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Pharmacist-Led Medication Reconciliation to Reduce Polypharmacy Risk in Elderly Outpatients

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Abstract

Polypharmacy is close to the modal experience of ageing in health systems where chronic-disease guidelines accumulate additively across an increasingly multimorbid older population, and the resulting medication lists are a leading, well-documented source of preventable emergency hospitalizations in older adults. Pharmacist-led medication reconciliation -- the structured comparison of a patient's actual regimen against the documented record at each transition of care, followed by resolution of the discrepancies found -- has been proposed and trialed across hospital, community, and ambulatory settings as a response. This article synthesizes that literature: the scope and mechanisms of polypharmacy-related harm; the structure of reconciliation as a multi-step process rather than a single documentation act; the explicit criteria-based tools, including STOPP/START, the Beers Criteria, and their frailty- and anticholinergic-burden-specific variants, that operationalize potentially inappropriate prescribing so it can be screened for systematically; the pharmacist-led intervention models trialed at hospital admission, hospital discharge, in the community, and in dedicated ambulatory clinics; and deprescribing as the structured extension of reconciliation once an appropriateness judgment has been made. Read together, the evidence is genuinely consistent that pharmacist-led reconciliation and review improve process measures -- discrepancy resolution, prescribing appropriateness, and total medication burden -- while the evidence for consistent reductions in hospital readmission or mortality is considerably more mixed, with well-designed trials on both sides of that question. We treat that gap as an honest feature of the evidence base rather than a problem to explain away, and close with the workforce, generalizability, and intervention-heterogeneity challenges that remain open.

Keywords: medication reconciliation; polypharmacy; deprescribing; potentially inappropriate medications; clinical pharmacy services

1. Introduction

Polypharmacy in older adults is no longer a marginal concern confined to frail nursing-home residents; it is close to the median experience of ageing in most high-income health systems. As multimorbidity accumulates with age, so does the number of prescribers, the number of guideline-recommended drugs per condition, and the number of over-the-counter and herbal products patients add on their own initiative, and the result is medication lists that no single clinician fully owns [1]. A widely cited systematic review of polypharmacy definitions found 138 distinct definitions across 110 articles, with the numeric threshold of five or more regularly used medications the single most common convention, used in 46.4% of the definitions surveyed — a useful reminder that "polypharmacy" is not a diagnosis with a sharp boundary so much as a statistical marker for rising risk [2]. That risk is not abstract. In the United States, adverse drug events send an estimated quarter of a million older adults to the emergency department each year, and a small number of drug classes — anticoagulants, oral antiplatelet agents, insulins, and oral hypoglycemics — account for the clear majority of those visits, precisely because they are common, have narrow therapeutic windows, and are frequently prescribed and monitored by different clinicians who may not see each other's changes in real time [3].

Medication reconciliation — the structured process of comparing a patient's actual medication regimen against what is documented in the record at every transition of care, and resolving the discrepancies that turn up — was formalized as a patient-safety priority by the World Health Organization's High 5s initiative, and subsequent implementation studies in university hospitals have continued to document a high baseline rate of unintentional discrepancies whenever the process is applied rigorously rather than performed as a documentation formality [4]. Pharmacists are not the only clinicians who perform reconciliation, but the profession's specific training in pharmacokinetics, drug interactions, and dosing in renal and hepatic impairment has made pharmacist-led reconciliation and review the most extensively studied version of the intervention, particularly for the elderly outpatient population in whom polypharmacy, cognitive change, and care fragmentation intersect most sharply.

This article synthesizes that literature. It is not a report of new experimental work; it is an attempt to lay out, with the evidence each claim actually rests on, what pharmacist-led medication reconciliation looks like as an intervention, what tools support it, what the trial and systematic-review literature says about its effect on adverse events, hospital utilization, and prescribing appropriateness, and where the evidence is thinner than the enthusiasm for the intervention might suggest. We organize the discussion around six themes: the scope and mechanisms of polypharmacy-related harm in older adults; the structure of medication reconciliation as a process rather than a single act; the explicit criteria-based tools — STOPP/START, the Beers Criteria, and their frailty-specific and anticholinergic-burden variants — that operationalize "inappropriate prescribing" so it can be screened for systematically; the pharmacist-led intervention models that have actually been trialed across hospital, community, and ambulatory settings; deprescribing as the natural extension of reconciliation once a discrepancy has been resolved into an active decision about whether a drug should still be there at all; and the open evidentiary gaps that remain. Throughout, we have tried to resist the temptation, common in narrative reviews of this literature, to report every positive trial as though it settles the question and every null trial as an outlier to be explained away. Some of the largest and best-designed studies in this space have returned genuinely mixed or null results on hard outcomes like 30-day readmission, even while showing clear benefit on process measures like discrepancy resolution and inappropriate-prescribing scores, and an honest synthesis has to hold both of those findings at once [5].

