

INTERDISCIPLINARY APPROACHES TO MEDICATION RECONCILIATION IN EMERGENCY DEPARTMENTS: COLLABORATION BETWEEN NURSES AND PHARMACISTS

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ABSTRACT

Background: Medication errors are prevalent in healthcare, particularly in emergency departments (EDs), where accurate medication reconciliation is critical. The involvement of interdisciplinary teams, including nurses and pharmacists, is essential for improving the accuracy of medication histories and reducing adverse drug events. **Methods:** This study reviews existing literature on the roles of pharmacy technicians in medication reconciliation processes within EDs. A systematic search was conducted using databases such as MEDLINE and Academic Search Premier, focusing on studies that included pharmacy technicians in the medication reconciliation process and reported outcomes related to quality and accuracy. **Results:** Findings indicate that pharmacy technicians can effectively gather Best Possible Medication Histories (BPMH) with accuracy comparable to that of pharmacists and nurses. Several studies demonstrated that involving pharmacy technicians significantly reduces medication discrepancies, with accuracy rates improving from 16% to 89% following their implementation. In one study, pharmacy technicians identified 775 discrepancies in medication histories, suggesting their critical role in minimizing errors in acute settings. **Conclusion:** The inclusion of pharmacy technicians in medication reconciliation processes can enhance the accuracy and efficiency of medication histories collected in emergency departments. This approach not only alleviates the workload of pharmacists and nurses but also contributes to improved patient safety outcomes. Future research should further explore the integration of pharmacy technicians into interdisciplinary teams to optimize medication management in emergency care settings.

KEYWORDS: Medication reconciliation, pharmacy technicians, emergency department, medication errors, interdisciplinary collaboration.

1. INTRODUCTION

The Institute of Medicine reports that the typical hospitalized patient encounters a minimum of one drug mistake daily.^[1] It is further predicted that 67% of hospitalized patients had at least one inaccuracy in their drug history, with 11% to 59% of these deemed clinically significant.^[2] The expenses associated with adverse drug events (ADEs) range from \$2,595 to \$4,685, leading to an estimated total yearly cost above \$5 million for a standard teaching hospital.^[3] Research findings from these studies, along with others, have prompted the healthcare community, professional organizations, and regulatory bodies to advocate for more systematic procedures for reviewing medication histories and addressing inconsistencies during care transitions.^[4,6]

A crucial element of medication reconciliation is the establishment of the best possible medication history

(BPMH). The BPMH utilizes data obtained from community pharmacies, medical records, structured interviews with patients and/or caregivers, and other sources to build the most precise and comprehensive medication history.^[6] Pharmacists, owing to their expertise and competencies, are well suited to gather the Best Possible drug History (BPMH) and facilitate the drug reconciliation process. Numerous studies have shown that pharmacists detect more inconsistencies and perform more drug interventions than doctors and nurses.^[7,10] Nonetheless, each drug reconciliation requires 15 to 30 minutes per patient, with some studies indicating durations exceeding 90 minutes for elderly patients.^[11,12] Comparable to findings in nursing literature, time and staffing resources are likely substantial impediments to active pharmacist involvement.^[13] It may be impractical to anticipate that pharmacists can get the Best Possible Medication History

(BPMH) for every patient undergoing a care transfer. This prompts an assessment of the involvement of additional healthcare providers in the medication reconciliation process.

Pharmacy technicians know standard dose forms, strengths, and schedules for many drugs, and thus may be an essential resource for gathering information and creating the BPMH. This article aims to examine the existing literature on the role of pharmacy technicians in creating the Best Possible Medication History (BPMH) within the medication reconciliation process, outline various reported technician programs, and summarize the outcomes related to quality and accuracy following program implementation.

2. METHODS

A literature review was performed utilizing MEDLINE (1948 – 2015) and Academic Search Premier with the search terms “pharmacy technician” or “pharmacists’ aides” and “medication reconciliation” or “medication history.” Further pertinent literature was obtained by examining bibliographies and articles identified through MEDLINE’s “Find Similar Result” feature. Articles underwent an independent evaluation to ascertain inclusion. The research required the involvement of pharmacy technicians in the medication reconciliation process and the reporting of outcomes related to the quality or accuracy of the intervention. Articles may not be exclusively descriptive of a program or service that included pharmacy technicians in the medication reconciliation process.

