Polypharmacy and Medication Management in Geriatrics

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ARTICLE DETAILS	ABSTRACT
	Polypharmacy, commonly defined as the concurrent use of five or more medications, is a growing concern in geriatric care due to its association with adverse drug reactions, hospitalizations, cognitive impairment, and functional decline. While polypharmacy can be appropriate in some clinical contexts, inappropriate prescribing remains widespread and underrecognized. This review explores the scope, consequences, and challenges of polypharmacy in older adults, with a focus on medication safety, prescribing appropriateness, and current strategies for optimization. A comprehensive review of literature, clinical guidelines, and expert frameworks was conducted to assess the prevalence, risk factors, and system-level contributors to polypharmacy. Key tools and approaches including Beers Criteria, STOPP/START, MAI, and deprescribing algorithms were evaluated for their clinical utility. Polypharmacy prevalence increases with age, frailty, and multimorbidity, particularly in institutionalized settings. Inappropriate polypharmacy contributes to adverse outcomes, including drug–drug interactions, falls, hospitalizations, and increased healthcare costs. Although several tools exist to identify and mitigate inappropriate prescribing, their application is inconsistent in clinical

practice. Addressing polypharmacy in geriatrics requires a multifactorial approach combining individualized assessment, clinical tools, interdisciplinary collaboration, and patient-centered deprescribing. Strengthening evidence, improving tool integration, and prioritizing shared decision-making are essential to enhancing medication safety and therapeutic outcomes for older adults.

Introduction

Polypharmacy is most commonly defined as the regular use of five or more medications concurrently[1,2].The prevalence of polypharmacy varies by setting from as low as 4% in community-dwelling older adults to over 96% in institutional or hospitalized elderly populations. A meta-analysis revealed that approximately 37–40% of older adults globally experience polypharmacy (≥5 drugs), while hyper polypharmacy (≥10 drugs) affects 11–13% of this population[3].Polypharmacy can be classified as either appropriate, when drug use is clinically justified and evidence-based, or inappropriate, when risks outweigh benefits. Despite this, only about 6% of studies include qualitative definitions based on appropriateness[1,4]. Polypharmacy is strongly associated with multimorbidity, advanced age (especially ≥70 years), nursing home residency, and hospitalization[5].

Numerical definitions, while useful, do not capture clinical appropriateness. A patient may benefit from ≥5 medications in multimorbidity, while another may be harmed by fewer drugs. Hence, there's a need to evaluate medications not just by count but by therapeutic necessity and risk-benefit balance[1,6]. Age-related changes in pharmacokinetics and pharmacodynamics—such as reduced renal/hepatic function and altered receptor sensitivity—make older adults more vulnerable to adverse drug effects, especially in polypharmacy contexts[7].

Risks associated with polypharmacy in geriatrics:

1. Increased Adverse Drug Reactions (ADRs)

Older adults taking five or more medications have a significantly higher risk of experiencing ADRs. Studies show that polypharmacy nearly doubles the risk of ADRs, especially in nursing home and hospitalized populations[2].

2. Drug–Drug Interactions

The likelihood of drug–drug interactions rises with every additional medication. Patients taking 5–9 medications have a 50% chance of a clinically significant interaction, which reaches nearly 100% in those taking 20 or more drugs[8].

3. Medication Non adherence

Complex regimens reduce patient adherence. Studies show that non-adherence can reach 35–100% among elderly patients with polypharmacy, primarily due to cognitive limitations, misunderstanding instructions, or high pill burden[9].

4. Functional Decline and Frailty

Polypharmacy is associated with reduced physical functioning, including impaired mobility, falls, and dependency in activities of daily living. Frail older adults are particularly vulnerable to the functional consequences of inappropriate medication use[3].

5. Cognitive Impairment and Delirium

Cognitive impairment and delirium are more common in elderly individuals exposed to polypharmacy. The use of medications with anticholinergic or sedative properties, particularly in combination, contributes to mental status changes[10].

6. Increased Risk of Falls and Fractures

Falls are a well-documented consequence of polypharmacy. Each additional medication increases the risk of falling by up to 7%, especially in patients taking CNS-active drugs or antihypertensives[11].

7. Prescription Cascades

When side effects of medications are misdiagnosed as new conditions, additional drugs may be prescribed, initiating a prescription cascade that worsens the overall drug burden[12].

8. Hospitalization and Mortality

Polypharmacy independently contributes to higher hospital admission rates, longer hospital stays, and greater mortality, regardless of comorbidities[13].

9. Higher Healthcare Costs

Increased medication use leads to higher costs through outpatient visits, emergency care, hospitalizations, and long-term care needs[14].