2. The Scope of Polypharmacy and Its Consequences in Older Adults

Polypharmacy is downstream of a structural feature of modern chronic-disease care: single-disease guidelines are additive. A patient with hypertension, type 2 diabetes, osteoarthritis, and mild cognitive impairment can accumulate a clinically defensible, guideline-concordant medication list of ten or more drugs purely by each condition being managed well in isolation, without any single prescriber having made an unreasonable decision. Barnett and colleagues' cross-sectional analysis of nearly 1.75 million patients in Scottish primary care made this structural point starkly: multimorbidity was the norm rather than the exception

by the seventh decade of life, it was more prevalent in absolute terms among people in socioeconomically deprived areas at a given age than among the more affluent, and its onset occurred, on average, 10 to 15 years earlier in deprived populations — meaning that the population most exposed to polypharmacy-related prescribing complexity is also, on average, the population least well served by care systems designed around single-condition specialty clinics [1]. This matters for medication reconciliation specifically because it means the "typical" older patient a reconciliation program will encounter is not an edge case with an unusually complicated history; multimorbidity, and the polypharmacy that follows from it, is close to the modal presentation.

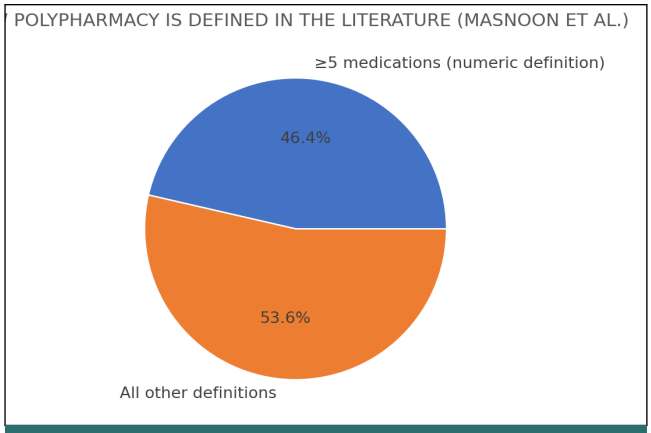

Figure 1: How polypharmacy is operationally defined across the literature -- share of the 138 definitions identified in a systematic review of 110 articles that used the numerical threshold of five or more regularly taken medications versus all other (duration-based, drug-count-with-criteria, or otherwise qualitative) definitions [2].

The consequence that has drawn the most attention from patient-safety researchers is the adverse drug event. Budnitz and colleagues' analysis of U.S. national surveillance data found that adults aged 65 and older accounted for a disproportionate share of emergency hospitalizations attributable to adverse drug events relative to their share of outpatient prescriptions, and that this burden was concentrated in a strikingly small number of drug classes: warfarin, insulins, oral antiplatelet agents, and oral hypoglycemic agents together accounted for roughly two-thirds of the emergency hospitalizations they identified [3]. The finding is important for reconciliation practice for a specific reason: it suggests that a pharmacist-led review does not need to achieve comprehensive perfection across an entire medication list to meaningfully reduce harm — a review process that reliably catches errors in this small set of high-risk drug classes captures a disproportionate share of the preventable harm, which is one reason many pharmacist intervention protocols explicitly prioritize anticoagulants, insulin, and other narrow-therapeutic-index agents for the most intensive scrutiny.

