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The Role of Nurses in Promoting Effective Medication Management and Reducing Errors

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Abstract

Medication management is a critical aspect of transitional care for older adults, as medication discrepancies and errors can lead to adverse outcomes, prolonged hospitalizations, and increased healthcare costs. Nurses play a pivotal role in preventing drug-related problems (DRPs) during transitional periods by collecting and evaluating medication information, providing patient education, enhancing adherence, and coordinating care among healthcare professionals. This narrative review summarizes the contributing factors to post-discharge DRPs, including age, specific drugs, polypharmacy, patient-related factors, and system-related factors. Medication reconciliation, a systematic process involving listing, comparing, and communicating medications, is essential for minimizing inconsistencies and preventing DRPs. Nurse-led transitional care interventions, such as home visits, telephone follow-ups, and educational programs, have demonstrated effectiveness in reducing medication discrepancies, improving adherence, and enhancing health outcomes. Nurses also serve as "Liaison Officers," uniquely positioned to identify high-risk patients, mediate communication among healthcare disciplines, and monitor for potential adverse drug reactions. Effective communication, trust-building, and the use of recall-promoting and teach-back techniques are crucial for reinforcing critical drug information. Technological advancements, such as electronic systems and mobile health applications, have further facilitated medication management during transitional care. However, further large-scale randomized controlled trials are needed to assess the broader impact of nurse-led interventions on care quality and healthcare costs.

Keywords: nurses, Medication Management, Medication error

Introduction

Transitional care is defined as "a set of actions designed to ensure the coordination and continuity of patient care and to prevent poor outcomes when patients transfer to different locations or different levels of care within the same location" (Naylor et al., 2017). Effective transitional care requires a multidisciplinary team approach and often involves active participation and lifestyle changes by both patients and their caregivers. Among older adults, medication management is a critical yet challenging aspect for minimizing hospital stays, readmissions, healthcare costs, and mortality rates (Montané et al., 2018), as medication regimens frequently undergo significant adjustments during hospitalization due to acute medical conditions or newly identified diagnoses. Medication discrepancies, defined as any variation between a patient's discharge medication list and

the medications they actually take post-discharge, have been identified in over half (56%) of elderly patients during the initial 48 hours of the cross-sectoral transitional period. Such discrepancies can lead to medication errors, which are defined as failures in the treatment process that may result in harm to the patient. In fact, nearly half (49%) of patients are reported to experience at least one medication error during continuity of care. Effective medication management is therefore essential not only for addressing or preventing medication discrepancies and errors but also for minimizing drug waste. Nurses play a pivotal role in managing medications during transitional periods. This narrative review aims to summarize the contributing factors to post-discharge drug-related problems (DRPs) and explore the role of nurses in preventing DRPs within transitional care. Furthermore, it investigates nurse-led interventions to support their role as liaison officers in multidisciplinary teams.

DRPs and their contributing factors

Drug-related problems (DRPs), as defined by the Pharmaceutical Care Network Europe (PCNE), encompass a group of events or circumstances associated with drug therapy that either actually or potentially interfere with achieving desired health outcomes. Research indicates that a majority of patients (84%) in geriatric rehabilitation centers experience at least one DRP (Freyer et al., 2018). Similarly, an average prevalence of 81% was reported in acute hospitals with an even higher rate of 94.4% in long-term care facilities (Ruiz-Millo et al., 2017). Among DRP subcategories, drug-drug interactions accounted for 34.6% of cases identified in a university hospital setting while non-adherence, affecting 18% of patients, was the most common problem noted by pharmacists in an academic family medicine outpatient clinic. The distribution of DRPs occurring before hospital admission, during the ward stay, and in transitional care settings was 37%, 36%, and 27%, respectively. DRPs encountered during transitional periods can result in adverse outcomes, ranging from patient discomfort and dissatisfaction to adverse drug events (ADEs) (Silva et al., 2011). Such outcomes can lead to worse prognoses, prolonged hospitalizations, higher rates of readmission, and increased utilization of healthcare resources.

Age

Older adults are particularly susceptible to DRPs following discharge due to a combination of factors (Trompeter et al., 2015), including chronic comorbidities, age-related metabolic changes, functional and cognitive impairments, complex therapeutic regimens (often prescribed by multiple providers), and substantial alterations to medication during hospitalization. A meta-analysis revealed that older adults had a threefold and sevenfold higher risk of ADEs compared to adults and pediatric patients, respectively (Taché et al., 2011). DRPs in this population frequently result in readmissions especially during the hospital-to-home transition, a period often marked by the overwhelming provision of information, which patients and caregivers may struggle to understand and retain(Cawthon et al., 2012). At home, unfamiliarity with new medications may lead to anxiety and poor treatment adherence among elderly patients. Consequently, identifying the optimal timing to provide education on medication management—whether at or shortly after discharge—is critical for patients and their caregivers.

