Review

Avoiding the Perfect Storm: Medication Reconciliation as a Diagnostic and Therapeutic Tool to Address Polypharmacy in Older Adults

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Avoiding the Perfect Storm: Medication Reconciliation as a Diagnostic and Therapeutic Tool to Address Polypharmacy in Older Adults

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Abstract

Polypharmacy presents a major challenge when caring for older adults and increasingly causes preventable health problems in both inpatient and outpatient settings. While it is often defined as taking five or more medications, it is more accurately seen as a clinical condition where medication burden surpasses physiological capacity, is unnecessary, or is incongruent with patient-centered goals. Age-related changes in drug absorption, distribution, metabolism, and excretion, along with multiple chronic conditions, fragmented care, and frequent transfers between healthcare environments, create a perfect storm for medication-related adverse effects. Falls, syncope, confusion, fatigue, low blood pressure, slow heart rate, or functional decline can be mistaken for evidence of underlying illness rather than side effects of medication. Medication reconciliation can therefore serve as a powerful diagnostic, therapeutic, and safety measure to avoid the harmful effects of polypharmacy. This review offers a practical, detailed, step-by-step approach to managing polypharmacy for internists, with a particular focus on medication reconciliation in older adults.

Keywords: polypharmacy; older adults; adverse effects; falls; cognitive decline; medication reconciliation; deprescribing; stepwise approach

Introduction

Polypharmacy, defined as the use of many drugs simultaneously or an excessive number of medications, has become a critical issue in modern internal medicine [1]. An aging population with increasingly complex medical needs, combined with a rapid proliferation of therapies and guidelines, creates ideal conditions for overprescribing and adverse effects from drug toxicity, drug-drug interactions, and higher health care costs as well. [2,3]. Medication lists can increase faster than the patient's physiological reserve, which they can handle, and even when started for specific reasons, drugs are often not reevaluated when circumstances change. Additional medications are frequently prescribed to counteract the side effects of current treatments, leading to what is often called a prescribing cascade. This is often compounded by patients frequently seeing multiple physicians in different specialties. In this way, polypharmacy develops not as a single prescribing error but as the cumulative result of fragmented, disease-focused care [4].

Older adults are particularly susceptible to medication-related harm. Age-related declines in renal and hepatic clearance alter drug metabolism and elimination. Changes in body composition, such as decreased total body water and increased body fat, affect drug distribution. Increased blood-brain barrier permeability and altered receptor sensitivity can enhance central nervous system effects. Orthostatic responses become less brisk, homeostatic reserve diminishes, and the gap between therapeutic and adverse effects narrows. Consequently, medications tolerated in younger adults may

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cause sedation, bradycardia, confusion, falls, urinary retention, constipation, hypoglycemia, hypotension, or delirium in older patients [2,5,6]. This is where medication reconciliation becomes indispensable. While often regarded as a documentation requirement, medication reconciliation should be considered to be an essential diagnostic tool to protect patients from harm.

This review provides internists with a practical, detailed guide for evaluating polypharmacy and conducting effective medication reconciliation in older adults. We start with a clinical vignette that highlights the significance of this process, then outline a step-by-step method for identifying and addressing problematic polypharmacy.

Clinical Vignette

A 74-year-old woman with hypertension, type 2 diabetes mellitus, and chronic heart failure was brought to the emergency department after falling at home and experiencing a brief loss of consciousness.

Upon arrival, she was awake, alert, and oriented. She was hypotensive (her vital signs revealed blood pressure 90/50 mmHg) and bradycardic (heart rate 42 beats per minute), and there were no focal neurological deficits. Her blood glucose was 148 mg/dL.

A thorough evaluation was conducted. Head computed tomography ruled out stroke or other intracranial issues. Laboratory testing, including a complete blood count, metabolic panel, thyroid function tests, and drug screen, revealed no abnormal findings. There was no evidence of infection, electrolyte imbalance, or acute decompensated heart failure. The electrocardiogram indicated sinus bradycardia.

