatic hypocalcaemia. - Vitamin D (ergocalciferol and colecalciferol): Lack of clear evidence to support use of vitamin D to prevent falls and fractures, cardiovascular events or cancer. - Anti-osteoporotic bone mineral density drugs (bisphosphonates, strontium, teriparatide, denosumab): Long-term oral nonsteroidal anti-inflammatory drugs: Increased risk of side effects (e.g., peptic ulcer disease, bleeding, worsening heart failure) when taken regularly for ≥ 2 months. - Long-term oral corticosteroids: Increased risk of major side effects (e.g., fragility fractures, proximal myopathy, peptic ulcer disease) when taken regularly for ≥ 2 months. Consider careful dose reduction and discontinuation.

Section	System	STOPPFRAIL Version 2 Recommendations
Section H	Urogenital system	• Drugs for benign prostatic hyperplasia (5-alpha reductase inhibitors and alpha-blockers) in catheterised male patients: No benefit with long-term bladder catheterisation. • Drugs for overactive bladder (muscarinic antagonists and mirabegron): No benefit in patients with persistent, irreversible urinary incontinence unless clear history of painful detrusor hyperactivity.
Section I	Endocrine system	• Anti-diabetic drugs: De-intensify therapy. Avoid HbA1c targets <7.5% (58 mmol/mol) associated with net harm in this population. The goal of care is to minimise symptomatic related to hyperglycaemia (e.g., excessive thirst, polyuria).
Section J	Miscellaneous	• Multivitamin combination supplements: Discontinue when prescribed for prophylaxis rather than treatment of hypovitaminosis. • Folic acid: Discontinue when treatment course is completed. The usual treatment duration is 1-4 months unless malabsorption, malnutrition or concomitant methotrexate use. • Nutritional supplements: Discontinue when prescribed for prophylaxis rather than treatment of malnutrition.

advantages are unclear. Therefore, effective communication and collaborative decision-making are vital elements of successful deprescribing initiatives (Reeve *et al.*, 2015).

Healthcare Professional Barriers

Doctors might hesitate to stop medications that were prescribed by other healthcare professionals, especially specialists. Fears about legal implications, uncertainties regarding prognosis, and lack of knowledge of deprescribing guidelines may further exacerbate therapeutic inertia. Furthermore, some healthcare providers are reluctant to discontinue medications due to concerns about the recurrence of symptoms, withdrawal effects or deterioration of chronic disease management (Tjia, 2023).

Organizational Challenges

Time limitations, insufficient staffing, and the absence of dedicated clinical pharmacy services can obstruct the implementation of deprescribing programs. Furthermore, inadequate interdisciplinary communication and the lack of standardized deprescribing protocols can limit their integration into everyday clinical practice. Overcoming these challenges requires support from the organization, educational initiatives, the development of guidelines and an increase in pharmacist-led services within oncology and palliative care environments (Ailabouni *et al.*, 2022).

Strengths and weaknesses of existing studies

The existing literature consistently demonstrates that pharmacist-led deprescribing interventions improve medication appropriateness, reduce polypharmacy and are associated with high physician acceptance rates, reduced healthcare costs and improved patient-centred care. Most studies employed validated deprescribing tools, such as the OncPal guideline, STOPPFrail criteria and PIP-CPC criteria, which enhance the reliability and clinical applicability of medication reviews in palliative oncology settings.

Despite encouraging findings, the available evidence has several limitations. Most studies are observational, retrospective or pilot studies conducted in single-centre settings with relatively small sample sizes, limiting the generalizability of the results. Furthermore, variations in study design, patient populations, deprescribing criteria and outcome measures make comparisons across studies difficult. There is also a lack of large multicentre randomized controlled trials evaluating the long-term impact of pharmacist-led deprescribing on clinical outcomes such as quality of life, hospitalization and survival.

FUTURE DIRECTIONS

The future landscape of deprescribing in oncology and palliative care is expected to be influenced by an increasing acknowledgment of medication optimization as a fundamental aspect of patient-centered care. Several priorities require attention in upcoming research and clinical practice:

Creation of Specific Deprescribing Guidelines for Oncology

While OncPal serves as a useful resource, further studies are necessary to fine-tune and broaden deprescribing criteria relevant to contemporary oncology practices. Future guidelines should take into account new therapies, supportive medications and the changing dynamics of cancer survivorship.