Specific Drugs and Polypharmacy

Previous studies have demonstrated that medications prescribed more frequently contribute to nearly half of all medication discrepancies. Among specific drug classes, anticoagulants accounted for 13%, diuretics for 10%, angiotensin-converting enzyme inhibitors (ACEIs) for 10%, and proton pump inhibitors (PPIs) for 7% of medication discrepancies identified during transitional care. Additionally, a prospective analysis involving 3,695 patient episodes revealed that patients experiencing adverse drug reactions (ADRs) were more likely to be prescribed diuretics, opioid analgesics, and anticoagulants, which resulted in prolonged hospital stays and increased financial burdens for both patients and healthcare systems. Consequently, these drug classes are frequently implicated in drug-related problems (DRPs) during both hospitalization and the post-discharge transition. The issue of overprescribing PPIs has been highlighted in multiple studies (Schepisi et al., 2016), and transitional interventions have been shown to significantly mitigate this issue thereby protecting patients from long-term adverse effects, such as enteric infections.

Polypharmacy is another significant contributor to DRPs. For instance, patients with chronic kidney disease (CKD) often take between 6 and 12 medications, with an incidence of polypharmacy reported to be approximately 80% in this population. Thus, both polypharmacy and high-risk medications (e.g., anticoagulants) are regarded as significant risk factors for post-discharge DRPs. The risk of adverse drug events (ADEs) increases by 13% when two medications are used concurrently, by 58% when five medications are combined, and rises to 82% when seven or more drugs are used simultaneously. Transitional care interventions that employ multicomponent strategies and thorough medication reconciliation have been shown to reduce these risks (Laugaland et al., 2012).

Patient-Related Factors

Patient-related factors contributing to DRPs include ADRs, intolerance, lack of knowledge about prescribed medications, low motivation to adhere to treatment regimens, and financial constraints. Among these,

intentional non-adherence accounts for 70% of cases, often resulting in discrepancies between prescribed medications and actual patient use (Bülow et al., 2021). Therefore, it is essential for healthcare providers to identify each patient's specific barriers as early as possible and implement tailored solutions to mitigate intentional non-adherence.

System-Related Factors

System-level factors are also critical contributors to medication discrepancies. In a study of participants aged 50 and older, the most common system-related issue was incomplete or inaccurate discharge instructions, also referred to as errors of omission. These issues can be addressed through meticulous medical reviews aimed at optimizing in-hospital medication regimens and standardizing discharge summaries and medication lists. Additionally, system-level discrepancies may arise during long-term care after acute discharge. For instance, a recent study in Denmark observed that Shared Medication Records (SMRs) were not consistently updated by general practitioners, and information on medication changes was often missing after discharge or at referral. Furthermore, DRPs within SMRs, such as dispensing errors at hospitals and missing electronic prescriptions, have also been documented (Sørensen et al., 2023).

Nurses play a vital role in identifying discrepancies, with one study showing that they detected system-level discrepancies in 69% of participants compared to patient-level discrepancies in 40% of cases. Other studies have reported nearly equal proportions of these two types of discrepancies identified by nurses. Another frequent source of system-level discrepancies involves conflicting information from various sources or confusion between brand and generic medication names, which can mislead patients without adequate guidance or education. Duplication is another common issue, often resulting from inaccuracies in medication histories at admission, failure to reconcile home medications with those documented at discharge, inadequate discharge education, multiple prescribers lacking access to accurate medication lists, or formulary substitution changes. A previous study found that 19% of medication discrepancies during transitions from hospital to skilled nursing facilities involved therapeutic duplications.

Medication Reconciliation

Medication reconciliation is a systematic process that involves several key steps: listing current and required medications, comparing these lists to identify discrepancies, creating a reconciled medication list, and communicating it to patients and care providers (Aronson, 2017). This process, conducted at admission, transfer, or discharge, is essential for minimizing inconsistencies and preventing DRPs during transitional care. Obtaining the best possible medication history has been shown to effectively identify discrepancies. This information is primarily gathered from patients and their caregivers, with supplementary data from hospital records and shared electronic health systems enhancing accuracy (Oliveira et al., 2020).

