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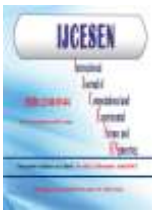

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Research Article

Collaboration Between Nursing and Pharmacy Teams in Managing Polypharmacy Among Older Adults

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Abstract:

Polypharmacy, defined as the concurrent use of multiple medications, poses significant risks for older adults, such as increased adverse drug reactions, drug interactions, and medication non-adherence. As the population ages, the prevalence of polypharmacy continues to rise, necessitating a strategic approach to medication management. Effective collaboration between nursing and pharmacy teams is crucial in addressing the complexities associated with polypharmacy in this vulnerable population. Nurses, who have the most frequent contact with patients, can provide valuable insights into medication adherence and the patient's overall health status. Meanwhile, pharmacists bring their expertise in pharmacology and medication management, making them essential partners in the interdisciplinary team. Together, they can conduct comprehensive medication reviews, assess each patient's medication regimen for safety and efficacy, and implement deprescribing strategies when necessary. One of the key advantages of this collaboration is the enhancement of care quality through improved patient outcomes. By engaging in regular communication and information sharing, nursing and pharmacy teams can identify potential medication-related problems early and design tailored interventions. For instance, joint initiatives, such as medication reconciliation at hospital discharge or the implementation of polypharmacy clinics, can significantly reduce hospital readmissions and enhance patient safety. Furthermore, involving patients and their caregivers in discussions about their medications fosters shared decision-making, which can improve adherence and satisfaction. Ultimately, this interdisciplinary collaboration not only enriches the competency of healthcare providers but also significantly benefits the health and well-being of older adults managing polypharmacy.

1. Introduction

The prevalence of polypharmacy is staggering and continues to rise. Recent epidemiological studies indicate that approximately **40% of community-dwelling older adults** and a striking **90% of nursing home residents** are exposed to polypharmacy [1]. In hospital settings, the figure is similarly high, with over 60% of older inpatients being prescribed multiple medications upon discharge [2]. This high medication burden is not without consequence. Polypharmacy is the single greatest risk factor for adverse drug events (ADEs), drug-drug interactions, and potentially inappropriate medications (PIMs). The Office of Disease Prevention and Health Promotion reports that **ADEs cause nearly 1.3 million emergency department visits each year** in the United States alone, with adults aged 65 and older being nearly seven times more likely to be hospitalized following an ADE than younger individuals [3]. The human cost is immense, manifesting as increased morbidity, functional decline, cognitive impairment, and a significantly reduced quality of life.

The financial implications are equally alarming. It is estimated that the cost of drug-related morbidity and mortality in the U.S. exceeds **$500 billion annually**, a substantial portion of which is attributable to the mismanagement of polypharmacy in older adults [4]. These costs stem from emergency department visits, hospital readmissions, and long-term care admissions that could have been prevented with more vigilant medication management. Beyond the economic toll, polypharmacy contributes to a treatment burden that many older adults find overwhelming, leading to poor adherence, pill fatigue, and a sense of loss of control over their own health.

The root causes of problematic polypharmacy are multifaceted and deeply embedded within the structure of modern healthcare. The management of multimorbidity often involves multiple prescribers across different specialties—a cardiologist, an endocrinologist, a rheumatologist—each focusing on their organ system or disease state without a comprehensive view of the patient's entire medication regimen. This "siloed" approach to care creates a significant risk for therapeutic duplication, conflicting medications, and the prescribing of medications that may be appropriate for a single condition but are harmful in the context of the patient's complete clinical picture. Furthermore, the physiological changes of aging, including altered renal and hepatic function, changes in body composition, and reduced homeostatic reserve, profoundly affect pharmacokinetics and pharmacodynamics, making older adults exquisitely sensitive to both the intended and unintended effects of drugs.

In this complex clinical scenario, no single healthcare profession can effectively address the challenges of polypharmacy alone. The traditional model, where physicians prescribe, pharmacists dispense, and nurses administer, is insufficient and even dangerous. It is within this critical gap that the

strategic collaboration between two frontline professions—nursing and pharmacy—emerges as an indispensable paradigm for enhancing patient safety. Nurses, by virtue of their continuous presence at the bedside and their holistic approach to care, possess a unique and invaluable perspective. They are the professionals who most frequently interact with the patient and their family, allowing them to conduct detailed medication histories, including the use of over-the-counter products and supplements. They are the first to observe and assess the patient's response to therapy, monitoring for subtle signs of ADEs, such as drowsiness, confusion, falls, or changes in functional status. A study in the *Journal of Gerontological Nursing* found that nurses accurately identified **over 70% of potential medication-related problems** through routine patient assessment, issues that were not flagged in the physician's notes [5].

Conversely, pharmacists bring a deep, specialized expertise in pharmacology, pharmacotherapy, and medication safety. They are uniquely qualified to perform comprehensive medication reviews (CMRs), identify drug-drug and drug-disease interactions, recommend dose adjustments based on renal function, and flag the use of PIMs according to established criteria like the Beers Criteria or the STOPP/START criteria. Research has consistently demonstrated the efficacy of pharmacist-led interventions. A meta-analysis of 29 studies showed that pharmacist involvement in patient care reduced potentially inappropriate medication use by **32% and significantly decreased medication-related problems** in older adults [6]. However, the pharmacist's expertise is often underutilized if it is not effectively integrated into the clinical workflow and communicated to the team responsible for direct patient care.