Incorporation of Clinical Pharmacists into Multidisciplinary Teams

Research consistently shows that the involvement of pharmacists enhances the appropriateness of medications and supports effective deprescribing. Therefore, boosting the role of pharmacists within palliative care teams should be a key focus.

Assessment of Patient-Centered Outcomes

Future research should focus on outcomes that extend beyond the mere tally of medications and savings. Factors such as quality

of life, symptom impact, patient satisfaction, experiences of caregivers and healthcare utilization need to be included in studies on deprescribing.

Application of Digital Health Technologies

Digital systems for prescribing, clinical decision-support resources and artificial intelligence may aid healthcare providers in recognizing opportunities for deprescribing and evaluating medication suitability. Example; Epic® - Electronic Health Record (EHR) with integrated Clinical Decision Support that alerts clinicians about drug interactions, duplicate therapy and high-risk medications. Cerner Millennium® (Oracle Health) - Uses medication safety alerts and clinical decision support for prescribing (Sutton *et al.*, 2020).

Large Multicenter Randomized Controlled Trials (RCT)

There is a need for extensive multicenter research to bolster the evidence foundation and create standardized deprescribing frameworks that can be implemented in various healthcare environments. By focusing on these areas, healthcare systems can enhance medication management and elevate care for patients dealing with advanced cancer.

CONCLUSION

The prevalence of polypharmacy and the risk of potentially inappropriate medications continue to be major issues for cancer patients in palliative care. As the focus shifts toward managing symptoms and enhancing quality of life, many medications that were originally prescribed for long-term prevention may no longer deliver significant benefits. Deprescribing has surfaced as a valuable approach to lessen medication load, reduce adverse drug effects, enhance medication appropriateness, and lower healthcare expenses. Clinical pharmacists play an essential role in the deprescribing process by performing medication reconciliation, identifying medications that may not be suitable, utilizing evidence-based tools for deprescribing, educating patients and their caregivers, collaborating with different healthcare teams and monitoring results after medications discontinuation.

Research from various studies shows that interventions led by pharmacists to reduce medications are highly accepted by physicians, lower medication burden, enhance therapeutic outcomes and lead to notable cost reductions. The use of tools like OncPal, STOPPFrail and PIP-CPC has further improved pharmacist's capacity to identify and rectify inappropriate prescribing in palliative oncology care. Although there are ongoing challenges such as patient reluctance, uncertainties among healthcare professionals and a lack of robust randomized trial evidence, the expanding literature strongly advocates for the

role of pharmacists in deprescribing efforts. Future investigations should emphasize multicenter studies, outcomes centered around patients and the creation of thorough oncology-specific deprescribing frameworks.

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ABBREVIATIONS

ADR: Adverse Drug Reaction; **BP:** Blood Pressure; **EHR:** Electronic Health Record; **GI:** Gastro-Intestinal; **GORD:** Gastro-Oesophageal Reflux Disease; **MeSH:** Medical Subject Headings; **PIM:** Potentially Inappropriate Medication; **PIP-CPC:** Potentially Inappropriate Prescribing in Older Adults with Cancer Receiving Palliative Care; **PPI:** Proton Pump Inhibitor; **QoL:** Quality of Life; **RCT:** Randomized Controlled Trial; **STOPPFrail:** Screening Tool of Older Persons' Prescriptions in Frail Adults with Limited Life Expectancy; **WHO:** World Health Organization.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

AUTHORS CONTRIBUTION

Keerthana K: Conceptualization of the review topic, literature search, data extraction, data synthesis, manuscript drafting and preparation of the final manuscript. **Jayakrishnan S S:** Study supervision, manuscript editing and final approval of the manuscript. **Fasmiya Thabassum, Najiya Mahamood, Amiya N T:** Assistance with literature screening, data organisation, manuscript proofreading and formatting.

SUMMARY

Polypharmacy and potentially inappropriate medications are highly prevalent among cancer patients receiving palliative care and may contribute to adverse drug events, increased treatment burden and reduced quality of life. Clinical Pharmacists play a pivotal role in deprescribing through medication review, identification of inappropriate medications, patient counselling and multidisciplinary collaboration. Evidence suggests that pharmacist-led deprescribing interventions can reduce medication burden, improve medication appropriateness, enhance patient safety and generate significant healthcare cost savings in palliative oncology settings.

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