Medication reconciliation also entails in-depth evaluation, such as reassessing medication indications and contraindications, determining appropriate dosages, and identifying potential ADEs using specialized knowledge. Documenting changes to medication lists is essential for resolving discrepancies and optimizing regimens. Additionally, proper monitoring of medication use, including appropriate laboratory tests to assess renal or liver function, is integral to determining whether to continue, adjust, or discontinue medications.

Certain patient groups may benefit more from specific aspects of medication reconciliation. For example, patients in gastroenterology wards may require enhanced safety checks, whereas those in neurology departments may benefit more from evaluations of potential drug-drug interactions compared to patients in urology departments.

Nurses' Role in Transitional Care for Preventing DRPs

Managing drug-related problems (DRPs) during transitional care is both time-intensive for healthcare professionals and costly for healthcare systems. It has been widely advocated that cross-sectoral and interdisciplinary resources be allocated to transitional care to proactively prevent DRPs rather than addressing them after they arise. Following patient discharge, effective communication and adequate follow-up are essential, as patients may experience adherence issues due to limited understanding of their medications or treatment regimens, particularly in cases of complex therapies. Transitional care interventions vary significantly in terms of their target population, objectives, services provided, duration, and types of service providers involved. Healthcare professionals such as clinical pharmacists, clinical pharmacologists, and physicians are often engaged in DRP prevention during transitional periods (Carollo et al., 2024). This discussion focuses specifically on nurse-led transitional care interventions aimed at older adults to optimize the prevention of DRPs.

Information Collection and Evaluation

The documentation and resolution of identified medication discrepancies play a critical role in managing medications during transitional care. Nurses are responsible for comparing and reconciling medication lists when patients transition between care settings. This task requires the collection of all available medication lists, with the discharge summary often serving as the primary source. Nurses can evaluate the quality of discharge letters based on specific criteria, including the inclusion of active ingredients with example brand names, explanations of drug changes compared to home medication lists, visual presentations of these

explanations alongside each drug, and recommendations for the duration of short-term treatments. A study by Hohmann et al. involving 312 patients with stroke or transient ischemic attack (TIA) demonstrated that a detailed medication list provided during an educational intervention improved medication adherence rates (90.9%) compared to a brief discharge letter (83.3%) within a three-month follow-up, highlighting the potential utility of detailed medication lists in facilitating information collection and evaluation(Hohmann et al., 2013).

Additionally, Meyer-Massetti et al. conducted a collaborative nurse-pharmacist study involving 100 discharged patients on four or more medications, where a PCNE Type 2b Medication Review was used to effectively assess the quality of discharge medication prescriptions(Meyer-Massetti et al., 2018). Another vital source of information for identifying discrepancies is patient interviews, with these discrepancies subsequently integrated into the finalized medication list. A home visit by a care coordinator within one week of discharge is recommended, as preventable adverse drug events (ADEs) frequently occur within the first one to two weeks post-discharge (Kanaan et al., 2013). During home or telephone visits, patients should have all their medications, including prescribed and over-the-counter drugs, available for review.

Home visits offer advantages over telephone calls for gathering information. Face-to-face interactions during home visits encourage patients to share their experiences and concerns about medications and make them more receptive to counseling. Home visits have been successfully integrated into nurse-pharmacist collaboration studies, where pharmacists identify DRPs during home nursing services or nurses report significant DRPs to community pharmacists. Moreover, home visits enable the identification of specific risk factors, such as multiple or inappropriate storage locations, and provide an opportunity to check for expired or unused medications for proper disposal. Unused or expired drugs due to non-adherence, overprescribing, or changes in medical regimens can be quantified through pill counts or self-reports. Patients, particularly older adults or those with limited health literacy, often face challenges in recalling drug names or dosages accurately, as noted in various studies.

Interventions combining pharmacists and nurses have demonstrated the effectiveness of identifying and resolving medication discrepancies during transitional care. Telephone-based nurse-led follow-up models have shown some success in reducing 30-day rehospitalization rates (from 34% to 23%) and achieving net healthcare cost savings of $663 per individual. For Medicare fee-for-service beneficiaries, a nurse care coordinator's post-discharge evaluation and medication reconciliation effectively reduced post-discharge costs (Kranker et al., 2018). However, large-scale randomized controlled trials (RCTs) involving scripted telephone calls by trained nurses to older patients discharged from emergency departments (EDs) did not significantly impact 30-day unplanned readmissions, ED returns, or mortality rates, suggesting that phone calls alone may not sufficiently improve health outcomes for patients discharged from acute conditions (van Loon-van Gaalen et al., 2021).

