Evaluation of Medication Errors in Community Pharmacy Settings: A Retrospective Report

Journal of Pharmacy Technology
2016, Vol. 32(2) 71–74
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DOI: 10.1177/8755122515617199
pharmatech.sagepub.com

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Abstract

Background. Drug-related errors can compromise patient care, increase health care costs, and, in worst case scenarios, result in patient deaths. **Objective.** To evaluate the incidence and contributing factors of medication dispensing errors in community pharmacy settings reported to the New Hampshire Board of Pharmacy (NHBOP). **Methods.** Medication errors reported to the NHBOP from February 1, 2007, to July 31, 2012, in a community pharmacy setting were reviewed. Quality Related Event Report (QER), a standardized form developed by the NHBOP, was used to record the errors. The QER allows collection of information related to the error, including time, date, type of error, and contributing environmental factors. **Results.** There were a total of 68 reported errors. The majority of errors (40%) involved dispensing an incorrect medication; 31% involved incorrect doses, and 12% involved incorrect directions. A majority of the errors involved new prescriptions (78%); 51% occurred during the pharmacist final check stage and 26% occurred during the data entry phase of the initial processing of the prescription. A greater percentage of errors (68%) occurred when only 1 pharmacist was on duty versus 29% with 2 pharmacists on duty. **Conclusions.** Contributing factors for errors included high prescription volumes and lack of adequate pharmacist coverage. Increasing pharmacist overlap hours in stores with high prescription volumes and implementing a formal technician certification program to ensure the consistency in training quality could assist in decreasing medication errors and improving patient safety.

Keywords

medication errors, community practice, medication safety

Introduction

The National Coordinating Council for Medication Error Reporting and Prevention defines a medication error as “any preventable event that may cause or lead to inappropriate medication use or patient harm while the medication is in the control of the health care professional, patient, or consumer.”¹ These errors often occur as a result of problems associated with prescribing, communicating, labeling, and therapy monitoring. Medication errors can cause unwanted adverse drug events and in some cases can lead to life-threatening injuries.² Additionally, medication errors are associated with a substantial increase of total health care cost in the United States; drug-related morbidity and mortality costs are estimated to be over \$177.4 billion.³ In most cases, fatal errors are the result of dispensing either an incorrect medication or dose.⁴ Interestingly, findings in the United Kingdom similarly show incorrect medication selection during data entry as responsible for a majority of errors.⁵ While some of the errors clearly originate before the prescription reaches the pharmacist, pharmacy workload

concerns can contribute to the errors rates.⁶ Reduced staffing has been shown to have an adverse impact on the ability of pharmacy staff to identify drug-drug interactions.⁶ This study was initiated to determine the incidence and contributing factors for errors that have been reported from community pharmacy settings to the New Hampshire Board of Pharmacy (NHBOP).

Methods

Medication errors that were reported to the NHBOP from February 1, 2007, to July 31, 2012, were reviewed. Reporting an error to the NHBOP requires completion of a

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Table 1. Stages of Prescription Filling.*Stage 1: Receiving prescription*

- How prescription arrives to the pharmacy via telephone, e-prescribed, faxed, or physically delivered to the pharmacy

Stage 2: Data entry

- Pharmacy personnel inputs information into the computer system

Stage 3: Prescription assembly

- Medication assembly to include preparation, counting, and labeling

Stage 4: Pharmacist final check

- Everything previously done by a pharmacy technician, or pharmacist, is reviewed to ensure accuracy

Stage 5: Addressing the issues

- Issues may include queries emanating from the prescription software program, denials by third-party payers, the need for communication with the prescriber or patient, and ambiguities related to the intended course of therapy

Stage 6: Delivery to the patient

- When the medication is handed to the patient or guardian to include counseling if necessary or requested by the patient

Table 2. Prescription Errors.

Prescription Type (n = 68)	Prescriptions (%)
New	79.4
Refill	17.6
Transfer	1.5
Unknown	1.5

Quality Related Event Report (QER) by the pharmacist who discovered and/or witnessed or was directly involved in the incident. Medication errors that occurred in New Hampshire community pharmacy settings were included; those that occurred in institutional pharmacy settings were excluded. Information that was extracted from the QER for the purposes of this study included date, time and description of the medication error, type of error (incorrect dose/incorrect drug/incorrect directions, and incorrect quantity/refills), environmental issues, staffing details, number of prescriptions filled on the day of the event, and the stage of prescription filling where the error occurred. The stages of prescription filling were divided into 6 stages as described in Table 1. The SPSS statistics program was used for data entry and descriptive analysis. Institutional review board approval was not sought for this study due to minimal risk to humans and de-identified data.

Results

A total of 68 medication errors were identified during the February 1, 2007, to July 31, 2012, time period. Time between error occurrence and reporting was 1 month 29% and 2 months 26%. Seventy-nine percent of the prescription errors occurred when processing a new prescription; 17% involved prescription refills (Table 2). The remainder of the errors involved a prescription transfer, and 1 error did not include information as to when the error occurred.

A total of 51% of the errors occurred in stage 4 (the pharmacist's final check) of the prescription processing (Figure 1). This stage included errors that were processed

by a pharmacy technician in the data entry phase and errors that were not detected by the on-duty pharmacist. Twenty-six percent of errors occurred during stage 2 (data entry). Among the errors that occurred in this stage, 73% of the data entry was performed by pharmacy technicians, 15% by pharmacists, and 6% by pharmacy interns (Figure 3). In 6%, the person who performed data entry was not identified by the QERs.

Other errors (28%) originated in stage 3 (prescription assembly) during which the prescription medications are pulled from the shelf and placed into dispensing containers. The remainder of the errors were equally distributed in the remaining categories: stage 1 (receiving prescriptions) and stage 6 (prescription delivery to patients), with 7% of the total errors in each area. The least number of errors were reported in stage 5, addressing errors involving computer software and insurance related matters.