Therefore, the synergy between nursing's continuous, patient-centered surveillance and pharmacy's specialized, medication-focused expertise creates a powerful defense against the perils of polypharmacy. This collaboration can take many forms, from structured interprofessional rounds and joint clinic appointments to integrated electronic health record (EHR) systems that facilitate shared decision-making. For instance, a model where nurses conduct initial medication reconciliation and symptom assessment, then proactively consult with a clinical pharmacist for a formal medication review, has been shown to be highly effective. A randomized controlled trial published in *JAMA Internal Medicine* demonstrated that such a collaborative model resulted in a **35% reduction in ADEs and a 30% lower rate of hospital readmissions** within 30 days for older patients discharged with complex medication regimens [7].

2. The Polypharmacy Pandemic:

The statistical landscape of polypharmacy reveals a staggering and consistently rising trend across all care settings. Recent comprehensive studies indicate that approximately **40-50% of community-dwelling older adults** regularly take five or more prescription medications, with nearly **20% using ten or more medications** concurrently—a situation termed hyperpolypharmacy [13]. The prevalence escalates dramatically in institutional settings, where up to **90% of nursing home residents** experience polypharmacy, often with complex medication regimens that include high-risk medications [14]. Hospitalized older adults present an equally concerning picture, with studies showing that over 60% are discharged with potentially inappropriate medication combinations, frequently resulting from the accumulation of new prescriptions without adequate review and discontinuation of pre-admission medications [15]. This pattern of prescribing creates a dangerous medication trajectory that follows patients across the care continuum, from community to hospital and back again.

The clinical consequences of inappropriate polypharmacy are severe and multifaceted. Older adults experiencing polypharmacy face a **50-60% higher risk of adverse drug events (ADEs)** compared to those taking fewer medications [16]. These ADEs manifest across physiological systems, ranging from falls and fractures due to psychotropic medications, to renal impairment from inappropriate analgesic use, to dangerous hypoglycemic episodes from complex diabetes regimens. The physiological changes associated with aging—including reduced renal and hepatic function, altered body composition, and decreased homeostatic reserve—significantly amplify these risks. Furthermore, polypharmacy substantially increases the likelihood of prescribing cascades, where new medications are prescribed to treat symptoms that are actually adverse effects of existing drugs, thereby compounding the problem and creating a vicious cycle of medication accumulation.

The economic burden of polypharmacy-related complications represents a substantial portion of healthcare expenditures in developed nations. Analysis of healthcare spending data reveals that medication-related problems in older adults account for approximately **$500 billion annually in the United States alone**, with a significant proportion

attributable to the consequences of inappropriate polypharmacy [17]. These costs manifest through multiple pathways: emergency department visits for ADEs, hospital readmissions due to medication complications, extended hospital stays resulting from drug interactions, and increased need for long-term care facilities when medication-related functional decline occurs. The financial impact extends beyond direct medical costs to include substantial indirect costs related to caregiver burden, lost productivity of family members, and reduced functional capacity of affected older adults.

The human experience of polypharmacy extends beyond clinical and economic metrics to profoundly affect quality of life and functional independence. Older adults managing complex medication regimens frequently report what researchers term "pill burden"—the physical, psychological, and practical challenges associated with taking multiple medications daily. Studies utilizing quality of life measures have demonstrated that individuals experiencing polypharmacy report significantly **lower health-related quality of life scores** across multiple domains, including physical functioning, emotional well-being, and social participation [18]. The cognitive burden of managing complex regimens can lead to medication non-adherence, which paradoxically increases the risk of poor outcomes while simultaneously representing a rational coping mechanism for overwhelmed patients. This treatment burden often results in "prescription fatigue," where patients become less engaged in their care and more likely to miss important follow-up appointments or necessary monitoring.

The problem of polypharmacy is further complicated by the inclusion of potentially inappropriate medications (PIMs) in older adults' regimens. Despite well-established criteria such as the Beers Criteria and STOPP/START tools, inappropriate medications continue to be prescribed at alarming rates. Recent analysis indicates that approximately **30-40% of community-dwelling older adults** receive at least one PIM, with higher rates observed in hospitalized and nursing home populations [19]. The most commonly prescribed PIMs include benzodiazepines, antipsychotics, certain anticholinergic medications, and proton pump inhibitors used beyond appropriate durations. These medications contribute disproportionately to adverse outcomes while offering limited therapeutic benefit for older populations.

The demographic imperative adds urgency to addressing the polypharmacy pandemic. With the global population of adults aged 65 and older projected to nearly double from **1 billion in 2020 to 1.6 billion by 2050**, the scale of this problem will continue to expand without systematic intervention [20]. This demographic shift, combined with increasing multimorbidity rates and ongoing pharmaceutical innovation, suggests that polypharmacy will remain a defining challenge in geriatric care for the foreseeable future. The convergence of these factors—high prevalence, severe clinical consequences, substantial economic burden, and demographic trends—establishes polypharmacy as a critical priority for healthcare systems, clinicians, policymakers, and researchers alike.