Beyond acute adverse events, polypharmacy is independently associated with a cluster of geriatric syndromes — falls, delirium, functional decline, and reduced adherence driven simply by regimen complexity — that are harder to attribute to a single causal drug and therefore harder to detect through spontaneous adverse-event reporting. Spinewine and colleagues, opening a Lancet series on prescribing in older people, argued that appropriateness in this population cannot be reduced to "is this drug indicated," because a drug can be correctly indicated for its own condition and still be inappropriate in the context of the patient's overall regimen, life expectancy, functional status, and treatment goals — appropriateness, in their framing, is a property of the whole medication list evaluated against the whole patient, not a property of individual drug-indication pairs evaluated in isolation [6]. That framing is, in effect, the conceptual justification for medication reconciliation and review as distinct clinical activities from ordinary prescribing: they exist because no single prescriber, looking only at the drugs they themselves added, can reliably evaluate the property Spinewine et al. describe.

3. Defining and Structuring Medication Reconciliation

Medication reconciliation is often described informally as "making sure the list is right," but the formal process, as codified in WHO's High 5s Standard Operating Protocol, has a specific structure: obtaining the best possible medication history directly from the patient or caregiver (not simply transcribing the prior record), comparing that history against the medications currently ordered or documented at the point of transition, identifying and resolving discrepancies with the prescriber, and communicating the reconciled list forward to the next point of care. Each of those four steps can fail independently, and implementation studies that measure discrepancy rates rather than simply auditing whether a reconciliation form was completed tend to find substantial gaps between the

two. In a prospective observational cohort study applying the WHO High 5s protocol at a German university hospital, Schmitz and colleagues found that unintentional medication discrepancies remained common even in a setting explicitly implementing the standardized protocol, underscoring that formal adoption of a reconciliation process and reliable execution of it are not the same thing, and that the gap between them is where much of the residual risk in "already reconciling" institutions actually lives [4].

Where a pharmacist is inserted into this four-step process, and how much authority they are given to resolve discrepancies directly rather than simply flagging them for physician review, varies substantially across the studies that have evaluated the intervention, and this variation is not a minor implementation detail — it is plausibly the single largest source of heterogeneity in reported effect sizes across the literature. At the more intensive end, Schnipper and colleagues' PILL-CVD trial embedded pharmacists in the discharge process for patients with acute coronary syndrome or decompensated heart failure, having them take an admission medication history, provide pharmacist counseling at discharge, and follow up by telephone after discharge; the trial found that this bundled, pharmacist-led intervention significantly reduced clinically important medication errors after discharge relative to usual care, with the largest reductions concentrated in the potential-adverse-drug-event category of errors — precisely the category that reconciliation, as opposed to generic patient education, is best positioned to catch [7]. At the admission end of the transition, Ceschi and colleagues' randomized trial of pharmacist-performed medication reconciliation at hospital admission is a useful corrective to an overly tidy narrative: reconciliation at admission reduced medication discrepancies as a process measure, but it did not significantly reduce 30-day return-to-hospital rates in the trial's primary intention-to-treat analysis, a null result on the hard outcome that the authors themselves discuss candidly rather than reframe as a subgroup success [5]. Read together, these two trials suggest that pharmacist-led reconciliation reliably improves the accuracy of the medication record and reduces process-level medication errors, but that translating that improvement into reduced hospital utilization depends heavily on what else is bundled with the reconciliation step — discharge counseling, telephone follow-up, and structured handoff to the next care setting appear to matter as much as the reconciliation act itself.

A systematic review of hospital-based medication review, spanning trials with genuinely heterogeneous intervention content, mortality and readmission definitions, and patient populations, illustrates the same tension at the level of aggregated evidence: the Cochrane review by Christensen and Lundh concluded that clinical outcomes from medication review conducted by pharmacists or multidisciplinary teams in hospitalized patients were mixed across the included trials, and cautioned explicitly against over-interpreting positive individual studies given substantial clinical and methodological heterogeneity across the evidence base — a conclusion that has aged reasonably well as more trials have accumulated since [8]. A related meta-analysis focused specifically on hospital readmissions found that pharmacist-led medication reviews across nineteen randomized trials did not significantly reduce all-cause readmission, but did significantly reduce readmissions and emergency department visits attributable specifically to drug-related causes, again pointing toward the same pattern: the intervention's most reliable signal is on drug-related outcomes rather than on the noisier, multiply-determined outcome of any-cause hospital utilization [9].