10. Undisclosed Use of OTCs and Supplements

Many older adults take over-the-counter medications, herbal remedies, or dietary supplements without informing their physicians, increasing the risk of unexpected interactions and side effects[15].

Challenges in polypharmacy and medication management in geriatrics:

1. Fragmented care and poor coordination among multiple providers

Older adults with multimorbidity often receive care from multiple healthcare providers, including general physicians, specialists, and allied health professionals. This fragmented care can result in inconsistent prescribing, medication duplication, and lack of clear accountability for medication review[16,17].

2. Limitations of disease-specific clinical guidelines

Most clinical guidelines are disease-specific and based on studies that exclude elderly patients with multimorbidity, making them less suitable for geriatric practice. As a result, applying multiple guidelines in such patients can unintentionally promote polypharmacy[18].

3. Inadequate representation of older adults in clinical trials

Older adults, especially those with frailty or multiple comorbidities, are often underrepresented in clinical drug trials, leading to uncertainty about the benefit–risk profile of many medications in this age group[18].

4. Time constraints and system inefficiencies

Healthcare professionals often face time pressures and heavy workloads, which limit the opportunity to perform thorough medication reviews, reconcile drug lists, or engage in shared decision-making[17].

5. Faulty or incompatible electronic systems

Poorly integrated or outdated electronic health records (EHRs) can hinder accurate tracking of prescriptions across care settings, especially during transitions between hospitals, nursing homes, and primary care[17].

6. Low health literacy and communication barriers

Many elderly patients have limited health literacy, making it difficult for them to understand complex regimens. In addition, hearing loss, cognitive impairment, and language differences can all affect communication and adherence[19].

7. Challenges in deprescribing and shared decision-making

Deprescribing, though essential, is often avoided due to clinical uncertainty, fear of withdrawal effects, or concern about contradicting prior prescribers. Despite its proven benefits, Comprehensive Geriatric Assessment (CGA) is not consistently used to identify inappropriate medications[20].

8. Limited pharmacist involvement in care teams

In many settings, clinical pharmacists are not fully integrated into multidisciplinary care teams. This reduces opportunities for structured medication reviews, despite evidence that pharmacist-led interventions improve outcomes[21].

9. Resource limitations and workforce shortages

There is a shortage of trained geriatricians and clinical pharmacists, as well as limited time allocated to manage complex drug regimens, particularly in low-resource settings[22].

Tools and Guidelines:

Polypharmacy management in geriatrics is supported by a number of validated clinical tools and guidelines designed to optimize prescribing, identify potentially inappropriate medications (PIMs), and promote safe deprescribing practices.

1. Beers Criteria

Developed by the American Geriatrics Society, the Beers Criteria is a widely used explicit tool that lists PIMs which should be avoided or used with caution in older adults. It is updated regularly to reflect emerging evidence and clinical relevance. The 2019 update includes medications with strong anticholinergic effects, certain sedatives, and drugs requiring renal adjustment [23].

2. STOPP/START Criteria

The STOPP (Screening Tool of Older Person's Prescriptions) and START (Screening Tool to Alert to Right Treatment) criteria are evidence-based guidelines designed to help identify medications that should

be discontinued (STOPP) or initiated (START) in older adults. They offer better clinical relevance than the Beers Criteria in some European settings and cover drug–drug and drug–disease interactions[24,25].

3. Medication Appropriateness Index (MAI)

The MAI is an implicit tool that evaluates each prescribed drug based on ten criteria including indication, dosage, directions, effectiveness, drug–drug interaction, and cost. It has been validated for use in geriatric settings and is useful for clinical decision-making during medication reviews[26].

4. Several implicit frameworks support deprescribing, such as CEASE, ERASE, and NO TEARS. These tools offer structured guidance to review, question, and simplify complex regimens, particularly during transitions of care. Though not universally standardized, they are widely adopted in clinical and educational settings[27].

5. MATCH-D Criteria

Specifically designed for patients with dementia, the Medication Appropriateness Tool for Comorbid Health Conditions in Dementia (MATCH-D) provides recommendations on deprescribing and continuing medications based on the dementia stage, with a focus on symptom relief and quality of life [28]

6. Digital Tools and Clinical Decision Support Systems (CDSS)

Tools such as MedStopper and ABiMed integrate Beers, STOPP/START, and deprescribing algorithms with electronic health records. These tools help visualize risks, propose tapering plans, and reduce medication burden through automation and clinician prompts[29,30].

7. Umbrella Reviews and Validation Studies

A recent umbrella review of deprescribing tools identified over 90 tools and 9 international guidelines. It confirmed high inter-tool variability and emphasized the need for further validation in frail, multi-morbid elderly populations[31].