3. Why Polypharmacy Proliferates in Geriatric Care

The most fundamental clinical driver of polypharmacy is the high prevalence of multimorbidity among older adults. Epidemiological studies reveal that approximately **80% of adults aged 65 and older** live with two or more chronic conditions, with nearly **50% managing four or more simultaneous chronic illnesses** [21]. This clinical reality creates a perfect storm for medication accumulation, as each condition typically comes with evidence-based clinical practice guidelines recommending specific pharmacological interventions. The fundamental challenge arises from the fact that these disease-specific guidelines rarely account for the presence of multiple coexisting conditions or consider the cumulative burden of multiple medications. A patient with hypertension, diabetes, osteoporosis, and osteoarthritis may receive four to six different medications simply by following individual disease guidelines, without any clinician considering the overall regimen's appropriateness. This "siloed" approach to chronic disease management, where specialists focus on organ-specific treatments without comprehensive medication review, significantly contributes to problematic polypharmacy [22].

A particularly insidious contributor to polypharmacy is the prescribing cascade, wherein medication-related adverse effects are misinterpreted as new medical conditions, leading to the prescription of additional medications. This phenomenon was first systematically described by Rochon and Gurwitz in 1997 and remains a prevalent issue in geriatric pharmacotherapy [23]. A classic example involves nonsteroidal anti-inflammatory drugs (NSAIDs) prescribed for osteoarthritis, which may cause hypertension, leading to the addition of antihypertensive medications, which in turn may cause electrolyte imbalances or renal dysfunction requiring further

pharmacological management. Recent research indicates that **approximately 20% of new medication starts in older adults** may represent prescribing cascades, with certain high-risk medications like anticholinergics and psychotropics being particularly prone to initiating these sequences [24]. The prescribing cascade is especially problematic because it often goes unrecognized by prescribers, who may not connect the new symptom to an existing medication, thereby perpetuating a cycle of unnecessary prescribing.

The structure of modern healthcare systems actively promotes polypharmacy through fragmented care delivery and inadequate communication channels. Older adults with multiple chronic conditions typically receive care from several different specialists in addition to their primary care provider, with studies showing that Medicare beneficiaries see an average of **two primary care physicians and five specialists annually** [25]. This multiplicity of prescribers, often working in different healthcare systems with incompatible electronic health records, creates significant challenges for medication coordination. Critical information about new prescriptions, discontinuations, or medication changes frequently fails to transfer between providers, leading to therapeutic duplication, dangerous drug interactions, and the continuation of medications that another provider intended to stop. The transition points between care settings—particularly hospital discharges—represent especially vulnerable periods where medication reconciliation errors proliferate. Research demonstrates that nearly **50% of hospitalized older adults experience at least one medication error at discharge**, with omission of pre-admission medications and inappropriate continuation of hospital-initiated drugs being common problems [26].

The normal physiological changes of aging create unique pharmacological challenges that, when unappreciated, contribute to inappropriate prescribing and polypharmacy. Age-related alterations in pharmacokinetics—including reduced renal clearance, decreased hepatic metabolism, and altered volume of distribution—significantly change drug handling in older bodies. Simultaneously, pharmacodynamic changes increase sensitivity to many medications, particularly those affecting the central nervous and cardiovascular systems. Many clinicians lack specific training in geriatric pharmacology and may prescribe adult doses without appropriate adjustment for age-related physiological changes. This is particularly problematic for medications that require renal dosing, as clinicians often fail to accurately estimate creatinine clearance in older adults with reduced muscle mass. Studies indicate that **approximately 30-40% of older adults receive at least one medication requiring renal adjustment** without appropriate dosing modifications, increasing their risk of toxicity and adverse events [27].

Patient expectations and cultural beliefs about medication also contribute significantly to polypharmacy. In many societies, both patients and clinicians have developed a "pill for every ill" mentality, where pharmaceutical interventions are expected for every symptom or abnormal laboratory value. Direct-to-consumer advertising, particularly in the United States, reinforces this mindset by promoting medication as the primary solution to health problems. Additionally, the deprescribing process—the systematic withdrawal of inappropriate medications—faces numerous barriers at the patient level. Many older adults develop strong beliefs about the necessity of their medications, fear that discontinuing a drug might worsen their health, or interpret deprescribing as "giving up" on their health. Research into patient attitudes reveals that **nearly 40% of older adults express significant concerns about deprescribing**, even when informed that a medication may be inappropriate or harmful [28]. This creates a psychological barrier to medication reduction that clinicians must navigate carefully.

Broader regulatory and economic factors within healthcare systems create additional drivers of polypharmacy. Quality measures and performance indicators often focus on disease-specific medication use—such as statins for cardiovascular disease or osteoporosis medications for fracture prevention—without considering the overall medication burden or potential harms in complex older patients. This can create pressure on clinicians to prescribe according to guidelines even when the net benefit for an individual patient is questionable. Additionally, the structure of healthcare reimbursement frequently prioritizes procedural interventions over cognitive services like comprehensive medication management. The time constraints of typical office visits—often just 15-20 minutes for complex older patients with multiple conditions—make thorough medication review and deprescribing discussions practically challenging. Economic analyses show that **less than 10% of primary care visits include comprehensive medication review**, despite the high prevalence of polypharmacy in this population [29].