4. Tools for Identifying Potentially Inappropriate Prescribing

Reconciliation resolves discrepancies between what a patient is taking and what is documented; it does not, by itself, tell a reviewer whether a drug that is both correctly taken and correctly documented is nonetheless a poor choice for that patient. That judgment is what explicit criteria-based screening tools exist to operationalize, converting an otherwise subjective clinical impression into a checklist a pharmacist can apply systematically and defend to a prescriber. The two most widely used families of tools take structurally different approaches. The Beers Criteria, maintained and periodically updated by an American Geriatrics Society expert panel, are organized primarily around specific drugs or drug classes that are potentially inappropriate in older adults generally, regardless of diagnosis — the 2023 update covers medications to avoid, drug-disease or drug-syndrome interactions to avoid, drugs to use with

caution, and drug-drug interactions of particular concern, with revisions reflecting newer evidence on drug classes such as certain anticoagulants and diabetes medications that were less prominent in earlier iterations [10]. The STOPP/START criteria, by contrast, are organized physiologically by organ system and explicitly pair "Screening Tool of Older Persons' Prescriptions" (drugs to stop) with "Screening Tool to Alert to Right Treatment" (indicated drugs that may be missing) — the START half of the tool is a genuinely distinct contribution, because it addresses under-prescribing, a form of inappropriate prescribing that a Beers-style stop-list cannot detect by construction. Version 3 of STOPP/START, published in 2023, expanded and reorganized the criteria based on accumulated clinical evidence and international consensus among the tool's authors and reviewers [11].

Table 1: Explicit criteria-based tools used to screen elderly outpatients' medication regimens for potentially inappropriate prescribing, what each tool targets, and the population it was developed for [10,11,12,13].

Tool	Source	Organizing Principle	Primary Target Population
AGS Beers Criteria (2023 update)	American Geriatrics Society Expert Panel [10]	Drug/drug-class list: medications to avoid, use with caution, or avoid in specific diseases	General population of adults aged 65 and older
STOPP/START, version 3	O'Mahony et al. [11]	Organ-system-based criteria pairing drugs to stop (STOPP) with indicated drugs that may be missing (START)	General population of older adults, primary and secondary care
STOPPFrail	Lavan et al. [12]	Medication time-to-benefit weighed against remaining life expectancy	Frail older adults with limited life expectancy
Anticholinergic burden scales	Salahudeen et al. (systematic review) [13]	Cumulative weighted score across all anticholinergic-active drugs in the regimen	Older adults on regimens with multiple anticholinergic-active agents

Neither tool is a substitute for clinical judgment, and both have known limitations that the reconciliation literature is generally candid about: they were developed and validated primarily in general older-adult populations, and applying them unmodified to patients with very limited life expectancy or advanced frailty can produce recommendations — such as continuing a statin for primary prevention — that are technically criteria-compliant but clinically questionable given a shortened time horizon over which the drug's benefit could accrue. This is the gap STOPPFrail was built to close: Lavan and colleagues developed and validated a screening tool specifically for frail older adults with limited life expectancy, using a different implicit standard — whether a medication's expected time-to-benefit exceeds the patient's likely remaining life expectancy — that shifts several drug classes routinely defended as appropriate under general Beers or STOPP/START criteria into the "consider stopping" category once frailty and prognosis are taken seriously as inputs to the appropriateness judgment [12].

A third, narrower but clinically important axis of screening concerns anticholinergic burden specifically, because anticholinergic effects accumulate additively across many drug classes — first-generation antihistamines, several antidepressants, bladder antimuscarinics, and some antipsychotics among them — in a way that a drug-by-drug review can easily miss even when each individual drug looks acceptable in isolation. Salahudeen and colleagues' systematic review of anticholinergic burden scales found consistent associations between higher cumulative anticholinergic burden scores and adverse outcomes including falls and cognitive impairment across the scales examined, while also noting that the scales themselves do not agree well with one another on which specific drugs to weight and how heavily, which complicates their use as a single objective threshold in the same way STOPP/START or Beers criteria are sometimes (imperfectly) treated as thresholds [13]. In practice, a pharmacist conducting a comprehensive review of an elderly outpatient's regimen typically draws on more than one of these tools rather than any single one, because they were built to catch different categories of problem — drug-specific risk, under-prescribing, frailty-adjusted time-to-benefit mismatches, and cumulative burden across a drug class — and no single tool covers all four.