3. Comparison of Pharmacists

Two papers were discovered in which pharmacists functioned as the control group. The first research presented a prospective comparison of medication histories collected by pharmacy technicians and pharmacists in a 400-bed community hospital (The Moncton Hospital, New Brunswick, Canada). In December 2008, patients visiting the emergency department (ED) were questioned twice, first by a pharmacy technician and then by a pharmacist, in a randomly determined sequence. Investigators then analyzed the two medication histories to ascertain the Best Possible Medication History (BPMH) and the number of drug inconsistencies. Ninety patients were included in the study. Patients had an average age of 61.3 ± 18.6 years and were prescribed 6.2 ± 4.6 pharmaceuticals, in addition to 1.9 ± 1.8 over-the-counter or herbal treatments. Pharmacists and technicians exhibited no inadvertent inconsistencies for prescription prescriptions in 47 and 50 patients ($p = .47$), respectively, nor for over-the-counter medications in 52 and 53 patients ($p = .77$), respectively. No substantial difference was seen between pharmacists and pharmacy technicians for the number of inconsistencies found per patient for a prescription (0.25 ± 0.54 vs 0.24 ± 0.68 ; $p = .88$) or over-the-counter (0.14 ± 0.39 vs 0.15 ± 0.48 ; $p = .83$) drugs. The research revealed that trained pharmacy technicians

could acquire a medication history with comparable accuracy and thoroughness to that of pharmacists.^[14]

In the second trial, patients admitted to a hemodialysis unit at St Paul’s Hospital, an academic medical facility in Vancouver, British Columbia, had an in-person interview conducted by both a pharmacy technician and a pharmacist to gather the Best Possible Medication History (BPMH). The main outcome was the concordance rate between the pharmacy technician and pharmacist about the documented medication history. Ninety-nine patients were interviewed from May to August 2008. Patients had a mean age of 67 years (range, 19–96 years) and were prescribed an average of 13.5 drugs (range, 5–23 prescriptions). A total of 1,334 medicine orders were evaluated; the technician and pharmacist concurred on all but 15 orders, resulting in an agreement rate of 98.9%. A total of 358 medication inconsistencies were detected among 93 patients, averaging 3.8 discrepancies per patient. Investigators determined that pharmacy technicians could effectively interview patients to compile an accurate medication history, which proved to be a valuable method for identifying prescription inconsistencies and possible drug-related issues.^[15]

4. Comparison of Nurses

Three trials were discovered in which nurses acted as the control group. The first research presented findings from a pre-post analysis contrasting a historical control group, where nurses managed medication history gathering, with a prospective cohort that implemented a pharmacy technician-led approach. The research was performed at the emergency department of a 687-bed community hospital (Morton Plant Hospital, Clearwater, FL) from November 2011 to February 2012. The primary objective was the proportion of patients having an accurate medication history, as assessed by a pharmacy resident after a thorough assessment of the medical record. The patients questioned by nurses ($n = 150$) had an average age of 67 ± 19.4 years and were prescribed 10.3 ± 5.6 drugs, while those interviewed by pharmacy technicians ($n = 150$) had an average age of 70 ± 17.3 years and were prescribed 12.3 ± 6.2 medications ($p = .144$ and $p = .003$, respectively). Pharmacy technicians performed medication histories with no detectable mistakes in 88% of cases, while nurses achieved this in 57% of cases ($p < .0001$). Nineteen mistakes (1.1%) occurred among pharmacy technicians, whereas nurses committed 117 errors (8.3%) ($p < .0001$). The research determined that educated pharmacy technicians might aid doctors and nurses in acquiring more precise drug histories in the emergency department.^[16]

The second research outlined a scheme using pharmacy technicians to mitigate possible adverse drug events during the transition of outpatient medication prescriptions to active inpatient orders in planned surgical hospitalizations. The initiative was executed at Fairview Southdale Hospital in Edina, MN, and had

three components: the use of a standardized home-medication order form, the employment of pharmacy technicians in the admissions department, and a hospital policy forbidding blanket prescriptions. The objective was to reduce probable adverse drug events in surgical admissions by 80% during a four-month timeframe. Potential Adverse Drug Events (ADEs) were assessed by the number of discrepancies in the admission medication history; discrepancies were characterized as the absence of critical information, the inclusion of erroneous information, the prescription of an unsuitable medication for the condition, an illegible prescription, a significant drug interaction, or the persistence of a previously discontinued medication.

