Errors Originating in Hospital and Health-System Outpatient Pharmacies

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ABSTRACT

Although a majority of prescriptions dispensed daily in outpatient pharmacies will be correct, errors can occur. Prescriptions dispensed in an outpatient setting are usually for a 30- and occasionally a 90-day supply, which means that an error may not be intercepted for a month or longer, potentially causing patient harm. Analysts reviewed medication errors reported to the Pennsylvania Patient Safety Authority that occurred in outpatient pharmacy settings. Of the 1,044 errors, the top three event types were wrong drug (19.6%, n = 205), medication list incorrect (17.0%, n = 178), and wrong dose/over dosage (14.7%, n = 153). More than half (56.2%; n = 587) of the events reached the patient. Error-reduction strategies can be implemented in multiple stages of the prescription filling process, including during triage and order entry, production, and point of sale. Counseling patients about their medication at the point of sale can intercept errors and help patients take their medications appropriately and safely. (Pa Patient Saf Advis 2017 Jun;14[2]:55-63.)

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INTRODUCTION

The overall dispensing accuracy rate in community pharmacies is estimated to be 98.3% (77 errors among 4,481 prescriptions).[1] Despite this level of accuracy, about 4 errors occur per day in a pharmacy filling 250 prescriptions daily. Extrapolating these numbers means that an estimated 64 million errors occur during the dispensing of 4 billion prescriptions annually in America's pharmacies.[2]

Outpatient pharmacies operate in a variety of settings, including entities affiliated with or located within hospitals, health systems, and clinics as well as freestanding pharmacies. The pharmacists who staff these pharmacies provide a variety of services to the community, including dispensing prescriptions, administering immunizations, providing medication-therapy management, providing patient education, and making recommendations for over-the-counter medications.

When dispensing medications, pharmacists perform tasks that can be repetitive, yet require high levels of professional training and optimal performance under considerable time constraints.[3] Dispensing a prescription can involve more than 40 separate steps.[4] Combine this with the numerous distractions from telephones, e-mails, customers, and the supervision of technicians, and a system emerges that is perfectly positioned to facilitate errors at any step in pharmacy dispensing process.

The outpatient pharmacy setting provides a unique problem, that errors might go unnoticed for months and may result in negative outcomes. Patients usually receive a 30-day supply of medication and possibly up to a 90-day supply with a prescription. If an error occurs, the patient may end up using the wrong therapy or wrong dose for a significant period of time.

Pennsylvania Patient Safety Authority analysts examined medication errors coded to have occurred in an outpatient pharmacy setting to determine the types of events, the steps in the pharmacy dispensing process in which the event occurred (when that information was available), and contributing factors.

METHODS

Analysts queried the Pennsylvania Patient Safety Reporting System (PA-PSRS) database for errors from January 2005 through December 2016, looking for events that were categorized as occurring in a hospital's outpatient pharmacy setting. To identify potential event reports, analysts queried the care-area field for: Pharm*, Phar*, or Rx* and the care-area name field for: out*, comm*, reta*, or amb*. This query yielded 1,044 event reports. The medications involved in the reports were standardized to either their brand or generic name. A medication was considered to have reached the patient if the medication left the control of the pharmacy or pharmacy staff and was dispensed or delivered to the patient. Reporters assigned harm scores, which are adapted from the National Coordinating Council for Medication Error Reporting and Prevention harm index,[5] and categorized events based on the type of error.

ANALYSIS

Event reports were categorized by their event type. The top five event types (Figure 1) comprised 69.9% of the reports. The top three event types were wrong drug, medication list incorrect, and wrong dose/over dosage. The ages of the patients involved in the events were as follows: 9.8% (n = 102) involved pediatric patients (younger than 18 years of age), 73.6% (n = 769) involved adult patients (age 18 to 64), and 16.6% (n = 173) involved elderly patients (age 65 or older). More than half (56.2%; n = 587)

of the events reached the patient (Harm Score C – I; Figure 2). Analysts also identified that 5.9% (n = 62) of the events submitted to the Authority involved delivery of a prescription to the patient's home or other location.