The evaluation of therapy duplication, a critical medication discrepancy affecting older patients, can be conducted by listing medications according to indications or therapeutic drug classes. Although treating an indication with multiple drugs is common, using more than one drug from the same therapeutic class is rare .

Several tools have been developed for identifying and addressing medication discrepancies. For example, at hospital discharge, nursing staff can use the Medication Regimen Complexity Index (MRCI) where a higher score indicates a more complex regimen. Post-discharge, tools such as the Medication Discrepancy Tool (MDT) and Comprehensive Medication Review (CMR) can help identify and resolve discrepancies, assess ADEs, and evaluate issues such as drug-drug interactions, contraindications, and treatment duplication. Trigger lists, such as the one developed by Sino et al. can assist in assessing potential ADEs. Standardized templates for documentation have been shown to improve quality and reduce mortality rates within one year of discharge. Structured drug reports with accurate medication lists have reduced errors and enhanced adherence during transitional care (Hohmann et al., 2014).

Technological advancements, including electronic systems and mobile health (mHealth) applications, have further facilitated medication management during transitional care. For instance, an app developed for diabetes management allows users to view recent prescriptions, track daily drug administration, and receive medication reminders (Zhang et al., 2022).

Communication and Education

Poor communication has been identified as a significant contributor to medication discrepancies and readmissions during transitional care. Therefore, effective medication reconciliation strategies must include clear communication with patients, their caregivers, and institutional staff. Nurses play a central role in coordinating communication among patients, caregivers, hospitals, and primary care providers. Direct communication is critical for collecting information that requires close monitoring and follow-up, which is essential for formulating care plans.

Effective communication during post-discharge follow-ups should encourage patients and caregivers to actively engage in discussions about their medications, including expressing concerns or preferences. Addressing patients' goals and asking clarifying questions helps identify issues and improve adherence. Patients' willingness to initiate or continue prescribed therapies often depends on their perception of the medication's

necessity versus their concerns about its use. Interventions that focus on patients' goals have shown improved health outcomes and reduced healthcare costs.

Trust-building, plain language, and coordination of post-discharge activities, such as scheduling follow-ups and medical referrals, are crucial elements of effective communication. Clear instructions on follow-up appointments, combined with explanations of the current health situation and future care plans, contribute to positive outcomes. High-intensity interventions are often necessary for older, multilingual, or cognitively impaired populations to enhance discharge experiences.

The lack of adequate education and follow-up has been linked to patients' diminished capacity to comprehend drug-related information, as highlighted in prior research. This deficiency can lead to misinformation or confusion, thereby increasing the likelihood of drug-related problems (DRPs). Conversely, patients with greater knowledge demonstrated improved medication adherence and more favorable post-discharge behavior, underscoring the critical need for interventional programs aimed at enhancing patient knowledge. Evaluating patients' drug-related knowledge, as suggested by Kwint et al., could be an effective approach during the transitional period, with follow-up visits potentially addressing identified gaps. Evidence indicates that a 6-week nurse-led intervention focusing on medication self-management significantly improved adherence among older patients with multimorbidity in a randomized controlled trial (RCT). Similarly, a 20-week nurse-led training program encompassing health education and motivational sessions enhanced adherence, health-related quality of life (HRQoL), and clinical indicators such as blood pressure, cholesterol levels, and body mass index (BMI). These findings emphasize the pivotal role of nurses as educators and motivators during transitional care. Properly executed educational strategies incorporating recall-promoting and teach-back techniques may facilitate the reinforcement of critical drug information, proven effective across diverse settings. The teach-back method requires patients or caregivers to reiterate their understanding of drug-related information to the nurses who provided the education, with reeducation offered as necessary. Nurses must be familiar with drugs frequently implicated in discrepancies and aware of hospital-prescribed medications that do not require long-term use. For example, medications prescribed for as-needed (PRN) use, such as those for pain or nausea, should typically be discontinued upon discharge to avoid unintended side effects or uncontrolled symptoms. Digital technologies, including mobile applications and multimedia tools, have gained traction in patient education. Studies have shown that patients counseled via tablets were more confident in making health decisions with their doctors and more inclined to follow medical advice. Moreover, patients educated using tablets demonstrated greater proficiency in self-administering injectable drugs compared to those receiving traditional explanations from nurses. Self-management education that utilizes culturally adapted and comprehensible materials has also been reported as acceptable and effective, enhancing patient self-efficacy (Furukawa et al., 2022).