Significant gaps in healthcare professional education regarding geriatric pharmacotherapy

represent a fundamental contributor to inappropriate polypharmacy. Many clinicians receive minimal training in the principles of geriatric prescribing, deprescribing strategies, and interprofessional collaboration for medication management. This educational deficit is compounded by interprofessional communication challenges between physicians, pharmacists, and nurses. Without clear roles and structured communication pathways for medication management, opportunities to identify and resolve polypharmacy are frequently missed. Implementation science research demonstrates that **healthcare facilities with structured interprofessional collaboration programs** show significantly lower rates of inappropriate polypharmacy, highlighting the importance of team-based approaches to this complex problem [30].

4. The Nurse's Pivotal Role:

Nurses serve as the primary agents for accurate medication reconciliation during care transitions, a process that represents the fundamental first step in appropriate polypharmacy management. During hospital admission, transfer between units, and discharge, nurses conduct detailed medication histories that form the baseline for all subsequent prescribing decisions. Research demonstrates that nurse-led medication reconciliation identifies **an average of 3.2 medication discrepancies per older patient** during hospital admission, with approximately 40% of these discrepancies having the potential to cause moderate to severe harm if uncorrected [31]. The nursing approach to medication history-taking extends beyond simply documenting prescription medications to include thorough assessment of over-the-counter products, herbal supplements, vitamins, and "as-needed" medication use patterns—elements frequently missed by other providers. This comprehensive medication profiling requires sophisticated communication skills, particularly when working with older adults who may have cognitive impairment, sensory deficits, or complex self-management routines. Advanced nursing practice in this domain involves validating medication lists with family members, community pharmacists, and previous medical records to create the most accurate possible medication history, thereby establishing a solid foundation for appropriate prescribing throughout the healthcare encounter.

The nursing role in monitoring for potential adverse drug events represents one of the most valuable yet underutilized aspects of polypharmacy management. Unlike other providers whose patient contact is episodic, nurses maintain continuous surveillance across shifts, enabling them to detect subtle changes in condition that may signal emerging medication-related problems. Through systematic physical assessment, functional evaluation, and ongoing communication with patients, nurses identify patterns that might indicate adverse drug reactions—such as new-onset confusion, changes in mobility, alterations in bowel patterns, or subtle shifts in laboratory values. Studies indicate that **nurses identify approximately 65% of adverse drug events** in hospitalized older adults before they result in serious harm, often through recognition of early warning signs that would be missed during brief physician visits [32]. This surveillance function is particularly crucial for medications with narrow therapeutic indices and those known to cause geriatric syndromes, such as falls, delirium, and urinary incontinence. The nursing assessment integrates medication effects within the broader context of the patient's overall clinical status, enabling differentiation between disease progression and medication toxicity—a distinction that fundamentally influences appropriate management decisions.

Nurses bring essential expertise in functional and cognitive assessment to the evaluation of medication appropriateness in older adults. Through standardized tools and clinical observation, nurses monitor changes in activities of daily living, instrumental activities of daily living, mobility, balance, and cognitive function that may be affected by medication regimens. This functional lens is particularly important for detecting anticholinergic burden, a common consequence of polypharmacy that manifests through subtle changes in cognition, dry mouth, constipation, and urinary retention. Research shows that **nurse-administered functional assessments detect medication-related functional decline approximately 2-3 days earlier** than standard physician monitoring, creating crucial opportunities for intervention before irreversible functional impairment occurs [33]. Similarly, nursing assessment using validated cognitive screening tools can identify medication-induced cognitive changes that might otherwise be attributed to dementia progression or normal aging. This functional perspective enables nurses to connect medication effects to patient-centered outcomes that matter most to older adults—maintaining independence, preserving cognitive function, and optimizing quality of life.

Nurses provide essential education and self-management support that directly addresses the practical challenges older adults face in managing

complex medication regimens. Through individualized teaching sessions, nurses help patients and caregivers understand medication purposes, dosing schedules, potential side effects, and appropriate monitoring parameters. Effective nursing education goes beyond simple information transfer to include practical strategies for managing complex regimens, such as pill organization systems, medication schedules, and symptom monitoring diaries. Studies demonstrate that **comprehensive nurse-led medication education improves medication adherence by 30-40%** in older adults with complex regimens, while simultaneously reducing medication-related concerns and treatment burden [34]. This educational role is particularly important during care transitions, when medication changes are common and patients must quickly adapt to new regimens. Nurse-led "teach-back" sessions, where patients explain their understanding of their medications, have been shown to significantly reduce medication errors following hospital discharge and improve patient confidence in medication self-management.

Nurses function as crucial patient advocates within the interprofessional team, voicing concerns about potential medication problems and facilitating appropriate prescribing modifications. This advocacy role involves communicating assessment findings, functional changes, and patient concerns to prescribers and pharmacists in a timely and clinically relevant manner. Effective nurses utilize structured communication tools like SBAR (Situation-Background-Assessment-Recommendation) to convey medication concerns clearly and advocate for regimen changes when appropriate. Research indicates that **nurse-initiated medication concerns result in prescribing changes in approximately 60% of cases** when communicated effectively to physicians, highlighting the substantial impact of nursing advocacy on medication optimization [35]. This advocacy extends to challenging potentially inappropriate prescribing, questioning the continuation of medications that may no longer be necessary, and ensuring that patient preferences and goals of care are considered in medication decisions. The nursing perspective—which integrates clinical assessment, functional status, and patient values—provides an essential counterbalance to disease-focused prescribing that might otherwise overlook the broader impact of medications on older adults' lives.