5. Pharmacist-Led Reconciliation Models Across Care Transitions

The trial literature on pharmacist-led reconciliation and review spans several distinct care settings, and the results are not simply interchangeable across them, because the mechanism of harm being addressed differs by transition point. At hospital admission, the dominant risk is that the admitting team works from an inaccurate or incomplete home-medication list and either omits a chronic medication the patient actually needs or fails to recognize an interaction with a newly started inpatient drug. At hospital discharge, the dominant risk shifts

toward the patient's own capacity to correctly understand and execute a medication regimen that may have changed substantially during the admission, often while the patient is fatigued, in pain, or cognitively taxed by the hospitalization itself. In ambulatory and community settings, where no single acute event triggers review, the dominant risk is one of slow accumulation — a medication started years earlier for an indication that has since resolved, or a dose that was never adjusted as renal function declined, simply persisting because no one's job description includes periodically asking whether it still belongs.

The Swedish trial by Gillespie and colleagues, one of the more methodologically rigorous ward-based interventions in this literature, embedded a clinical pharmacist directly on a general internal medicine ward for patients aged 80 and older, with responsibilities spanning admission medication reconciliation, in-hospital medication review against explicit appropriateness criteria, patient education, and a discharge report to the patient's subsequent care providers; the trial was reported as effective in reducing hospital revisits and drug-related readmissions relative to usual care, and a companion economic analysis found the intervention to be cost-effective from a health-system perspective [14]. The design is notable for bundling reconciliation with active in-hospital review and structured discharge communication rather than treating reconciliation as an isolated checklist item performed once at admission, which is consistent with the broader pattern in this literature that bundled interventions tend to outperform single-touchpoint ones on utilization outcomes even when single-touchpoint reconciliation reliably improves the accuracy of the medication list itself.

Community pharmacy is a structurally different setting because the pharmacist has no access to the medical record and typically must build a picture of the patient's regimen, indications, and goals largely from what the patient reports and what dispensing history reveals — a genuine limitation relative to hospital-embedded models, but one offset by community pharmacists' comparatively frequent, low-barrier contact with patients over months and years rather than a single admission. Varas-Doval and colleagues' cluster randomized trial of a structured, follow-up-inclusive community pharmacist medication review for polypharmacy patients found clinically meaningful improvement on measures of medication-related problems and patient-reported outcomes relative to usual community pharmacy care, supporting the view that the community setting, despite its informational limitations, is a viable site for reconciliation-adjacent review specifically because of the relationship continuity it offers [15]. A broader systematic review and meta-analysis of community pharmacy-based interventions in older adults reached a similar overall conclusion — consistent, if moderate, clinical and humanistic benefit across the pooled trials — while also noting substantial variability in intervention intensity and duration across the studies pooled, a heterogeneity problem that recurs throughout this literature regardless of care setting [16].

Ambulatory clinic-based models occupy a middle position, combining record access with the ongoing relationship advantage of the community setting. A recently reported pharmacist-led ambulatory clinic designed explicitly around polypharmacy management in older outpatients illustrates the direction this literature has moved toward: rather than a one-off reconciliation event, the clinic model treats medication optimization as a recurring service with its own scheduled visits, distinct from and complementary to the patient's other specialty and primary care appointments [17]. Whether this dedicated-clinic model generalizes cost-effectively beyond well-resourced academic health systems, where most of the reported examples originate, is one of the open questions we return to below.

6. Deprescribing as the Natural Extension of Reconciliation

Once a reconciliation process has produced an accurate, appropriateness-screened medication list, the remaining question for a substantial fraction of elderly patients is not whether any individual drug is technically indicated, but whether the burden of continuing it still outweighs its benefit given the patient's current goals, function, and life expectancy — a decision-making process the field now generally calls deprescribing rather than simple discontinuation, to emphasize that it is a planned, supervised clinical process rather than a passive lapse in adherence. Scott and colleagues laid out an influential structured process for this decision: reconcile the current medication list, identify drugs that

may be causing harm or are no longer of benefit, determine priority for discontinuation based on risk-benefit balance and the difficulty of withdrawal, and implement a discontinuation plan with monitoring, explicitly framing deprescribing as requiring the same systematic rigor as prescribing rather than being treated as prescribing's casual, unstructured opposite [18]. Garfinkel and Mangin's earlier feasibility study of a comparable structured discontinuation algorithm in a frail, community-dwelling elderly population reported that the large majority of medications targeted for discontinuation under their protocol were successfully stopped without clinically significant adverse consequences, and that patients' global health ratings and cognitive status did not worsen and in some measures improved over the study period — an early and influential demonstration that systematic deprescribing in a frail population need not be the high-risk undertaking many prescribers instinctively treat it as [19].