Wrong Drug

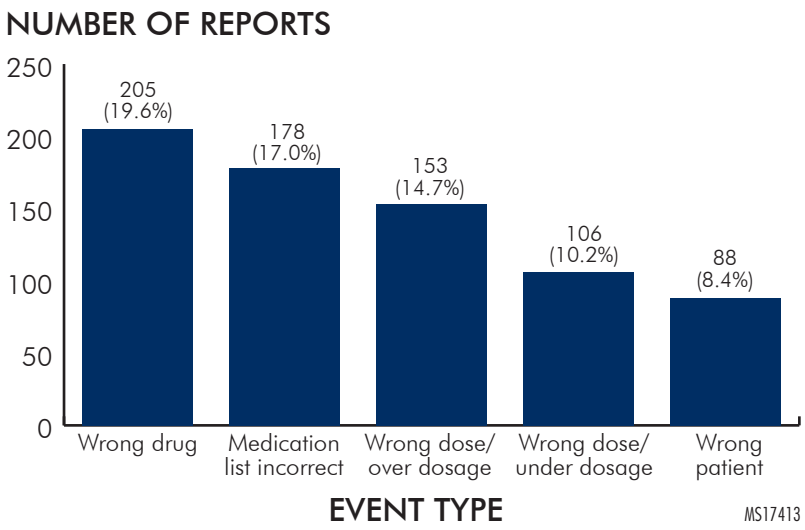
Wrong drug errors comprised 19.6% (n = 205) of all the errors, and 89.3% (n = 183) of these errors reached the patient. It should be noted that nearly half (48.3%, n = 99) of the reports did not provide the names of both medications involved (e.g., the report only listed one drug when two drugs were involved) in the medication name fields. There were 105 different drugs mentioned in reports and 147 unique combination of drugs involved in wrong drug errors. The most common drug mentioned in reports of wrong drug errors was the opioid analgesic traMADol (10.7%, n = 22), of which the majority (68.2%, n = 15) were drug mix-ups with traZODone, an antidepressant. The next most common drug involved in wrong drug errors was metoprolol (5.4%, n = 11), with 72.7% (n = 8) of the mix-ups occurring between immediate release metoprolol tartrate and long-acting metoprolol succinate.

The other wrong drug mix-ups worth noting were within drug classes rather than individual medications. Mix-ups between different oral contraceptive products comprised 7.8% (n = 16) of the errors. Mix-ups between different insulin products comprised 7.3% (n = 15). The remaining 68.8% (n = 141) of the errors involved at least 121 different medications. Following are examples of wrong drug errors reported through PA-PSRS:*

> *Patient received traZODone instead of traMADol. After taking the dose, she fell on floor. She felt woozy and sleepy. Received multiple traZODone*

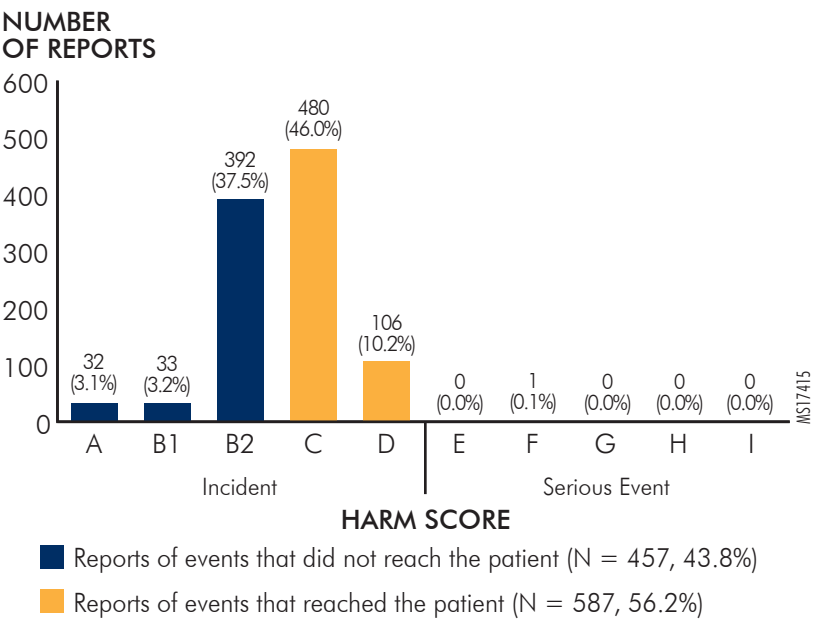
* The details of the PA-PSRS event narratives in this article have been modified to preserve confidentiality.

Figure 1. Top Five Outpatient Pharmacy-Related Medication Error Event Types (N = 1,044)



Note: Data reported through the Pennsylvania Patient Safety Reporting System, January 2005 through December 2016.