In an increasingly fragmented healthcare system, nurses provide essential continuity in medication management across settings and providers. As patients transition between hospital, rehabilitation, home care, and primary care settings, nurses ensure that medication information transfers accurately and that appropriate monitoring continues. Nurse-led transition programs that include comprehensive medication management have been shown to **reduce medication-related hospital readmissions by 35-50%** among older adults with polypharmacy, representing both improved patient safety and substantial cost savings [36]. This coordination function involves communicating with community providers, facilitating follow-up appointments, and ensuring that medication changes are clearly explained to patients and caregivers. The nursing role in care transitions is particularly valuable for managing high-risk medications like anticoagulants, insulin, and opioids, where coordination failures can have serious consequences.

The nursing documentation in electronic health records creates an essential longitudinal record of medication effects, patient responses, and potential problems. Through detailed nursing notes, flow sheets, and assessment documentation, nurses create a rich clinical picture that supports medication decision-making by the entire healthcare team. Research on nursing documentation patterns reveals that **nursing notes contain critical medication-related information not found elsewhere in the chart** in approximately 25% of older patients with complex medication regimens [37]. This documentation becomes particularly important for tracking subtle medication effects over time, identifying patterns that might suggest adverse reactions, and documenting patient responses to medication changes. When structured systematically, nursing documentation can support data analytics for identifying polypharmacy patterns and evaluating interventions, making the nursing record a valuable resource for quality improvement and research initiatives.

5. The Pharmacist's Expertise:

Pharmacists conduct structured, comprehensive medication reviews (CMRs) that form the cornerstone of effective polypharmacy management. This systematic process involves far more than simply verifying prescription accuracy; it represents a holistic evaluation of the entire medication regimen within the context of the patient's complete clinical picture. During a CMR, pharmacists assess each medication for appropriateness, effectiveness, safety, and adherence, while simultaneously evaluating the regimen for therapeutic duplications, drug-drug interactions, and drug-disease interactions.

Research demonstrates that pharmacist-led CMRs identify **an average of 3.8 medication-related problems per older adult**, with approximately 70% of these problems being accepted by prescribers and resulting in medication changes [41]. The CMR process typically involves multiple components: thorough medication history verification, assessment against explicit criteria for potentially inappropriate medications, evaluation of monitoring parameters, and identification of untreated conditions. This comprehensive approach enables pharmacists to detect patterns and problems that might be missed by providers focusing on individual disease states, making them uniquely positioned to view the medication regimen as an integrated whole rather than a collection of discrete prescriptions.

Pharmacists utilize well-validated explicit criteria, such as the American Geriatrics Society Beers Criteria® and the STOPP/START criteria, to systematically identify potentially inappropriate medications (PIMs) in older adults' regimens. These evidence-based tools provide objective standards for identifying medications whose risks may outweigh their benefits in older populations, as well as potential prescribing omissions. Studies show that pharmacist application of these criteria during medication reviews results in **identification of PIMs in 35-45% of older adults with polypharmacy**, with subsequent deprescribing or modification in approximately 60% of identified cases [42]. The pharmacist's expertise is particularly valuable in interpreting these criteria within the context of individual patient factors, such as life expectancy, functional status, and patient preferences. For example, while a medication might be considered potentially inappropriate according to general criteria, a pharmacist can evaluate whether continued use is justified based on specific clinical circumstances or patient goals. This nuanced application of explicit criteria represents a significant advancement over simple checklist approaches, requiring sophisticated clinical judgment and pharmacological knowledge.

Pharmacists possess specialized expertise in identifying and managing complex drug interactions and adverse effect risks that are particularly prevalent in older adults with polypharmacy. Through sophisticated knowledge of pharmacokinetics, pharmacodynamics, and pharmacogenomics, pharmacists can predict and prevent dangerous interactions that might be overlooked by other providers. This includes not only drug-drug interactions but also drug-disease interactions (where medications may exacerbate existing conditions) and drug-age interactions (where age-related physiological changes alter medication effects). Research indicates that **pharmacist intervention prevents approximately 50% of potential adverse drug events** in older adults with complex medication regimens, primarily through identification and management of interaction risks [43]. The pharmacist's role extends beyond identification to include management strategies such as dosage adjustments, timing modifications, therapeutic alternatives, and monitoring plans. This proactive approach to interaction management is particularly crucial during care transitions, when medication changes are frequent and interaction risks are heightened.

Pharmacists are increasingly recognized as leaders in the systematic process of deprescribing—the planned and supervised withdrawal of inappropriate medications. The deprescribing process involves multiple stages: identification of candidate medications for discontinuation, comprehensive risk-benefit assessment, development of a withdrawal plan, monitoring for withdrawal symptoms or return of underlying conditions, and documentation of outcomes. Pharmacist-led deprescribing initiatives have demonstrated **successful discontinuation of targeted medications in 60-80% of cases**, with minimal adverse events and high patient satisfaction [44]. The pharmacist's role in deprescribing includes patient education about the reasons for medication discontinuation, management of withdrawal regimens (particularly for medications requiring gradual tapering), and coordination with other providers to ensure consensus on deprescribing decisions. This leadership role requires not only pharmacological expertise but also sophisticated communication skills to address patient concerns, prescriber reservations, and interprofessional collaboration challenges. The growing evidence base for deprescribing, coupled with pharmacist expertise in medication management, positions pharmacists as essential change agents in reducing inappropriate polypharmacy.