The evidence base has grown substantially since those early studies, and the more recent systematic reviews are more circumspect about the size of deprescribing's benefit on hard clinical outcomes even while confirming its general safety. Bloomfield and colleagues' systematic review and meta-analysis of deprescribing interventions in community-dwelling older adults found that deprescribing interventions could reduce the total number of medications a patient took and, in some analyses, reduce mortality relative to usual care, but the authors were explicit that certainty of evidence for many outcomes was low to moderate given heterogeneity in intervention design, populations, and outcome definitions across the included trials — a familiar refrain in this literature, and one worth taking seriously rather than smoothing over in service of a cleaner narrative [20]. The current (fifth) update of the relevant Cochrane review on interventions to improve appropriate polypharmacy use in older people reaches a broadly similar conclusion: multiple types of intervention, including pharmacist-led medication review, can improve the appropriateness of prescribing as measured by validated instruments, but the evidence for downstream effects on hospitalization, falls, and mortality remains considerably less consistent than the evidence for the appropriateness measures themselves [21].

This gap between "appropriateness improved" and "hard outcomes improved" is not, in our reading, evidence that deprescribing or reconciliation are ineffective; appropriateness scores are a reasonable proxy precisely because inappropriate prescribing is mechanistically linked to the adverse events those hard outcomes count, and most individual trials are underpowered to detect a change in comparatively rare hard outcomes like hospitalization or mortality even where the mechanistic pathway toward that reduction has plausibly been improved. But it is a gap that deserves to be stated plainly rather than papered over, because it shapes what a realistic claim about the value of pharmacist-led reconciliation and deprescribing should sound like: reliably improves the accuracy and appropriateness of what a patient is taking, and probably reduces drug-related harm as a consequence, rather than a guaranteed reduction in readmissions or mortality that every individual trial should be expected to reproduce.

7. Open Challenges

Several limitations recur across this literature clearly enough to name directly. First, intervention heterogeneity remains the single largest obstacle to precise, pooled effect estimates. "Pharmacist-led medication reconciliation" describes interventions that range from a single structured admission interview to a multi-month clinic-based program with scheduled follow-up, and systematic reviews that pool across this range, however carefully conducted, are necessarily reporting an average effect across genuinely different interventions rather than the effect of one well-specified intervention [8,21]. Second, and related, most trials measure process outcomes — discrepancies resolved, appropriateness scores improved, potentially inappropriate medications discontinued — far more reliably than they measure hard clinical outcomes, and the handful of trials designed with adequate power to detect changes in readmission or mortality, such as Ceschi et al.'s admission-reconciliation trial, have sometimes returned null results on those outcomes even while process measures improved [5]. Readers of this literature, including prescribers deciding whether to advocate for pharmacist-led reconciliation services, should not expect every well-conducted trial to show a readmission benefit; that expectation is not well supported by the totality of the evidence, even though the process-level and drug-related-outcome evidence is

considerably more consistent [9].

Third, most of the trial evidence originates from well-resourced academic hospital systems and structured national health systems in North America, northern Europe, and Australia, and the degree to which pharmacist-led reconciliation models generalize to resource-constrained settings, fragmented multi-payer systems, or health systems where pharmacists do not have prescribing or care-plan-modification authority is comparatively under-studied. Community pharmacy models in particular depend heavily on the specific scope-of-practice and reimbursement environment a given health system provides, which limits how directly trial results from one jurisdiction can be expected to transfer to another [15,16]. Fourth, the appropriateness-screening tools this literature depends on — STOPP/START, the Beers Criteria, and their frailty- and burden-specific variants — were developed through expert consensus processes grounded primarily in observational associations between specific drugs and adverse outcomes, and while STOPPFrail and comparable frailty-adjusted tools represent a genuine improvement in matching criteria to patient prognosis, applying any criteria-based tool still requires clinical judgment about individual patient goals that a checklist cannot fully encode, and the tools' developers are generally explicit about this limitation themselves [11,12].