Figure 2. Harm Scores for Outpatient Pharmacy–Related Medication-Error Events (N = 1,044)



Notes: Data reported through the Pennsylvania Patient Safety Reporting System, January 2005 through December 2016. Percentages add up to more than 100% because of rounding.

tablets. Called pharmacy to report error. Noticed tablets were different.

Patient received traZODone instead of traMADol in his dispensed medication prescription. He actually took his wife's medication that was also filled incorrectly.

Patient was prescribed triamcinolone and label was typed for triamcinolone. Nystatin was dispensed. Nystatin did not help the patient's poison ivy and additional predniSONE was dispensed.

Patient received Singulair® [montelukast] 10 mg and Zyrtec® [cetirizine] 10 mg. Each bottle was labeled with opposite drug and directions. Patient had remaining Zyrtec from previous fill in her old bottle. Therefore, for a few days, she had been taking two Zyrtec tablets and no Singulair. She reported feeling a little drowsier than usual.

Two tablets of pravastatin 20 mg were found in a bottle of Paxil® [PARoxetine] 20 mg filled by the outpatient pharmacy. Pravastatin was in the robot and was exchanged out for Paxil. The pharmacist believes two tablets of the pravastatin must have remained behind when exchanging out for Paxil. The patient brought the incorrect tablets back [to the pharmacy] and the error will be addressed with next training to be sure robot is empty of all drugs when exchanging out.

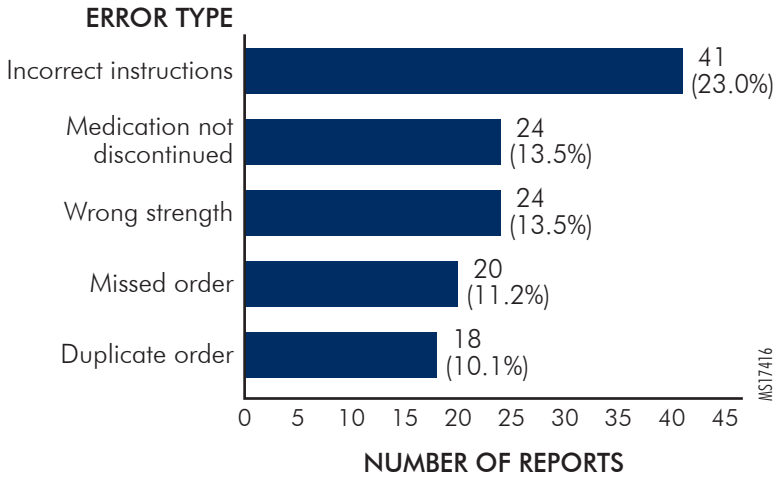
Medication List Incorrect

The second most common event type selected by facilities was medication list incorrect (17.0%, n = 178). Within this category, analysts identified 15 different types of errors. The top error types were incorrect instructions (23.0%, n = 41), medication not discontinued (13.5%, n = 24), and wrong strength (13.5%, n = 24). See Figure 3. At least 80 different medications were involved in errors. Only SEROquel® (QUEtiapine; 12.4%, n = 22), an antipsychotic agent, was involved in more than 10% of the medication list incorrect events. Nearly 28% (n = 49) of the events involved antipsychotics, while 12.4% (n = 22) involved antidepressants. Following are some reported errors in which the medication list was incorrect:

Doctor wrote order for fentaNYL [transdermal system] 12 mcg/hr, change every 3 days, start today. Pharmacy had order in twice for today.

Oxazepam 10 mg ordered. Entered as ZyPREXA® (OLANZapine) 10 mg by mouth every 8 hours when necessary. The patient did not receive any Zyprexa.

Figure 3. Top Five Types of Medication List Incorrect Errors (N = 178)



Note: Data reported through the Pennsylvania Patient Safety Reporting System, January 2005 through December 2016.

Wrong Dose/Over Dosage

The third most common event type was wrong dose/over dosage (14.7%, n = 153). In 36.6% (n = 56) of the events there was a two-fold overdose, while 3.9% (n = 6) involved a 10-fold overdose. Nearly 35% (n = 53) of the event reports did not have enough information to determine the amount of drug the patient received. In 11.8% (n = 18) of the events, the actual product dose strength was correct, but the instructions would have had the patient take a higher dosage. Of these overdoses, 85.0% (n = 130) reached the patient. In 14.4% (n = 22) of these events, the patient took at least one dose of the medication. Discovery of some of these errors did not occur until the time of the patient's first refill (11.8%, n = 18) or even months after the initial dispensing of the prescription (7.8%, n = 12). There were 98 different drugs mentioned in wrong dose/over dosage reports, including vitamin D (5.2%, n = 8), metFORMIN (4.6%, n = 7), hydroCHLOROthiazide (3.3%, n = 5), and lansoprazole (2.6%, n = 4).