She was admitted for further observation and placed on telemetry, which showed persistent sinus bradycardia without any arrhythmias. Consultations with cardiology and neurology were obtained. Despite a thorough evaluation, no clear cause for her presentation was initially identified. It was only after a detailed medication review that the underlying reason became clear. The patient was found to be taking two beta-blockers: propranolol 40 mg daily for headache prevention and metoprolol succinate 25 mg daily for heart failure. Additionally, she was taking gabapentin 300 mg three times a day for neuropathic symptoms. The duplication of beta-blocker therapy combined with the sedative effects of gabapentin likely contributed to her bradycardia, hypotension, and subsequent fall. Both beta-blockers and gabapentin were discontinued. The patient was monitored on telemetry for 48 hours, during which her heart rate improved. She regained strength, resumed safe ambulation, and was discharged home with close outpatient follow-up.

Methods

This article was constructed as a narrative review to provide a practical, clinically focused framework for recognizing and managing polypharmacy in older adults. A structured literature search was performed in PubMed and Google Scholar to identify relevant studies, guidelines, and review articles. Search terms included “polypharmacy,” “medication reconciliation,” “deprescribing,” “older adults,” “geriatric syndromes,” and “adverse drug events.” Emphasis was placed on guideline-based recommendations, including those from established geriatric and internal medicine frameworks, as well as clinically relevant observational studies and narrative reviews. The reference lists of selected articles were also screened to identify additional pertinent sources. Studies were selected for their relevance to clinical practice in internal medicine, with a focus on medication safety, care transitions, and practical deprescribing methods. Foundational studies were included to provide conceptual background, while newer literature was incorporated to reflect current practices.

This review provides a qualitative narrative synthesis of the literature. No formal statistical analysis or quantitative data pooling (such as meta-analysis or meta-regression) was performed. Evidence was described descriptively, emphasizing clinical relevance, safety, and integration into routine practice.

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Defining Polypharmacy

Polypharmacy refers to the use of five or more medications, whereas hyperpolypharmacy generally means ten or more [1,7]. Although the term polypharmacy has developed over time, its basis remains prescribing or taking more drugs than are clinically appropriate for a patient's comorbidities. Both are important public health issues, especially among older adults [8]. However, polypharmacy should not be viewed only as a numerical threshold. Even though patients with multiple comorbidities may need several evidence-based therapies, even a small number of medications can be harmful if there is no clear reason for their use, if there is duplication, if one causes adverse effects, or if they interact.

Few studies have distinguished between appropriate and inappropriate polypharmacy, where appropriate polypharmacy is defined as "the optimization of medications for patients with complex and/or multiple conditions where medicine use aligns with the best evidence. Inappropriate polypharmacy involves unnecessary medications, medication underuse or duplication, failure to adjust dosages for renal or hepatic function, continuation of treatments with limited benefit relative to life expectancy, or prescribing cascades where adverse effects are mistaken for new clinical conditions [9–11]. This broader perspective shifts the clinician's role: the aim isn't merely to reduce medication counts but to ensure each medication is clearly indicated, has an acceptable risk–benefit profile, and remains relevant within the patient's overall clinical context [9–11].

Polypharmacy is influenced by multiple determinants. Patient-related factors include older age, socioeconomic deprivation, low education level, smoking, obesity, urban living, and psychological parameters such as behavioral abnormalities that have been linked to polypharmacy. Disease-related factors such as cardiovascular disorders, metabolic conditions including diabetes and hyperlipidemia, chronic kidney disease, and frailty are also associated with polypharmacy. Prescribing-related factors such as poor communication between providers, guideline complexity, and personal beliefs tend to favor polypharmacy. Lastly, healthcare access factors, including frequent doctor visits, recent hospitalizations, and involvement of multiple providers, are strongly associated with polypharmacy [12].