Fifth, and more practically: the workforce and reimbursement models needed to sustain pharmacist-led reconciliation and review at scale remain uneven even within single health systems, with ambulatory clinic-based models in particular depending on funding and staffing arrangements that are not universally available outside academic health-system pilot programs [17]. Scaling the more intensive, better-evidenced bundled models — reconciliation plus review plus discharge counseling plus follow-up — beyond the specific institutions that have trialed and funded them is, in our reading, the central practical challenge the field faces, distinct from and in some ways harder to solve than the remaining clinical-evidence gaps.

8. The Conceptual Foundations: Pharmaceutical Care as a Practice Model

It is worth pausing on where the professional mandate for this kind of intervention comes from, because it predates most of the trial literature discussed above by two decades. Hepler and Strand's foundational statement on pharmaceutical care, published in 1990, argued that the pharmacy profession's core responsibility should be reframed away from the accurate dispensing of a prescriber's order and toward a broader accountability for the patient achieving defined therapeutic outcomes from their overall medication therapy — explicitly including the identification, resolution, and prevention of drug-related problems that arise not from any single prescription being wrong, but from the interaction of multiple correctly written prescriptions [22]. That reframing matters for understanding why pharmacist-led reconciliation and deprescribing developed as a distinct clinical activity rather than remaining an informal byproduct of dispensing: if a pharmacist's professional responsibility is defined at the level of the whole regimen and the whole patient's outcomes, then systematically reviewing the interaction of a patient's ten medications is not an optional value-add, it is close to the central job description. Much of the subsequent literature on comprehensive medication management in ambulatory and community settings can be read as an attempt to operationalize Hepler and Strand's conceptual argument into billable, schedulable clinical services with defined workflows, documentation standards, and, increasingly, formal reimbursement pathways — a translation from professional philosophy into health-system infrastructure that took the better part of three decades and is still incomplete in many jurisdictions.

This history also explains a recurring tension in the trial literature: studies vary considerably in how much clinical authority the pharmacist is given, from a purely advisory role that only flags concerns to the physician of record, through a collaborative practice agreement allowing direct dose adjustment or discontinuation of specific drug classes, to fully independent prescribing authority in some ambulatory clinic models. Interventions further along that authority spectrum tend to show faster resolution of identified problems, since a flagged concern requiring a separate physician visit or message introduces both delay and attrition. This is an under-examined moderator in existing systematic reviews, most of which code interventions simply as "pharmacist-led" without stratifying by the scope of authority the pharmacist actually held.

9. Conclusion

The literature synthesized here supports a specific and moderately confident claim rather than a sweeping one. Pharmacist-led medication reconciliation, when implemented as the structured, multi-step process the WHO High 5s protocol describes rather than a documentation formality, reliably identifies and resolves medication discrepancies that would otherwise persist across care transitions [4]. Layering explicit appropriateness screening — STOPP/START, the Beers Criteria, and frailty- or burden-specific variants where relevant — onto that reconciled list allows pharmacists to systematically identify potentially inappropriate prescribing and, where appropriate, to initiate a structured deprescribing process rather than leaving that judgment to whichever prescriber happens to next encounter the drug on the list [10,11,12,18]. The evidence that these steps improve process measures — discrepancy resolution, prescribing appropriateness scores, and total medication burden — is genuinely consistent across trial settings and systematic reviews. The evidence that they translate into consistent, statistically reliable reductions in hospital readmission or mortality is considerably less uniform, with well-designed trials on both sides of that question, and an honest reading of the field should reflect that uncertainty rather than resolve it by emphasis [5,9,20,21].

None of this diminishes the practical case for pharmacist-led reconciliation and review in elderly outpatients specifically; the population in which polypharmacy risk concentrates most heavily — patients with multiple chronic conditions, multiple prescribers, and reduced physiologic reserve for tolerating drug-related harm — is exactly the population in which even a moderate, reliably reproducible reduction in inappropriate prescribing and drug-related adverse events is clinically meaningful, whether or not that reduction is always statistically detectable on a hospitalization endpoint in any single trial [3,6]. What the field needs going forward is less another single-site trial of a bespoke bundled intervention and more work on which specific components of the more intensive, better-evidenced models — direct record access, structured discharge counseling, scheduled follow-up, explicit prescribing authority — are doing the causal work, so that resource-constrained health systems can implement the parts of this pattern that matter most rather than attempting to replicate an entire academic-medical-center program wholesale.

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Not applicable. This article is a literature synthesis and did not involve the recruitment of human participants, animal subjects, or the collection of primary clinical data.

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