The following are examples of reported wrong dose/over dosage events:

Directions on the label were to inject 0.4 mL (5,000 units) [epoetin alfa] via IV every 7 days. Actually, the correct volume to inject for 5,000 units is 0.25 mL. Labs drawn to assess harm. No harm to patient.

A 60-year-old female was prescribed PROzac® [FLUoxetine] 20 mg by mouth, 2 capsules daily. Pt received 40 mg PROzac capsules (80 mg), which she took 2 of daily for one month. The doctor was notified by outpatient pharmacist.

A prescription for vitamin D 5,000 units daily was filled erroneously with 50,000 units daily, which the patient took for one month.

A prescription written for [methotrexate] 10 mg was entered as 10 tablets (25 mg dose). This prescription was refilled two more times. A [subsequent] prescription was called in and filled correctly, but [the patient's] mom kept giving as before. Error discovered after discussion with the patient's mother and review of medications with her. Physician made aware of error. Confirmed that there was no patient harm.

Notified provider that he did not write out units and that the prescription for [insulin regular] was misunderstood as 150 units. Also, the pharmacist did not call to clarify the prescription with the provider and notified the social worker that the prescription could only be partially filled due to limited stock.

The pharmacist who was checking reports noticed an error [involving LisinoprilhydroCHLOROthiazide] that perpetuated for 10 months. The physician's office was contacted and since the patient was doing well, the decision was made to keep the dose as it had been dispensed and taken by the patient.

Wrong Dose/Under Dosage

Under dosing was identified in 10.2% (n = 106) of the events. In 40.6% (n = 43) of the errors, the selected strength was half the prescribed strength. Incorrect drug strength was cited in 42.5% (n = 45) of the errors, 10.4% (n = 11) had incorrect instructions leading to an under dose, and 4.7% (n = 5) had an incorrect quantity. More than 20% (n = 22) of the reports did not have enough information to determine the type or cause of the error. Although 78.3% (n = 83) of the errors reached the patient, only 20.8% (n = 22) of the incorrect prescriptions were actually taken by the patient, with 11.3% (n = 12) of the patients taking the dose for at least one month. There were 71 different medications involved in the errors, including lisinopril (5.7%, n = 6), levothyroxine (3.8%, n = 4), simvastatin (3.8%, n = 4), and furosemide (2.8%, n = 3).

Following are reported examples in which drugs were under dosed:

TraZODone 50 mg was processed and dispensed instead of 100 mg. The patient had trouble sleeping and noticed the pills were different but didn't say anything. The error was caught on next refill.

The pharmacy received a prescription for tacrolimus 0.5 mg/mL electronically and dose for the patient is 4 mg every 12 hours. Pharmacy filled prescription as tacrolimus 0.5 mg/mL, [take] 2 mL (1 mg) by mistake.

The patient was prescribed Lantus® [insulin glargine] 70 units subcutaneous at bedtime as prescribed. The label and instructions were incorrectly listed as 30 units at bedtime. The patient has not required additional care or medication. No current lab work in computer system.

The patient's mother called nursing for refill of medication [topiramate]. It was then discovered that the patient had been dispensed the wrong dosage and patient had been receiving wrong dose [for 3 days].

Wrong Patient

Wrong patient errors comprised only 8.4% (n = 88) of all events. Of these errors, 90.9% (n = 80) reached the patient, although only two of the reports indicated that the patient had ingested the medication. Nearly 24% (n = 21) of the events occurred during the order entry phase, while 73.9% (n = 65) of the events occurred when dispensing the medications to the patient. More than a third (35.4%, n = 23) of the 65 errors that occurred when dispensing the medication involved home delivery services. In fact, more than a third (37.1%, n = 23 of 62) of the events involving home delivery were wrong patient errors. Following are examples of wrong patient errors:

During the process of setting up home deliveries via courier, one patient received another's medication via the mail, and vice versa. [The mix-up involved Xanax® (ALPRAZolam) and Truvada® (emtricitabine and tenofovir disoproxil fumarate)]. The patient realized that the patient name [printed] on the bottle was not hers and recognized the medication was not prescribed to her. She contacted the pharmacy and returned the medications to pharmacy via mail. The patient did not take any of the medication.