Pharmacists bring essential expertise in age-related changes in pharmacokinetics and pharmacodynamics that fundamentally influence medication selection and dosing in older adults. This includes understanding how reduced renal function, decreased hepatic metabolism, altered body composition, and changes in protein binding affect medication handling in older bodies. Pharmacist-led renal dosing programs have been shown to **reduce inappropriate medication dosing by 40-60%** in older adults with chronic kidney disease, significantly decreasing the risk of medication toxicity [45]. Similarly, pharmacist

understanding of pharmacodynamic changes—such as increased sensitivity to anticoagulants, psychotropic medications, and antihypertensive agents—enables more precise medication selection and titration. This specialized knowledge is particularly valuable for medications with narrow therapeutic indices, where small dosing errors can have serious consequences. The pharmacist's ability to integrate laboratory data, clinical assessment, and pharmacological principles represents a unique contribution to medication safety that complements the nursing focus on functional assessment and monitoring.

Pharmacists employ multifaceted strategies to address medication adherence challenges that are particularly prevalent among older adults with complex regimens. Through comprehensive adherence assessment, pharmacists identify barriers ranging from practical challenges (such as difficulty opening containers or affording medications) to cognitive limitations and motivational factors. Pharmacist-led adherence interventions typically include patient education, medication synchronization, blister packing, simplified dosing schedules, and regular follow-up. Studies demonstrate that **comprehensive pharmacist-led adherence programs improve medication adherence by 25-35%** in older adults with polypharmacy, with corresponding improvements in clinical outcomes [41]. The pharmacist's approach to adherence extends beyond simple compliance monitoring to include shared decision-making that respects patient preferences and priorities. This patient-centered approach is particularly important for medications where adherence is essential for preventing serious outcomes, such as anticoagulants, antidiabetic agents, and cardiovascular medications.

Pharmacists play a critical role in ensuring medication safety during transitions between care settings, a period of particular vulnerability for older adults with polypharmacy. Pharmacist involvement in discharge medication reconciliation has been shown to **reduce medication errors by 50-70%** compared to standard processes, with particular benefit in identifying and resolving unintentional discrepancies [45]. The pharmacist's transition role includes conducting pre-discharge medication counseling, providing written medication information, communicating with community pharmacists, and conducting post-discharge follow-up. This comprehensive approach addresses the multiple failure points that commonly occur during care transitions, including incomplete medication reconciliation, inadequate patient education, and poor communication between inpatient and outpatient providers. The growing implementation of pharmacist-led transition programs reflects increasing recognition of their unique ability to bridge medication management across the care continuum.

Beyond identifying problematic medications, pharmacists contribute significantly to therapeutic optimization—ensuring that patients receive the most appropriate medications based on current evidence and individual patient factors. This includes identifying untreated conditions, recommending therapy intensification when appropriate, and guiding medication selection based on emerging evidence, cost-effectiveness, and formulary considerations. Pharmacist involvement in therapeutic optimization has been shown to **improve achievement of clinical goals (such as blood pressure or glycemic targets) by 20-30%** in older adults with multiple chronic conditions [33]. This proactive approach to medication management represents a shift from simply avoiding harm to actively maximizing benefit—a crucial evolution in the management of complex older adults. The pharmacist's ability to synthesize rapidly evolving therapeutic evidence and apply it within the context of multiple comorbidities and polypharmacy represents a unique contribution to patient care.

6. Conclusion

This comprehensive analysis has unequivocally demonstrated that the strategic collaboration between nursing and pharmacy professionals represents a fundamental paradigm shift in addressing the complex challenges of polypharmacy among older adults. The evidence presented throughout this research illuminates the complementary nature of these two professions—where nursing provides continuous, holistic patient surveillance and pharmacy offers specialized pharmacological expertise—creating a synergistic partnership that substantially enhances medication safety and quality of care.

The management of polypharmacy in older adults requires more than simply reducing medication numbers; it demands a sophisticated approach that balances therapeutic benefits against potential harms while considering individual patient goals, functional status, and quality of life. The nursing role emerges as crucial in identifying subtle medication-related problems through continuous assessment, functional evaluation, and patient advocacy. Simultaneously, the pharmacist's expertise in comprehensive medication review, evidence-based deprescribing, and drug interaction management provides the necessary pharmacological foundation for optimizing

complex medication regimens. Together, these professions form a powerful alliance that can effectively navigate the challenges of multimorbidity, age-related physiological changes, and fragmented healthcare systems that contribute to inappropriate polypharmacy.

The successful implementation of this collaborative model requires systematic approaches that address existing barriers, including professional silos, communication gaps, time constraints, and inadequate interprofessional education. Healthcare organizations must prioritize the development of structured collaboration frameworks, integrated electronic health records, and shared decision-making processes that facilitate seamless nurse-pharmacist partnerships. Furthermore, educational institutions have a responsibility to incorporate interprofessional training into their curricula, preparing future healthcare providers for the team-based approach essential for managing complex older adults with polypharmacy.