DISCUSSION

Polypharmacy, defined as the concurrent use of multiple medications, is prevalent among older adults and poses significant clinical challenges. Its increasing occurrence is often attributed to the growing burden of multimorbidity in the aging population, with over 85% of individuals aged above 85

years affected by two or more chronic conditions [32]. The implications of polypharmacy are profound, influencing not only individual health outcomes but also broader healthcare system utilization.

The complexity in defining polypharmacy stems from its multifactorial nature. While commonly described as the use of five or more medications [1], this threshold lacks consensus and fails to capture the appropriateness of prescribing. Woodford emphasizes the distinction between appropriate and inappropriate polypharmacy, asserting that a qualitative assessment is more relevant than a numeric count[32]. Inappropriate polypharmacy has been associated with adverse drug reactions (ADRs), hospitalizations, and increased mortality. Osanlou et al. demonstrated that ADRs account for approximately one-sixth of medical hospital admissions, a figure likely underestimated in older populations due to under-recognition of symptoms such as falls or delirium [33]. Moreover, medication adherence remains suboptimal, with the WHO estimating only 50% long-term adherence in developed countries[19].

A key contributor to the inappropriate prescribing cascade is the reliance on disease-specific clinical guidelines that encourage medication use without clear deprescribing criteria[33]. Clinical trials informing these guidelines often exclude frail older adults or those with multiple comorbidities, thereby limiting their external validity. Masoudi et al. reported that only 13–25% of hospitalized older adults with heart failure would meet inclusion criteria for relevant trials[34]. Ageism in clinical trial recruitment is widespread; for instance, participants in osteoporosis trials are, on average, two decades younger than typical patients presenting with hip fractures[35].

The pharmacodynamics and pharmacokinetics of medications in the elderly further complicate polypharmacy. Frailty significantly alters drug metabolism, increases blood-brain barrier permeability, and amplifies vulnerability to toxicity[32,36]. For instance, Brugts et al. reported a high incidence of ACE inhibitor-induced cough in older adults, and statin intolerance was noted to be more common among elderly populations[37,38]. Despite these risks, evidence supporting deprescribing interventions remains limited. A systematic review by Keller et al. found only modest improvements in prescribing quality, with no significant impact on key clinical outcomes such as mortality or hospitalization[39]. Similarly, Hung et al. concluded that while deprescribing may improve quality of life, definitive evidence for reductions in adverse events is lacking[40].

Several tools have been developed to aid clinicians in identifying potentially inappropriate medications (PIMs), including the STOPP, Beers, and EU(7)-PIM criteria. However, Perpétuo et al.

highlighted discrepancies among these tools and noted their limited utility in individualizing patient care[41]. Additionally, the concept of 'legacy prescribing' continuation of drugs beyond their intended duration remains pervasive for agents like proton pump inhibitors and antidepressants[42, 43]. Guidelines from organizations like NICE advocate for individualized therapeutic targets in frail older adults[44,45]. Yet practical implementation remains challenging. Reeve reviewed various deprescribing tools and found that most are underutilized due to complexity and lack of integration into clinical workflows[46]. Emerging research emphasizes the role of shared decision-making in deprescribing. Jansen et al. outlined a four-stage process for engaging patients in discussions about therapeutic goals, risks, and benefits, which has shown promise in aligning treatment with patient preferences [47].

CONCLUSION

Woodford's 2024 review on polypharmacy in older patients provides an insightful synthesis of current clinical challenges and conceptual frameworks around the topic. The article is particularly commendable for shifting the focus from simple numerical definitions of polypharmacy to a more meaningful assessment of prescribing appropriateness. It highlights key systemic issues such as over-reliance on disease-specific guidelines, trial populations unrepresentative of older adults, and a lack of deprescribing protocols—offering a realistic picture of why polypharmacy persists in clinical practice.

From a critical standpoint, the article excels in contextualizing polypharmacy within broader issues of multimorbidity, frailty, and life expectancy, drawing attention to the nuanced risks and limited benefits of preventive pharmacotherapy in this population. Its emphasis on shared decision-making and medicines optimization adds clinical depth. However, the article also underscores the limitations of the current evidence base—particularly the modest impact of deprescribing interventions on hard clinical outcomes like mortality and hospitalization. This gap, while acknowledged, remains an area where further exploration is warranted.

In conclusion, Woodford offers a well-rounded, practical, and clinically resonant review that effectively balances theory with application. It serves as both a call to improve prescribing practices and a reminder of the complexities inherent in managing older adults with multiple comorbidities. For researchers and clinicians alike, the article provides a valuable platform for reflection and future investigation into how we can better navigate polypharmacy in aging populations.

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