Clinical Implications of Polypharmacy

The clinical effects of polypharmacy are significant. They are associated with higher risks of adverse drug events (ADEs), drug–drug interactions, medication nonadherence, functional decline, and increased healthcare costs [2]. ADEs are a primary cause of emergency visits and hospital stays among older adults, often presenting with nonspecific, syndromic signs such as falls, syncope, bradycardia, hypotension, delirium, cognitive decline, weakness, and metabolic issues [13], several of which were illustrated in our patient described above. Falls are a critical outcome, frequently resulting from the combined effects of sedative, cardiovascular, and metabolic drugs. Common high-risk medication groups include benzodiazepines, anticholinergics, sedative-hypnotics, opioids, gabapentinoids, antidepressants, beta-blockers, antihypertensives, anticoagulants, hypoglycemics, diuretics, and nonsteroidal anti-inflammatory drugs [14] (Table 1). Polypharmacy also negatively impacts the physical domain of the health-related quality of life scale, complicating adherence [15]. The more complex the regimen, the greater the likelihood of missed doses or medication errors. Financial burdens can further reduce adherence, especially when older adults must choose between medications and other necessities [16].

Table 1. Medications causing adverse drug events in older adults.

Medication Class	Examples	Mechanism	Clinical Consequences
Benzodiazepines	Lorazepam, Diazepam	CNS depression	Falls, delirium, sedation
Anticholinergics	Diphenhydramine, Oxybutynin	Central & peripheral cholinergic blockade	Confusion, urinary retention, constipation
Sedative Hypnotics	Zolpidem, alprazolam	CNS depression	Falls, cognitive impairment, delirium
Opioids	Oxycodone, Morphine	CNS depression	Sedation, respiratory depression, falls
Gabapentinoids	Gabapentin, Pregabalin	CNS modulation	Dizziness, gait instability

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Antidepressants	Tricyclic antidepressants, venlafaxine	Anticholinergic + sedative	Dizziness, Sedation, Delirium, arrhythmias
Beta-blockers	Metoprolol, Propranolol	Reduced heart rate & contractility	Bradycardia, hypotension, syncope
Antihypertensives	Amlodipine, ACE inhibitors	Vasodilation	Orthostatic hypotension
Anticoagulants	Warfarin, Apixaban, Rivaroxaban	Prevent thrombosis	Gastrointestinal and intracranial bleeding
Hypoglycemics	Insulin, Sulfonylureas	Glucose lowering	Hypoglycemia, falls
Diuretics	Furosemide, Hydrochlorothiazide	Inhibit sodium reabsorption, increase urine output, decrease plasma volume	Electrolyte imbalance, hypotension, falls
NSAIDS	Ibuprofen, naproxen, celecoxib	Inhibit cyclooxygenase enzymes	Renal failure, gastrointestinal bleeding, cardiovascular events, falls

Medication Reconciliation as a Clinical Skill

Medication reconciliation involves reviewing a patient's medication orders and all the medications they have been taking. The purpose is to prevent errors such as omissions, duplications, incorrect doses or timing, and adverse drug-drug interactions or effects on the patient's condition. The Joint Commission added medication reconciliation as a National Patient Safety Goal across the care continuum in 2005 [17].

Medication reconciliation works best when done within a team setting. Ideally, a pharmacist should help gather and verify the best possible medication history (BPMH) and match it with current orders. If a pharmacist isn't available, this role can be assigned to a trained healthcare professional, such as a doctor, nurse, or other health staff member. The effectiveness of medication reconciliation heavily relies on a culture of collaboration and teamwork within the institution [18].

A structured approach to medication reconciliation involves four key steps. First, a BPMH is gathered by creating a detailed list of all medications the patient currently takes, using interviews with the patient and caregivers, referral documentation, and other available sources. Second, the accuracy of this list is verified through additional sources such as pharmacy records, electronic medical records, or primary care providers. Third, the BPMH is compared with current medication orders, and any discrepancies are identified and resolved collaboratively with the prescribing clinician, with all modifications carefully documented. Finally, accurate and up-to-date medication information, including reasons for any changes, is communicated to the patient, caregivers, and receiving healthcare providers during transitions of care [19].

The vignette above illustrates why these issues matter. If the medication list had been treated as routine paperwork rather than a diagnostic tool, the patient's duplicate beta-blocker exposure might have gone unnoticed. The admission then risked becoming an investigation of syncope instead of an effort to prevent medication-related harm.