Two prescriptions were presented to staff—one for the husband and one for the wife. The husband was supposed to get citalopram and his wife was supposed to get metoprolol. The wife received both prescriptions in her name. She said she took one of the citalopram since her name was on it. Verified with the wife that she only took one dose. Incorrectly labeled bottle was brought back by the patient and replacement was given to her. The patient's only complaint was that she was lightheaded and dizzy and that her blood pressure was a little elevated that day.

The patient received medication prescribed for another patient. The patient did not read label and took the medication for three months.

DISCUSSION

There are many differences between inpatient and outpatient pharmacies. An inpatient pharmacist may fill orders for medications, monitor patient medication therapies, provide drug information, and prepare infusions. Outpatient pharmacists provide many similar services (e.g., filling prescriptions, educating patients, administering immunizations, providing medication therapy management, calling doctor's offices to get refills or clarify prescriptions) but are also tasked with calling insurance companies for reimbursement, completing transactions with customers at the point of sale, completing business reviews, and running a business.

The quantity of medication dispensed of any given prescription is different between outpatient and inpatient pharmacies. While inpatient pharmacies typically provide one day's worth of medications for a given patient in the hospital, in the outpatient setting, 30- and occasionally 90-day prescriptions are dispensed. Also, errors (e.g., wrong drug, wrong strength) that occur in the hospital setting have more opportunities to be caught by other practitioners before reaching the patient than in the outpatient setting. Outpatient dispensing errors frequently reach patients, who may fail to notice their prescription is not what it should be. In 12.7% (n = 33 of 259) of the wrong doses, both over and under dose, reports noted that patients took at least one dose of a medication that was not the correct strength or amount. Of these reports, 81.8% (n = 27 of 33) of the patients took at least one full month of the incorrect strength, and the error was found upon refill. In fact, 48.5% (n = 16 of 33) of patients were reported to have taken the incorrect strength for multiple months. For the wrong drug errors, 17.6% (n = 36 of 205) of patients who received the wrong drug took at least one dose of the medication, with 36.1% (n = 13 of 36) of the patients taking at least one month's worth.

Wrong drug and wrong dose errors occurred during both the order entry and production stages of the dispensing process. Order entry is the stage in which the prescription details are entered or selected in the pharmacy computer system. Findings from other error reporting programs are similar to those identified in the events submitted to the Authority. For example, in one event, methotrexate, a high-alert medication (i.e., a medication that bears a heightened risk of harm if used in error), was incorrectly selected in the computer system instead of metolazone, a diuretic. The patient took the medication daily for one week until she developed mouth ulcers.[6] In a second example, a wrong dose error was reported after a patient brought in a new prescription for oxyCODONE 5 mg. To expedite the dispensing process, the pharmacist copied the patient's previous oxyCODONE 30 mg prescription. However, he failed to edit the product dose strength, leading to the patient receiving the wrong dose. The same pharmacist conducted the final verification immediately after completing order entry and filling the prescription, limiting the effectiveness of the check.[7] Ideally, one person (e.g., pharmacy intern, pharmacy technician, second pharmacist) performs data entry for the prescription, allowing the verification pharmacist to perform a truly independent double check.

Analysts identified events in which the wrong drug or wrong strength of a medication was selected from the pharmacy shelf during the production stage of the dispensing process. The production stage of the pharmacy workflow includes activities such as retrieving the drug stock bottle from the pharmacy shelves, counting out the number of tablets to be dispensed, and applying the computer-generated prescription label to the prescription container. Similar medication errors have been repeatedly detailed in the literature. For example, an error occurred when the antidepressant Brintellix (vortioxetine, brand name now Trintellix®) was retrieved from the pharmacy shelf instead of Brilinta® (ticagrelor), an antiplatelet agent. The two drugs were stored side by side, and the wrong product was selected. The patient fell and was admitted to a hospital with a periorbital hematoma after taking Brintellix for nine days.[8] In another event, the incorrect strength of ARIPiprazole, an antipsychotic, was nearly dispensed to the patient. The bottles of ARIPiprazole 2 mg and ARIPiprazole 5 mg, both from the same manufacturer, looked alike with similar size, shape, color, and labeling. Additionally, the strength of each product was displayed in a small font size on the far right edge of the main panel of the label and could be missed if the bottle was turned slightly.[9]