Regarding the types of dispensing errors, 40% were identified as an incorrect medication; 31% were identified as an incorrect dose. Among the remaining designated categories, the next most frequent type of error was incorrect directions (12%), followed by incorrect label and incorrect refill (Figure 2). The other errors did not fall into the designated categories. These included dispensing an expired medication, selecting an incorrect prescriber, a communication error, and the wrong quantity.

Data related to staffing levels revealed that 68% of the errors occurred when 1 pharmacist was on duty; 29% occurred when 2 pharmacists were on duty (Figure 4). Three percent of the errors occurred when 3 pharmacists were present in the pharmacy. Of the errors that occurred with a single pharmacist on duty, 78% reported that this was usual staffing; 20% reported that this was reduced staffing.

With regard to the day and time of error occurrence, 25% occurred on Fridays and 20% on Mondays. Sixty-three percent occurred during the afternoon hours. With regard to prescription volume, pharmacies filling 251 to 300 prescriptions daily had the highest percentage of errors (19%) followed by pharmacies filling between 151 and 200 and between 201 and 250 prescriptions daily (14.7% each;

Figure 1. Stage of medication error (n = 128)*.

*Stage 4 errors include data entry errors by pharmacy technicians.

Figure 2. Type of error (n = 68).

Figure 3. Stage 2 errors—data entry (n = 33).

Table 3). Staffing with 1 pharmacist on duty at these pharmacies was reported at 90%, 80%, and 77%, respectively.

Discussion

Pharmacist Considerations

We found that lack of adequate pharmacist coverage may have contributed to errors. It is of concern to see that a sole pharmacist was responsible for filling between 251 and 300 prescriptions per day without additional pharmacist

Figure 4. Number of pharmacists on duty (n = 68).

Table 3. Prescription Volume per Day.

Prescriptions Filled per Day	Number of Errors	Percentage
51-100	5	7.4
101-150	4	5.9
151-200	10	14.7
201-250	10	14.7
251-300	13	18.8
301-350	6	8.8
351-400	8	11.8
401-500	9	13.2
Over 600	3	4.4
Total	68	100.0

coverage or overlap. It was even more alarming that pharmacists reported that this was a typical work schedule and not a result of a pharmacist shortage or reduced staffing due to illness. Pharmacies that had 2 pharmacists on duty had fewer errors, supporting the premise that additional pharmacist coverage may help reduce error rates. These findings lead us to believe that increasing pharmacist overlap hours during periods of high activity may subsequently reduce error rates significantly. A majority of the errors occurred during the pharmacist final check stage of the prescription

filling process. Additional pharmacist coverage dedicated to this work area may minimize errors due to distractions and other responsibilities, such as immunizations, that interrupt work flow. Further investigation may be necessary to evaluate the process and identify causes and areas of improvement, particularly at this later stage. As pharmacist workload (long hours, limited pharmacy staffing, and lack of lunch/dinner breaks) may contribute to errors, the NHBOP is addressing some of these concerns. Legislation has been introduced to grant rule-making authority to the Board. This would allow the Board to implement changes to address workload issues, especially with regard to adequate pharmacist coverage in higher volume pharmacies and mandatory pharmacist breaks to reduce fatigue and promote safer medication practices.

Pharmacy Technician Considerations

Many of the medication errors occurred while processing a new prescription. While it is the responsibility of the pharmacist to perform the final verification, regardless of who performed the data entry, it is important to note that pharmacy technicians performed the data entry for many of the prescriptions for which errors were reported. The cause of these data entry errors may be due to inconsistencies in pharmacy technician training in pharmacies. When this research occurred, there were no formal laws in New Hampshire requiring technicians to be trained or certified to perform tasks in the pharmacy. The previous New Hampshire law stated that "a registered pharmacy technician is not required to obtain any formal training but shall have training or experience as determined by the pharmacist-in-charge."⁷ This could have led to inconsistencies among pharmacy technicians across the state based on the requirements imposed by the pharmacist-in-charge at the pharmacy where they are employed. As a result of this research, the NHBOP updated the rules to standardize the requirements, duties, and training of pharmacy technicians. These rules were adopted in November 2014. The revised rules require that a minimum of 600 hours of training be completed under the supervision of a pharmacist before a technician is certified as a pharmacy technician. Formal training programs approved by the NHBOP include American Society for Health System Pharmacists and Criticalpoint. Once certified, pharmacy technicians will be allowed to perform the following tasks: accepting new pharmacy orders by phone, transfer of a noncontrolled medication to and from another pharmacy, performing data entry, and preparing compounded prescriptions. It is the hope that the implementation of these new pharmacy technician rules will standardize the role and responsibility of pharmacy technicians and promote consistent good practices.

Limitations

We believe that errors described in this report are only a fraction of those that occurred in the state due to the fact

that reporting of errors is not mandatory, and many of the errors were reported by patients. Another limitation is that error reporting may have been subject to recall bias since the QRER forms were completed several months after the actual error occurred in many cases.

Conclusions

Pharmacy workload issues such as inadequate pharmacist coverage and staffing may contribute to errors in the community pharmacy setting. This may be further exacerbated in the future with increasing pharmacist responsibilities. Increasing the number of pharmacists on duty to compensate for the increase in workload may minimize the number of errors especially in those pharmacies filling a greater amount of prescriptions. Implementation of the revised rules pertaining to pharmacy technician training requirements and certification in New Hampshire will provide consistent work practices throughout the state.

Authors' Note

Results of this study were presented at the American Society of Health-System Pharmacists (ASHP) Midyear Clinical Meeting & Exhibition; December 2-6, 2012; Las Vegas, NV.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

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