Identifying Potentially Inappropriate Prescribing

Validated screening tools, such as the Beers Criteria and STOPP/START criteria, provide a structured approach to identify potentially inappropriate prescribing (PIP) in older adults. The Beers Criteria, developed by the American Geriatrics Society and updated in 2023, lists medications associated with increased risks of adverse effects in older patients. The Beers Criteria categorize PIP in older adults into five domains: medications to avoid, medications inappropriate for specific conditions, medications to use with caution, clinically significant drug–drug interactions, and medications requiring dose adjustments based on renal function. The list includes 88 medications or classes derived from clinical evidence and expert consensus. Limitations include the lack of guidance on underprescribing and the absence of recommended therapeutic alternatives [20].

The STOPP (Screening Tool of Older Persons' Prescriptions) criteria are designed to identify medications that may be inappropriate in specific clinical situations, while the complementary START (Screening Tool to Alert to Right Treatment) criteria highlight beneficial therapies that are often missed. The STOPP/START criteria include 80 criteria for potentially inappropriate medications (STOPP) and 34 criteria for appropriate prescribing (START), organized by organ systems, adverse

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event risks, and drug classes. Compared with the Beers Criteria, STOPP detects a higher number of potentially inappropriate medications in older hospitalized patients and has a stronger link to adverse drug events. However, it does not provide guidance on alternative therapies or renal dose adjustments [21].

The FORTA (Fit fOR The Aged) criteria offer a patient-centered approach that addresses both overtreatment and undertreatment by identifying potentially inappropriate medications and omitted therapies. Medications are classified from A (indispensable) to B (beneficial), C (questionable), and D (avoid), based on their safety, efficacy, and appropriateness for older adults. However, limitations include a lack of transparency in the rationale behind recommendations and insufficient guidance on drug–drug interactions, drug–disease interactions, and renal dose adjustments [22].

Although these tools are useful and provide comprehensive drug information, they must be used alongside sound clinical judgment, as individual patient factors and care goals are crucial to decision-making.

Deprescribing

Deprescribing is the process of reducing, stopping, discontinuing, or withdrawing medications to decrease polypharmacy and improve patient outcomes [23]. It can enhance various aspects of patient safety and quality of care by lessening medication burden, ADEs such as falls and cognitive decline, and improving overall health by decreasing hospitalization and mortality. Deprescribing is most used in older adults, individuals with multiple chronic conditions, and those near the end of life. Beyond its specific goals, deprescribing can be regarded as a fundamental part of good clinical practice. All medications carry potential risks and financial costs and add to treatment complexity and patient burden. A careful medication review often uncovers drug- related issues such as side effects, limited effectiveness, and high treatment costs, many of which can be effectively addressed through appropriate medication discontinuation [24].

Deprescribing is a structured, multi- step process conducted in three phases. The first phase involves engaging the patient and gathering comprehensive information on current medications, treatment experiences, and personal goals, often with support from the healthcare team, including pharmacists. The Geriatric 5 Ms framework- Medications, Mind, Mobility, Multicomplexity, and What Matters Most- supports person-centered care by guiding discussions that help identify relevant information and guide deprescribing decisions. The second phase involves identifying medications for deprescribing. Each medication should be reviewed for dose reduction or discontinuation by weighing current and future benefits against possible harms. Although decision-making tools can assist, individualized assessments and shared decision-making with patients are essential. The final phase includes implementation and follow-up. Prioritize medications for discontinuation, starting with those posing the greatest risk, and typically stopping one medication at a time to allow for monitoring. A patient-centered plan should be developed, framing deprescribing as a trial and incorporating tapering when necessary to reduce withdrawal effects or symptom recurrence. Continuous monitoring, clear documentation, and effective communication with patients and the healthcare team are crucial to ensuring safety and sustaining outcomes [23,25].