Analysts identified that 8.4% (Figure 1) of the events submitted to the Authority were wrong patient errors; however, this error might be more common than indicated. A study conducted by the Institute for Safe Medication Practices (ISMP) found that a correctly filled prescription was given to the wrong patient at the point of sale once for every 1,000 prescriptions.[10,11] With close to 4 billion prescriptions dispensed each year, an average of seven wrong patient errors happens each month at every pharmacy across the United States. This number does not take into account a person getting the wrong medication because the wrong patient's name was chosen when entering the prescription into the computer system. In addition to the potential harm from receiving another patient's medications (e.g., administration of a contraindicated medication, omission of the correct medication, misuse of the incorrectly dispensed medication), a wrong patient error can result in a breach of protected health information.[10]

Wrong patient errors occur for several reasons. First, a mistake may be made when one patient's medication is accidently placed in another patient's bag

for pickup.[10] Another way a correctly filled medication can be given to a wrong patient is when pharmacy staff selects the wrong patient's bag from the will call area and bypasses recommended ways of verifying a patient's identity, such as using two patient identifiers.[10] Failing to use two patient identifiers also reduces the likelihood that a pharmacy technician or pharmacist will catch wrong patient errors that occurred when entering the prescription into the computer system. Considering that only half of patients confirm their name on a prescription label, and only about three-quarters confirm the medication's name prior to use, this can result in a patient taking another patient's medication.[12]

Another issue that predominantly affects the outpatient setting is the practice of delivering prescriptions to the patient's home or location by courier or mail. Although delivery services can offer convenience and help ensure homebound patients receive their medications, there are potential failure modes that could impact patient safety. The first issue is the inability to accomplish verification using two patient identifiers if the patient is not home or if the prescription is delivered by a commercial courier or through the mail. This may lead to a patient getting another person's medication, an error identified in 35.4% of the wrong patient dispensing errors that involved delivery services. A second risk with home delivery is the decreased likelihood that the pharmacist provides education to the patient. Although a medication-information insert may be delivered to the patient with the prescription, the pharmacist is not immediately available to provide direct patient counseling. The pharmacist must take steps to contact and convey important medication information to the patient by telephone.[13] If the medication has complex instructions for use or has dangerous side effects, this barrier to patient education can prove dangerous to the patient. This was the case in one event in which a patient received a three-cycle supply of lomustine, a chemotherapeutic agent, from a mail-order pharmacy.[14] However, the patient was to take one cycle's worth of medication and then be reevaluated. To dispense the correct dose of lomustine 150 mg, the pharmacy sent three separate prescription bottles, one with 100 mg capsules, one with 40 mg capsules, and one with 10 mg capsules with the instructions to take a dose from each bottle for a "total of 150 mg daily once per month as directed." The patient, who did not receive counseling from the pharmacy, took the entire three-cycle (9 capsules) supply and died 6 weeks later. A major contributing factor to the event was that the pharmacy sent enough capsules for three cycles of therapy instead of just one.

An article published December 2016 in the *Chicago Tribune* highlighted the potential shortcomings of current drug-drug interaction screening processes.[15] For the article, reporters presented prescriptions with known contraindications to concomitant use (e.g., a chronic cholesterol medication and an acute care antibiotic) and recorded the number of times interaction was missed. Among the community pharmacies presented with these prescriptions, the interaction was missed between 30% and 72% of the time. What makes this worrisome is that in each encounter, the prescriptions were filled at the same pharmacy. The rate of missed interactions and therapeutic duplications are likely to only be higher if the patient is filling prescriptions at different, unrelated pharmacies with non-interfaced computer systems (e.g., two different retail pharmacy companies, a mail order pharmacy and a local independent pharmacy). Access to the patient's inpatient and outpatient medical record, which some hospital and health system outpatient pharmacies have, can help the pharmacists obtain a fuller picture of the patient's health history and identify potential drug-related problem interactions and duplications.

Although automation can increase the efficiency of the dispensing process, it can also be involved in errors. There were several events submitted to the Authority in which look- or sound-alike drugs contributed to wrong drug errors with the use of automation. For example, in one report, the traMADol cell or bin in the pharmacy robot was refilled incorrectly with traZODone. When wrong drug errors involving automation occur, the error can occur multiple times over the course of days, impacting multiple patients, until the error is discovered. This type of error, which can also include filling the cell with the incorrect drug strength, has also been reported in the literature. For example, a pharmacy technician inadvertently loaded one cell in a robot with two different medications.[16] It was thought that she only scanned the first bottle of medication she added to the cell and skipped scanning the second bottle, which was a different medication. The patient discovered that the prescription vial contained two different medications and reported the error before the mistake caused any harm.