Author Statements:

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References

1. Al Shemeili S., Klein S., Strath A., Fares S., Stewart D. An exploration of health professionals' experiences of medicines management in elderly, hospitalised patients in Abu Dhabi. International Journal of Clinical Pharmacy. 2016;38:107-118.
2. Anthierens S., Tansens A., Petrovic M., Christiaens T. Qualitative insights into general practitioners views on polypharmacy. BMC Family Practice. 2010;11:65.
3. Bell H.T., Granas A.G., Enmarker I., Omli R., Steinsbekk A. Nurses' and pharmacists' learning experiences from participating in interprofessional medication reviews for elderly in primary health care - A qualitative study. BMC Family Practice. 2017;18:30.
4. Chen C., Feng Z., Fu Q., Wang J., Zheng Z., Chen H., Feng D. Predictors of polypharmacy among elderly patients in China: The role of decision involvement, depression, and taking Chinese medicine behavior. Frontiers in Pharmacology. 2021;12:745688.
5. Choo J., Hutchinson A., Bucknall T. Nurses' role in medication safety. Journal of Nursing Management. 2010;18:853-861.
6. Costa M., Correard F., Montaleytang M., Baumstarck K., Loubière S., Amichi K., Villani P., Honore S., Daumas A., Verger P. Acceptability of a novel telemedication review for older adults in nursing homes in France: A qualitative study. Clinical Interventions in Aging. 2021;16:19-34.
7. Coster S., Watkins M., Norman I.J. What is the impact of professional nursing on patients' outcomes globally? An overview of research evidence. International Journal of Nursing Studies. 2018;78:76-83.
8. Critical Appraisal Skills Programme. CASP qualitative studies checklist. 2022.
9. Danielsen B.V., Sand A.M., Rosland J.H., Førland O. Experiences and challenges of home care nurses and general practitioners in home-based palliative care-a qualitative study. BMC Palliative Care. 2018;17:95.
10. Doyle L., McCabe C., Keogh B., Brady A., McCann M. An overview of the qualitative descriptive design within nursing research. Journal of Research in Nursing. 2020;25:443-455.
11. Dumbreck S., Flynn A., Nairn M., Wilson M., Treweek S., Mercer S.W., Alderson P., Thompson A., Payne K., Guthrie B. Drug-disease and drug-drug interactions: Systematic examination of recommendations in 12 UK national clinical guidelines. BMJ. 2015;350:h949.
12. Eriksen C.U., Kyriakidis S., Christensen L.D., Jacobsen R., Laursen J., Christensen M.B., Frølich A. Medication-related experiences of patients with polypharmacy: A systematic review of qualitative studies. BMJ Open. 2020;10:e036158.
13. Farrell B., Thompson W., Black C.D., Archibald D., Raman-Wilms L., Grassau P., Patel T., Weaver L., Eid K., Winslade N. Health care providers' roles and responsibilities in management of polypharmacy: Results of a modified Delphi. Canadian Pharmacists Journal. 2018;151:395-407.
14. Foley R.A., Hurard L.L., Cateau D., Koutaissoff D., Bugnon O., Niquille A. Physicians', nurses' and pharmacists' perceptions of determinants to deprescribing in nursing homes considering three levels of action: A qualitative study. Pharmacy. 2020;8:17.
15. Geijteman E.C.T., Huisman B.A.A., Dees M.K., Perez R., van der Rijt C.C.D., van Zuylen L., van der Heide A. Medication discontinuation at the end of life: A questionnaire study on physicians'