Medication Reconciliation During Transitions of Care

Transitions of care, defined as the movement of a patient between healthcare settings, are high-risk periods during which critical clinical information may be lost. Medication discrepancies are common, especially in the context of polypharmacy and frequent regimen changes, as each drug must be accurately reconciled, prescribed, or discontinued. Adverse drug events significantly contribute to morbidity and mortality during these transitions. Hospital admissions and discharges, including both ICU and non-ICU settings, carry a high risk of unintentional medication omissions, which may lead to increased emergency visits, rehospitalizations, and death. Medication reconciliation is an essential step during care transitions to prevent adverse health outcomes. Older adults discharged after medication changes are particularly at risk if instructions are unclear or if previous medications remain at home. Medications stopped in the hospital may be restarted after discharge if the home

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supply persists or if the outpatient list was not updated. Differences between electronic health record systems for inpatient and outpatient care can also cause discrepancies in medication lists. The clinician should ensure that the patient and caregiver understand what has changed, why it has changed, and what should no longer be taken. Using a simplified list, providing clear discontinuation instructions, conducting follow-up calls, and communicating with the primary care physician are crucial [26–28].

Stepwise Approach to Polypharmacy for Internists (Figure 1)

Figure 1. Stepwise Approach to Polypharmacy for Internists.

Step 1: Establish the True Medication List (Medication Reconciliation as a Diagnostic Act)

The first and most important step is to create an accurate and complete medication list. Obtain and verify a full medication history, including how medications are taken, and make sure each drug has a clear, current indication. Gather the information through direct patient interviews, caregiver input, pharmacy records, and previous documentation.

Step 2: Identify High-Risk Medications and Prescribing Cascades

Recognize drugs and combinations associated with harm with attention to sedatives, anticholinergics, antihypertensives, hypoglycemic agents, and centrally acting medications.

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Recognize prescribing cascades, where a medication's adverse effect is misinterpreted as a new medical condition, leading to the addition of further drugs.

Step 3: Interpret the Medication Regimen in Clinical Context

Evaluate the regimen considering age, renal function, cognition, frailty, fall risk, and alignment with patient goals of care.

Step 4: Apply Evidence-Based Tools to Support Clinical Judgment

Use validated tools such as the Beers Criteria, STOPP/START criteria, and FORTA classification to provide structured guidance in identifying potentially inappropriate medications. However, these tools should be used as adjuncts rather than replacements for clinical judgment, with the goal of integrating evidence-based recommendations with personalized care.

Step 5: Implement Thoughtful Deprescribing

Deprescribing is a key therapeutic intervention and should be approached systematically. Discontinue or taper medications with limited benefit or high risk, prioritizing those most likely contributing to harm. Engaging patients and caregivers in shared decision-making is essential, as successful deprescribing depends on understanding patient preferences and addressing concerns.

Step 6: Monitor, Reassess, and Close the Loop

Evaluate clinical response, symptom improvement, and functional outcomes following medication changes.

Step 7: Ensure Safe Transitions of Care

Reconcile medications at admission and discharge, communicate changes clearly, and prevent unintended continuation or re-initiation of inappropriate therapies.

Practical lessons from the vignette

The vignette offers several important lessons. First, unexplained syncope, bradycardia, and falls in older adults should always prompt a thorough medication review. Second, duplicate therapy may happen for understandable reasons when different clinicians prescribe drugs for different reasons. Third, medication reconciliation can shorten hospital stays, reduce testing, and help regain function. Fourth, simplifying the medication list is often both diagnostic and therapeutic and can yield a regimen to which the patient is more likely to adhere.

Conclusion

Polypharmacy in older adults represents a complex and often underrecognized contributor to morbidity and healthcare utilization. It reflects a complex clinical situation influenced by multimorbidity, fragmented prescribing, physiological vulnerability, and evolving patient goals. The manifestations of polypharmacy are often subtle and syndromic, as seen in falls, syncope, cognitive decline, or functional impairment rather than overt drug toxicity, making it hard to recognize. Medication reconciliation should be reframed as a core clinical skill, one that is diagnostic, therapeutic, and essential to patient safety. A detailed review of the medication list can uncover duplications, outdated therapies, and prescribing cascades, often revealing reversible factors in complex cases. Medication reconciliation serves not only as a safety measure but also as a diagnostic and therapeutic tool, fostering safer, more patient-centered care.

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