Upon the establishment of the standardized home medication order form, nurses were tasked with gathering a medication history upon the patient's arrival for the procedure. To integrate this phase into the presurgical admission process and address nurse workload limitations, the task of gathering medication histories was delegated to pharmacy technicians. The technicians contacted patients slated for surgery before admission to finalize the home medication order form, which was then evaluated by a pharmacist. In both processes, the completed form was sent to the physician for evaluation to ascertain whether to persist with or adjust the treatment during inpatient hospitalization. Nurses filled out the home order forms from February 4 to March 17, 2002 (baseline); pharmacy technicians, under pharmacist supervision, completed the home order forms from March 18 to July 7, 2002 (intervention). The implementation of the pharmacy process reduced the average number of faults per order from 1.45 ± 0.39 ($n = 182$) at baseline to 0.76 ± 0.07 ($n = 585$) post-intervention ($p < .005$). The number of defects per individual medicine order decreased from 0.25 ($n = 1,056$) at baseline to 0.12 ($n = 3,620$) post-intervention ($p < .005$). Both exhibited a reduction above 80% from the baseline. The research determined that a program using educated pharmacy technicians decreased the incidence of issues in inpatient orders for planned surgical hospitalizations.^[17]

The concluding research presented the findings of a medication reconciliation quality enhancement initiative undertaken in a not-for-profit integrated healthcare system comprising 13 hospitals (Novant Health, Winston-Salem, NC). One objective of the initiative was to enhance the accuracy of drug histories obtained from patients hospitalized via the emergency department. Before the initiative, the admitting nurse was responsible for collecting the medication history. Baseline data were gathered about the accuracy of these medication histories by having a pharmacist obtain the Best Possible Medication History (BPMH) within 24 hours of admission. From October 2007 to May 2008, two medication histories were gathered from 200 individuals. It was ascertained that 32 (16%) of the histories collected by nurses were correct. Pharmacy technicians were then

included in the emergency departments of two hospitals, and the precision of medication histories collected by these technicians was evaluated using the same methodologies from June 2008 to December 2010. Randomly collected dual histories were obtained from 1,251 patients. It was concluded that 1,113 (89%) were correct. The healthcare system concluded that pharmacy technicians may enhance the precision of drug histories for patients admitted via the emergency department, facilitating the extension of the pharmacy technician-driven initiative.^[18]

5. Comparison between Nurses and Pharmacists

This research assessed the completeness and accuracy of medication histories obtained in a pilot trial with pharmacy technicians. The research was performed in a teaching hospital (The Hospital for Sick Children, Toronto, Ontario) involving kids aged 18 years or younger who were hospitalized or transferred to the cardiology ward or the cardiac critical care unit. Before the pilot research, baseline data were gathered about the accuracy of the standard care method. A pharmacist or nurse practitioner acquired the BPMH and reconciled the history with admission or transfer instructions. In the pilot program, the duty of generating and reconciling drug information was delegated to a pharmacy technician. The main research outcome was the correctness of the drug list as assessed by a pharmacy resident during a subsequent interview. Baseline and pilot data were gathered over three-week periods, with a total of 38 and 46 patients questioned, respectively. The demographics of patients in the baseline and pilot studies were comparable in age (median [range] 9.0 months [1 day to 17 years] versus 5.9 months [3 days to 16 years], respectively), yet differed in the proportion of patients consuming more than 3 prescription and/or nonprescription medications (29% versus 52%; $p = .043$, respectively). No substantial unintended disparities were seen between baseline and pilot data for the percentage of patients with at least one medication history discrepancy overall (38% vs 22%; $p = .27$), at admission (21% vs 10%; $p = .46$), or at transfer (6% vs 3%; $p = .58$). The authors determined that a skilled pharmacy technician can conduct medication reconciliation for pediatric patients with accuracy equivalent to that of nurses and pharmacists during both admission and transfer.^[19]

6. Comparison of Physicians and Interdisciplinary Teams

Three research used doctors' or physician-led workflows as the benchmark for comparison. The first investigation was performed at a preoperative screening clinic associated with a general teaching hospital in TweeStenden, The Netherlands. Before the intervention, anesthesiologists examined the patient's medication history and drug allergies during the preoperative screening phase. The intervention involved the inclusion of a pharmacy technician tasked with gathering community pharmacy medication records before the

preoperative appointment and subsequently interviewing the patient during the appointment to reconcile this information before the anesthesiologist's evaluation. The pharmacist evaluated this list before it was given to the anesthesiologist, who might adjust the medication list as necessary throughout the medical screening procedure.