Enhancement of Adherence

Barriers to long-term medication adherence often stem from patient-related factors, insufficient care support, or systemic healthcare issues. Intentional nonadherence is the most frequent cause of patient-level discrepancies, with reports indicating that only 78% of electronic prescriptions and 72% of new prescriptions are filled. The primary reason cited by patients for not filling prescriptions was their perception that the medications were unnecessary or ineffective. Additionally, nonintentional nonadherence, which accounts for about 30% of patient-level discrepancies, arises from a lack of understanding about the prescribed drug regimen, including dosing and frequency.

Understanding patients' actual medication-taking behaviors is vital to identifying self-related barriers to adherence. These behaviors include missed doses, patterns of nonadherence, and difficulties with drug administration or tolerance. For instance, some medications may be challenging to swallow, cause gastrointestinal discomfort, or have complex administration procedures (e.g., inhalers or injectables). Practical challenges, such as forgetfulness, organizational issues, or difficulties opening pill containers, can also hinder adherence and may be addressed through follow-up interventions by nurses. Moreover, adherence behaviors may reflect individual beliefs or cultural contexts. When patients cannot provide reliable information, caregivers or medical records may offer a more accurate understanding.

Enhancing medication adherence is a primary objective of many nurse-led interventions, which have shown significant effectiveness. Adherence can be assessed through methods such as direct observation of drug use, evaluation of symptomatic improvement, measurement of drug concentrations in blood or urine, pill counts, and patient interviews. It is noteworthy that self-reported adherence data may overestimate actual adherence compared to registry-based observations. To bolster adherence, patients are often enrolled in group sessions, such as fitness programs, smoking cessation initiatives, or healthy eating classes, where they establish lifestyle modification goals and develop personalized action plans in collaboration with nurses.

Coordination Among Healthcare Professionals

Depending on the scope of their practice, nurses play a collaborative role in reporting identified medication discrepancies and DRPs to a multidisciplinary medical team, which may include specialists, general practitioners (GPs), pharmacists, nutritionists, and physical therapists. Coordination facilitated by nurse coaches

has been recognized as a core element of implementing health coaching programs for stroke survivors and their caregivers. Such collaboration fosters stronger connections with patients' specialists, primary care providers, and community care services, particularly for older adults and caregivers (Yous et al., 2023).

Nurses are well-positioned to act as "Liaison Officers," uniquely equipped to identify patients at high risk for DRPs and to mediate communications among various healthcare disciplines (e.g., specialists, pharmacists, primary care physicians, nursing home staff) as well as with patients and their families. Their frequent and direct interactions with patients make them trusted points of contact, allowing for early detection and reporting of potential side effects or adverse drug reactions (ADRs) that might go unnoticed by other professionals. As frontline providers involved in drug administration, nurses are strategically placed to monitor and document early-stage ADRs. Evidence-based nurse-led transitional care models have demonstrated efficacy in improving care quality and reducing healthcare costs across various settings. Additionally, transitional care bundles delivered collaboratively by nurses, pharmacists, and physicians have successfully reduced medication errors in high-risk patients. Nurses play a central role in implementing these bundles by coordinating care during admission and discharge. For instance, they discuss patients' pre-admission medication regimens with physicians and provide discharge education. These interventions aim to create evidence-based, comprehensive, and individualized care plans that address the needs and goals of patients and their families. However, further large-scale RCTs are needed to assess the broader impact of nurse-led interventions.

Conclusion

In transitional care, effective medication management is essential to improving patient outcomes and minimizing drug-related problems (DRPs). Nurses play a pivotal role in this process, acting as educators, coordinators, and frontline healthcare providers. Their involvement in patient education, medication reconciliation, and communication within multidisciplinary teams helps to address common issues such as medication discrepancies, nonadherence, and adverse drug reactions. Nurse-led interventions, including structured education programs, motivational strategies, and post-discharge follow-ups, have demonstrated significant success in enhancing medication adherence, improving health-related quality of life, and reducing healthcare costs. Additionally, leveraging digital technologies and culturally adapted materials can further support nurses in delivering effective patient-centered care.

By positioning themselves as liaison officers and advocates, nurses facilitate better communication and coordination among healthcare providers, patients, and caregivers, ultimately ensuring continuity of care and minimizing risks associated with transitions. As evidence suggests, further large-scale studies are needed to evaluate the long-term effectiveness and scalability of these interventions across various healthcare settings. This underscores the importance of integrating nurse-led strategies into transitional care frameworks to address the growing complexities of patient care in an aging population.

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