LIMITATIONS

In-depth analysis by the Authority of events involving hospital and health-system outpatient pharmacies is limited by the information reported through PA-PSRS, including the event descriptions. As with all reporting systems, the type and number of reports collected depend on the degree to which facility reporting is accurate and complete. Although the narrative fields of the reports help analysts discern what happened during the event, they often do not contain details describing how the event deviated from the standard operation, the specific stage of the pharmacy workflow process in which the error occurred, or which factors contributed to the event. It is important to note that these reports are from outpatient pharmacies affiliated with hospitals or health systems and the results of this study may not apply to other types of pharmacies.

RISK REDUCTION STRATEGIES

One of the most important differences between the inpatient and outpatient pharmacy is the opportunity to intercept errors. Unlike inpatient settings, once an error occurs in an outpatient pharmacy, fewer healthcare practitioners handle the medication and can possibly intercept the error before it reaches the patient. The final dispensed prescription is in the control of the patient rather than a nurse or healthcare practitioner, as in an inpatient setting. Patients who do not notice an error in their prescription may continue to take the incorrect medication until either the pharmacy notices the error upon refill, or the patient experiences a treatment failure or other harm. This means that outpatient pharmacies and other stakeholders need to critically evaluate the systems in place, identify opportunities for improvement, and implement high-leverage risk reduction strategies. The reality that the patient is the final line of defense against error also means that outpatient pharmacies must engage patients to help identify and catch mistakes. Consider the strategies described below, which are based on a review of current literature, events reported to the Authority, and observations from the ISMP.

Triage and Order Entry

- Establish a policy that requires collection and use of the patient's date of birth when the prescription is presented to pharmacy staff and when selecting a patient in the pharmacy computer system.
- For prescriptions that are phoned to the pharmacy, use preprinted prescription phone pads that prompt the receiver to ask the caller for date of birth, allergies, and purpose of the drug.
- Flag patients with similar names in the computer system so that an alert will appear when these patients are selected during order entry.[10] If applicable, use a patient's middle initial to differentiate patients with the same first and last name in the system. Use modifiers such as Jr. and Sr. when applicable.[17]
- When searching for a drug in the pharmacy computer system during order entry, type the drug name using the first four or five letters and its strength.[18] Instruct pharmacy staff to not first retrieve the medication stock bottle from storage and then scan the product's barcode as a means to enter (or select) the drug in the pharmacy computer system. If the wrong product is selected from storage at order entry, there will be no opportunity to catch a potential drug selection error later in the dispensing process by scanning the barcode.

Production

- Take the drug monograph or pharmacy label to the shelf to get the drug and verify the National Drug Code (NDC) on the label matches the NDC on the bottle. Return drug stock bottles to shelves immediately after filling the prescription to avoid crowding the work counter.
- Implement barcode scanning to identify when the wrong product is selected from the shelf.[19,20] Review compliance with barcode scanning to ensure staff complies with this safety step.[19]
- Require scanning of each stock bottle or package (e.g., inhaler, insulin carton) when more than one stock bottle or package is needed to fill a prescription or a cell in a dispensing robot.[16]

Verification

- Use the original prescription or an image of the original prescription when conducting verification and medication utilization review. Encourage the pharmacist to check the data entry against the prescription rather than the vial, to guard against confirmation bias.
- For refills, check the scanned image of the original prescription, and verify the prescription is being dispensed correctly.[21]
- Enlist clinical staff to report inappropriate or irrelevant alerts. An expert committee within the organization can review questionable or frequently overridden alerts, recommending system customizations and providing feedback to database providers.[22]
- Educate pharmacists on using the clinical decisions support (CDS) tools available in the pharmacy computer system. CDS tools are intended to support rather than replace the clinical judgment of the pharmacist.[22]

Point of Sale

- Ask the patient to provide at least two patient identifiers, including their full name and date of birth, when picking up prescriptions.[10,11] This is important for all patients, even those well known to pharmacy staff. Compare the patient-provided identifiers to the information in the computer system or on the prescription receipt.
- Employ technological solutions to help ensure verification of the patient's identity. One possibility is to build a blind prompt into the point-of-sale computer system that requires the pharmacy staff member to ask for the patient's date of birth and then key punch it into the register.[10] If the date of birth does not match the patient's profile or is not entered, the transaction cannot be completed.
- Open the prescription bag and have the patient review the pharmacy labels and contents of each prescription container to

verify that the medication is correct.[10,11] The use of a will call system that employs clear plastic hanging bags to hold prescription containers and receipts awaiting pick up can facilitate this process.