Medication reconciliation was conducted upon hospital admission in both the standard care and intervention protocols. The main result was the percentage of individuals exhibiting one or more drug inconsistencies between the two medication lists. Data were gathered from 204 patients before the intervention (March to June 2007) and from 93 patients after the intervention (July to August 2007). Patients had an average age of 59.1 ± 14.8 and 60.6 ± 16.7 years and were using an average of 3.9 ± 3.2 and 4.5 ± 3.1 drugs in the pre-and post-intervention groups, respectively. The percentage of patients having at least one medication discrepancy reduced from 18.6% to 5.4% after the intervention was implemented (relative risk [RR], 0.29; 95% CI, 0.12 to 0.71). The research determined that pharmacy technicians may be included in preoperative clinics to diminish medication discrepancies.^[20]

The second trial was a multicenter investigation including patients aged 65 years or older admitted via the emergency department at 12 hospitals across the Netherlands, encompassing both academic medical institutions and community hospitals. Before the intervention, the obligation to obtain medication histories rested with doctors and nurses in the emergency department or the unit to which the patient was sent. The intervention included the implementation of the BPMH as previously outlined. In the majority of hospitals, pharmacy technicians collected the Best Possible Medication History (BPMH) under pharmacist supervision; however, three hospitals used a "mixed model" in which either a physician or a pharmacy technician trained in BPMH collection conducted the procedure. The main outcome was the percentage of patients exhibiting one or more unexpected medication discrepancies and the proportion of prescription orders including one or more unintended medication discrepancies, as assessed by an independent observer.

Data were gathered from March 2010 to July 2012, including 1,543 individuals in the study, including 350 people from the mixed model hospitals. During the pre- and postintervention periods, patients had mean ages of 78.8 ± 7.5 and 78.2 ± 7.7 years ($p = .13$) and were prescribed 8.3 ± 4.5 and 8.4 ± 4.5 drugs upon admission ($p = .82$), respectively. The percentage of patients experiencing at least one medication discrepancy across all hospitals declined from 62% to 32% (odds ratio [OR], 0.29; 95% CI, 0.23–0.37), while the percentage of prescription orders including at least one difference fell from 18% to 8% (OR, 0.20; 95% CI, 0.15–0.26). When analyzing results by intervention type, hospitals employing a solely pharmacy-based process

demonstrated statistically significant reductions in both the percentage of patients with at least one medication discrepancy (63% vs 22%; OR, 0.16; 95% CI, 0.12–0.21) and the percentage of medication orders with at least one medication discrepancy (19% vs 4%; OR, 0.18; 95% CI, 0.15–0.21). Conversely, mixed model hospitals exhibited an increase in the percentage of patients with at least one medication discrepancy (53% vs 62%; OR, 1.45; 95% CI, 0.88–2.39) and the percentage of medication orders with at least one medication discrepancy (12% vs 18%; OR, 1.64; 95% CI, 1.29–2.08). The research revealed that a pharmacy-based medication reconciliation method decreased prescription inconsistencies in acutely hospitalized elderly patients.^[21]

The concluding investigation assessed whether pharmacy technicians' verification of medication histories in the emergency department may reduce mistakes in first inpatient prescription regimens at an academic medical institution (University of North Carolina Hospitals, Chapel Hill, NC). Hospital admission orders were analyzed against medication histories provided by a pharmacy technician before admission (intervention) or after admission (control), with disparities categorized as justifiable or unjustified. A total of 113 participants in the intervention group and 75 subjects in the control group were enrolled. The patients' ages were 54.3 ± 16.7 years in the intervention group and 56.2 ± 15.8 years in the control group, with the corresponding number of drugs taken being 7.62 ± 4.38 and 8.16 ± 5.23 . In the intervention group, 566 modifications to home medicines were noted upon admission, with 352 (62%) deemed unreasonable, while 406 modifications were recorded in the control group, with 228 (56%) designated as unjustified ($p = .059$). The frequency of unwarranted medication alterations per patient was not substantially different between the intervention group (3.14 ± 2.98) and the control group (3.17 ± 2.81) ($p = .957$). Investigators found that medication reconciliation conducted by a pharmacy technician in the emergency department did not lead to a substantial reduction in unwarranted prescription discrepancies.^[22]

7. Quality Enhancement Initiatives

Three papers were discovered that measured the effect of including a pharmacy technician in the medication reconciliation process; however, they did not include a formal comparison group. The initial article detailed the frequency of medication discrepancies discovered via a pharmacy technician-facilitated medication reconciliation process in a 20-bed inpatient unit focused on mental health issues and learning disabilities (Basildon Mental Health Unit, South Essex Partnership University NHS Foundation Trust, UK). The pharmacy technician compiled the Best Possible Medication History (BPMH) and then convened with the clinical team to ascertain if the discovered disparities were deliberate or inadvertent. From March to June 2012, pharmacy technicians reconciled 377-unit admissions. The hospitalized patients had an average age of $44.5 \pm$

17.2 years and were prescribed an average of 4.65 ± 3.19 medicines. A medication disparity was unintentionally detected in 212 hospitalizations (56.2%), involving 569 medications (1.5 medications per admission). The research revealed that prescription inconsistencies often occur in mental health care, and skilled pharmacy technicians effectively reduced their prevalence.^[23]