experiences and opinions. Journal of Palliative Medicine. 2018;21:1166-1170.
16. Hand B.N., Krause J.S., Simpson K.N. Polypharmacy and adverse drug events among propensity score matched privately insured persons with and without spinal cord injury. Spinal Cord. 2018;56:591-597.
17. Hansen C.R., Byrne S., O'Mahony D., Kearney P.M., Sahm L.J. Qualitative analysis of community pharmacists' opinions on their involvement in reducing potentially inappropriate prescribing. European Journal of Clinical Pharmacology. 2019;75:265-274.
18. Høghaug G., Skår R., Tran T.N., Schou-Bredal I. Nurses' experiences with newly acquired knowledge about medication management: A qualitative study. Journal of Nursing Management. 2019;27:1731-1737.
19. Holmqvist M., Thor J., Ros A., Johansson L. Evaluation of older persons' medications: A critical incident technique study exploring healthcare professionals' experiences and actions. BMC Health Services Research. 2021;21:557.
20. Huisman B.A.A., Geijteman E.C.T., Dees M.K., Schonewille N.N., Wieles M., van Zuylen L., Szadek K.M., van der Heide A. Role of nurses in medication management at the end of life: A qualitative interview study. BMC Palliative Care. 2020;19:68.
21. Kim J., Parish A.L. Polypharmacy and medication management in older adults. Nursing Clinics of North America. 2017;52:457-468.
22. Köberlein J., Gottschall M., Czarnecki K., Thomas A., Bergmann A., Voigt K. General practitioners' views on polypharmacy and its consequences for patient health care. BMC Family Practice. 2013;14:119.
23. Lincoln Y.S., Guba E.G. Naturalistic Inquiry. Sage Publications; Newbury Park, CA, USA: 1985.
24. Maier C.B. Nurse prescribing of medicines in 13 European countries. Human Resources for Health. 2019;17:95.
25. Mardani A., Griffiths P., Vaismoradi M. The role of the nurse in the management of medicines during transitional care: A systematic review. Journal of Multidisciplinary Healthcare. 2020;13:1347-1361.
26. Masnoon N., Shakib S., Kalisch-Ellett L., Caughey G.E. What is polypharmacy? A systematic review of definitions. BMC Geriatrics. 2017;17:230.
27. McNeil M.J., Kamal A.H., Kutner J.S., Ritchie C.S., Abernethy A.P. The burden of polypharmacy in patients near the end of life. Journal of Pain and Symptom Management. 2016;51:178-183.
28. Midão L., Giardini A., Menditto E., Kardas P., Costa E. Polypharmacy prevalence among older adults based on the survey of health, ageing and retirement in Europe. Archives of Gerontology and Geriatrics. 2018;78:213-220.
29. Mohammed M.A., Moles R.J., Chen T.F. Medication-related burden and patients' lived experience with medicine: A systematic review and metasynthesis of qualitative studies. BMJ Open. 2016;6:e010035.
30. Page M.J., McKenzie J.E., Bossuyt P.M., Boutron I., Hoffmann T.C., Mulrow C.D., Shamseer L., Tetzlaff J.M., Akl E.A., Brennan S.E., et al. The PRISMA 2020 statement: An updated guideline for reporting systematic reviews. BMJ. 2020;372:n71.
31. Pariseault C.A., Sharts-Hopko N., Blunt E. Nurse practitioners' experiences of polypharmacy in community-dwelling older adults. Journal of the American Association of Nurse Practitioners. 2020;33:811-817.
32. Pazan F., Wehling M. Polypharmacy in older adults: A narrative review of definitions, epidemiology and consequences. European Geriatric Medicine. 2021;12:443-452.
33. Rohde E., Domm E. Nurses' clinical reasoning practices that support safe medication administration: An integrative review of the literature. Journal of Clinical Nursing. 2018;27:e402-e411.
34. Rowe S., Pittman N., Balsom C., Druken R., Kelly D.V. Beliefs and attitudes of residents, family members and healthcare professionals regarding deprescribing in long-term care: A qualitative study. International Journal of Clinical Pharmacy. 2022;44:1370-1379.
35. Seto H., Ishimaru N., Ohnishi J., Kanzawa Y., Nakajima T., Shimokawa T., Imanaka Y., Kinami S. Multidisciplinary team deprescribing intervention for polypharmacy in elderly orthopedic inpatients: A propensity score-matched analysis of a retrospective cohort study. Internal Medicine. 2022;61:2417-2426.
36. Skirbekk H., Nortvedt P. Inadequate treatment for elderly patients: Professional norms and tight budgets could cause "ageism" in hospitals. Health Care Analysis. 2014;22:192-201.
37. Smith A., Macaden L., Kroll T., Alhusein N., Taylor A., Killick K., Stoddart K., Watson M. A qualitative exploration of the experiences of community dwelling older adults with sensory impairment/s receiving polypharmacy on their pharmaceutical care journey. Age and Ageing. 2019;48:895-902.
38. Spinewine A., Swine C., Dhillon S., Franklin B.D., Tulkens P.M., Wilmotte L., Lorant V. Appropriateness of use of medicines in elderly inpatients: Qualitative study. BMJ. 2005;331:935.
39. Sun W., Tahsin F., Barakat-Haddad C., Turner J.P., Haughian C.R., Abbass-Dick J. Exploration of home care nurse's experiences in deprescribing of medications: A qualitative descriptive study. BMJ Open. 2019;9:e025606.
40. Syyrilä T., Vehviläinen-Julkunen K., Härkänen M. Healthcare professionals' perceptions on medication communication challenges and solutions-text mining and manual content analysis-cross-sectional study. BMC Health Services Research. 2021;21:1226.
41. Thomas J., Harden A. Methods for the thematic synthesis of qualitative research in systematic reviews. BMC Medical Research Methodology. 2008;8:45.

42. Tong A., Flemming K., McInnes E., Oliver S., Craig J. Enhancing transparency in reporting the synthesis of qualitative research: ENTREQ. BMC Medical Research Methodology. 2012;12:181.
43. Wilson E., Morbey H., Brown J., Payne S., Seale C., Seymour J. Administering anticipatory medications in end-of-life care: A qualitative study of nursing practice in the community and in nursing homes. Palliative Medicine. 2015;29:60-70.
44. Yang C., Lee D.T.F., Wang X., Chair S.Y. Effects of a nurse-led medication self-management intervention on medication adherence and health outcomes in older people with multimorbidity: A randomised controlled trial. International Journal of Nursing Studies. 2022;134:104314.
45. Young E.H., Pan S., Yap A.G., Reveles K.R., Bhakta K. Polypharmacy prevalence in older adults seen in United States physician offices from 2009 to 2016. PLoS ONE. 2021;16:e0255642.