- Provide patient education.[10,11] Include a discussion of the medication's purpose to help ensure the correct medication is being dispensed to the correct patient. When analyzing the events reported to the Authority, it appeared that many could have been caught if patient counseling had taken place.
- Employ scripted patient education and checklists, especially for high-alert medications, to aid in educating patients and to promote consistent discussions.[6,23]
- If the medication is being used off label, ensure that the patient understands why their doctor chose this medication for them.[24,25]
- Avoid asking a "yes" or "no" question when verifying the patient's identity (e.g., by reading aloud the patient's date of birth) or when providing patient education.[10,13] Ask the person to supply the information so that you can confirm it. When asked "yes" or "no" questions, patients may answer "yes" and confirm the information presented was correct, only to take home someone else's medication.
- If a friend or family member is picking up the patient's prescription or it is delivered to the patient's location, send instructions for the patient to open the package at home, check the contents before taking any of the medication, and call the pharmacist with any concerns or questions.[10,13] For high-alert drugs or drugs with potentially harmful side effects, particularly if it is the first time the patient is receiving the medication, consider proactively calling the patient to review important information to reduce the risk of misuse.

Storage

- Ensure stickers, labels, or markings do not obscure the manufacturer's barcode.[26] Review inventories periodically to check that manufacturer's barcodes are not covered up.
- Face labels forward when bottles are stored on the shelf.
- For look-alike products, explore ordering one of the medications from a different manufacturer.[20] Also, avoid labels that separate the strength from the product name.[9] A good reference to check for container label appearance is DailyMed, a service provided by the U.S. National Library of Medicine (http://dailymed.nlm.nih.gov/dailymed/index.cfm).
- Ensure look- and sound-alike names and packaging are sufficiently separated, regardless of normal alphabetical placement. Inform staff of the reasons for relocating these problematic drugs. Provide signage to direct staff to the storage site for relocated medications.[20]
- Use shelf dividers to keep stock separated and neatly organized on shelves.
- Add shelf talkers (a product or sign designed to call attention to products on a shelf) at specific storage locations or use other strategies (e.g., Tall Man lettering [see https://www.ismp.org/tools/tallmanletters.pdf]) to help staff identify look-alike medications or medication pairs that have been involved in dispensing errors.

Quality Processes

- Have pharmacy managers or medication safety officers periodically perform quality-control checks by observing the process at the different phases of the dispensing process, including the point of sale, to ensure adherence to standardized work practices.[10,13]
- Proactively conduct comprehensive safety assessments of the systems in place in the pharmacy. One tool that can help pharmacies evaluate their current systems is the free *2017 Institute for Safe Medication Practices Medication Safety Self Assessment® for Community/Ambulatory Pharmacy*.[27]
- Develop and operate a continuous quality improvement (CQI) program to enhance patient safety, identifying and evaluating quality-related events and constantly enhancing the efficiency and effectiveness of the structures and processes that determine the outcomes of medication dispensing and use.[27]
- Work with hospital or health-system information technology staff and health information technology vendors to establish access to the inpatient medical health record. Access to the patient's full medical health record better enables the pharmacist to perform a full medication reconciliation and screening for interactions and duplications.

CONCLUSION

With an estimated 64 million medication errors occurring each year in the outpatient setting and an average of 87 outpatient medication errors reported to the Authority annually, the chance of a serious error harming a patient is a real possibility. In Pennsylvania 56.2% (n = 587) of reported outpatient medication errors reached the patient. Outpatient pharmacies provide the last opportunity for a healthcare professional to intervene to ensure patients receive and take the correct medication in the correct manner. By reviewing patients' medications upon each fill and providing patient counseling, outpatient pharmacists can make certain that patients are receiving the correct therapy. Educating and empowering patients to engage in patient counseling can prepare them to serve as the final barrier in preventing errors from negatively impacting themselves and help ensure that they are getting the therapy they need.

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PENNSYLVANIA PATIENT SAFETY ADVISORY

This article is reprinted from the Pennsylvania Patient Safety Advisory, Vol. 14, No. 2–June 2017. The Advisory is a publication of the Pennsylvania Patient Safety Authority, produced by ECRI Institute and ISMP under contract to the Authority.

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The Institute for Safe Medication Practices (ISMP) is an independent, nonprofit organization dedicated solely to medication error prevention and safe medication use. ISMP provides recommendations for the safe use of medications to the healthcare community including healthcare professionals, government agencies, accrediting organizations, and consumers. ISMP's efforts are built on a nonpunitive approach and systems-based solutions.

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