The second research details the incidence of prescription inconsistencies discovered by a pharmacy technician-led medication reconciliation procedure in a 35-bed inpatient geriatric unit at Odense University Hospital, Denmark. During a 7-week interval, two pharmacy technicians performed medication reconciliation and targeted medication evaluations by a cooperation agreement. Upon admittance to the hospital, doctors documented the patient's medication history; subsequently, pharmacy techs examined the history using information from many sources to detect any inconsistencies. A total of 212 medication reconciliations were performed, revealing 629 differences (3 inconsistencies per patient); of these, 45% were finally accepted and rectified by doctors. Investigators found that pharmacy technicians could significantly reduce prescription discrepancies in acutely hospitalized patients using medication reconciliation.^[24]

Investigators reported the incidence of prescription discrepancies detected by a pharmacy technician-led medication reconciliation procedure for patients admitted to the surgical and medical wards of a 440-bed tertiary care hospital (Providence Health Care, Vancouver, British Columbia). Every morning, all patients hospitalized over the preceding 24 hours were recognized, and thereafter, a Best Possible Medication History (BPMH) was compiled by a pharmacy technician. Any inconsistencies were reported to a pharmacist who assessed the need to modify medication treatment and/or notify the doctor. Data were gathered for a pilot program conducted from January 14, 2008, to March 6, 2008, including 39 working days. Pharmacy technicians conducted interviews with 325 individuals (averaging 8 patients daily) who were prescribed 1,345 drugs (about 4 prescriptions for each patient). The technicians detected 775 inconsistencies, 75 of which were inadvertent, indicating an incidence rate of around 1 in every 4 patients questioned. The findings corroborated the notion of using pharmacy technicians to acquire BPMH.^[25]

8. CONCLUSIONS

Recent data indicates that educated pharmacy technicians can detect drug inconsistencies and gather prescription histories with accuracy comparable to other healthcare practitioners. A significant portion of this data has been gathered outside the United States, potentially restricting its generalizability. Future investigations on the precision of medication histories gathered by pharmacy technicians should be undertaken in the United States to provide enhanced involvement in medication reconciliation and bolster additional clinical services.

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النهج متعدد التخصصات لتسوية الأدوية في أقسام الطوارئ: التعاون بين الممرضين والصيادلة**الملخص**

الخلفية: تعد أخطاء الأدوية شائعة في الرعاية الصحية، لا سيما في أقسام الطوارئ (EDs)، حيث تعتبر تسوية الأدوية الدقيقة أمراً بالغ الأهمية. يساهم إشراك الفرق متعددة التخصصات، بما في ذلك الممرضين والصيادلة، بشكل كبير في تحسين دقة تاريخ الأدوية وتقليل الأحداث الضارة المرتبطة بالأدوية. **الطرق:** تراجع هذه الدراسة الأدبيات الحالية حول أدوار فنيي الصيدلة في عمليات تسوية الأدوية داخل أقسام الطوارئ. تم إجراء بحث منهجي باستخدام قواعد بيانات مثل MEDLINE و Academic Search Premier، مع التركيز على الدراسات التي تضمنت فنيي الصيدلة في عملية تسوية الأدوية وأبلغت عن النتائج المتعلقة بالجودة والدقة.

النتائج: تشير النتائج إلى أن فنيي الصيدلة يمكنهم جمع أفضل تاريخ ممكن للأدوية (BPMH) بدقة تقارن بدقة الصيادلة والممرضين. وأظهرت عدة دراسات أن إشراك فنيي الصيدلة يقلل بشكل كبير من التباينات في الأدوية، مع تحسين معدلات الدقة من 16% إلى 89% بعد تطبيقهم. في إحدى الدراسات، حدد فنيي الصيدلة 775 تبايناً في تواريخ الأدوية، مما يشير إلى دورهم الحاسم في تقليل الأخطاء في بيانات الطوارئ. **الخلاصة:** إن تضمين فنيي الصيدلة في عمليات تسوية الأدوية يعزز دقة وكفاءة جمع تواريخ الأدوية في أقسام الطوارئ. يساهم هذا النهج في تقليل عبء العمل على الصيادلة والممرضين ويعزز نتائج سلامة المرضى. يجب أن تركز الأبحاث المستقبلية على دمج فنيي الصيدلة في الفرق متعددة التخصصات لتحسين إدارة الأدوية في بيئات الرعاية الطارئة.

الكلمات المفتاحية: تسوية الأدوية، فنيي الصيدلة، قسم الطوارئ، أخطاء الأدوية، التعاون متعدد التخصصات.