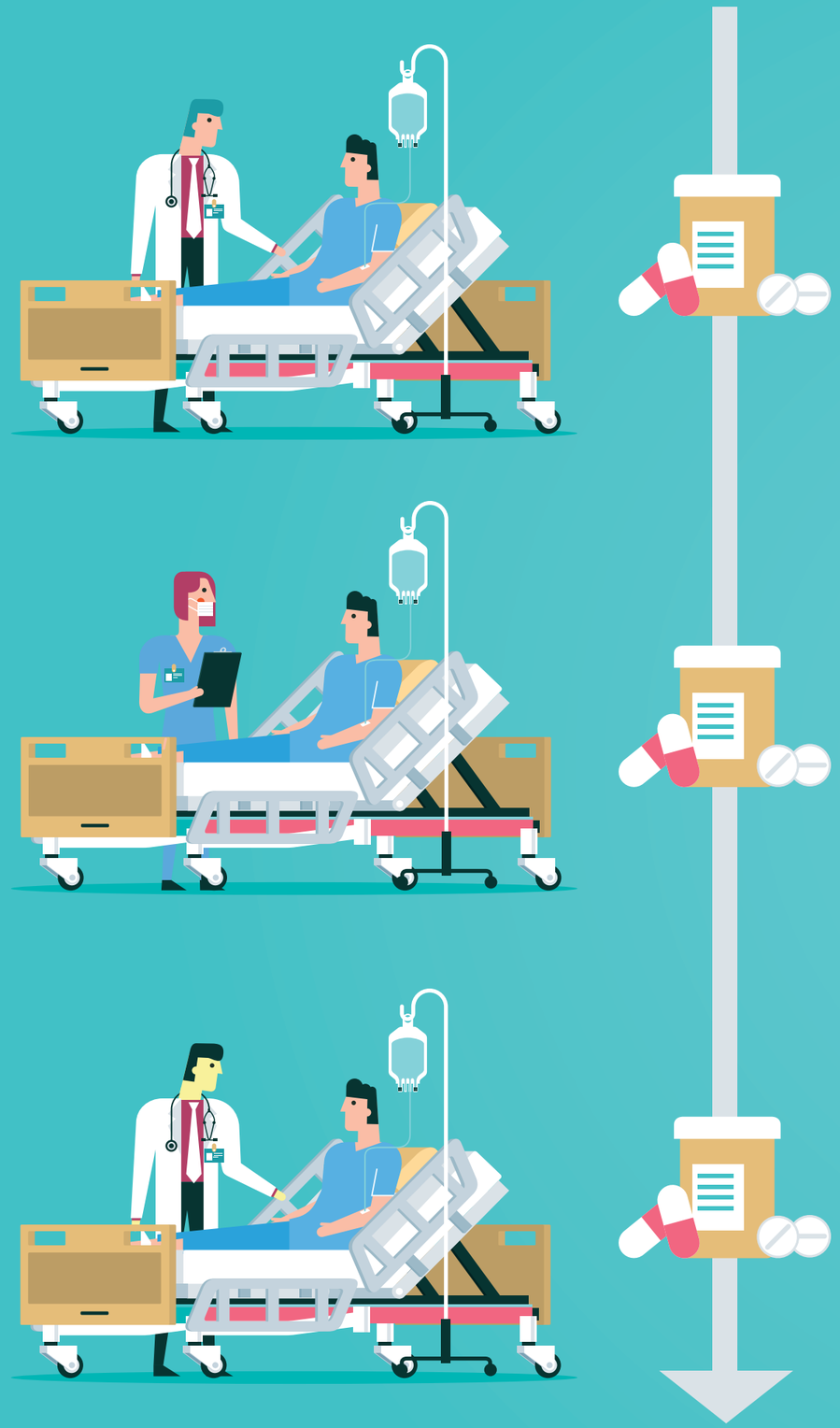

Patient Harm Resulting From

Medication Reconciliation Process Failures:

A Study of Serious Events Reported by Pennsylvania Hospitals

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Medication reconciliation broadly defined includes both formal and informal processes that involve the comprehensive evaluation of a patient's medications during each transition of care and change in therapy. The medication reconciliation process is complex, and studies have shown that up to 91% of medication reconciliation errors are clinically significant and 1–2% are serious or potentially life-threatening. We queried the Pennsylvania Patient Safety Reporting System (PA-PSRS) and identified 93 serious events related to the medication reconciliation process reported between January 2015 and August 2020. Serious events related to medication reconciliation were most common among patients 65 years or older (55.9%; 52 of 93). The majority of events (58.1%; 54 of 93) contributed to or resulted in temporary harm and required treatment or intervention. Permanent harm or death occurred as a result of 3.3% (3 of 93) of the events. Admission/triage was the most frequent transition of care associated with events (69.9%; 65 of 93). The most common stage of the medication reconciliation process at which failures most directly contributed to patient harm was order entry/transcription (41.9%; 39 of 93) and resulted most frequently in wrong dose (n=21) or dose omission (n=13). Most events were discovered after the patient had a change in condition (76.3%; 71 of 93), and patients most often required readmission, hospitalization, emergency care, intensive care, or transfer to a higher level of care (58.0%; 54 of 93). Among 128 medications identified across all events, neurologic or psychiatric medications were the most common (39.1%; 50 of 128), and anticonvulsants were the most common pharmacologic class among neurologic or psychiatric medications (42.0%; 21 of 50). Based on our findings, risk reduction strategies that may improve patient safety related to the medication reconciliation process include defined clinician roles for medication reconciliation, listing the indication for each medication prescribed, and for facilities to consider adding anticonvulsants to their processes for medications with a high risk for harm.

Keywords: *medication reconciliation, home medication, medication errors, transitions of care, patient safety, anticonvulsant*

Introduction

The Joint Commission defines the medication reconciliation process as "…the process of comparing the medications a patient is taking (or should be taking) with newly ordered medications. The comparison addresses duplications, omissions, and interactions, and the need to continue current medications."[1] In addition to these formal processes that facilities use to reconcile home medications, providers for hospitalized patients also must informally consider changing patient conditions; current therapies, diagnoses, and labs; and many other factors when making changes to therapies to also prevent discrepancies. The American Pharmacists Association (APhA) considers a broader definition of medication reconciliation as

> *the comprehensive evaluation of a patient's medication regimen any time there is a change in therapy in an effort to avoid medication errors such as omissions, duplications, dosing errors, or drug interactions, as well as to observe compliance and adherence patterns. This process should include a comparison of the existing and previous medication regimens and should occur at every transition of care in which new medications are ordered, existing orders are rewritten or adjusted, or if the patient has added nonprescription medications to [his or her] self-care.*[2]

Thus, medication reconciliation broadly defined is an ongoing process that optimally occurs at each transition of care and change in therapy for the patient (e.g., outpatient physician visits, admission and discharge from hospitals and nursing homes, transitions between hospital units, before and after procedures, and changes in therapy).[3-5] Medication reconciliation involves a complex set of steps that require effective communication, documentation, and patient and clinician participation.[6] The process is also resource intensive and poses numerous challenges for healthcare providers. For example, medication reconciliation requires designating clear roles and responsibilities; standardizing admission, transfer of care, and discharge procedures; and ensuring access to accurate patient medication lists.[5-11] Though many studies have examined the medication reconciliation process and some have achieved localized success through interventions involving nurses, medical interns, pharmacists, and pharmacy technicians, breakdowns in this process continue to contribute to patient safety events each year.[12-18]

Studies have shown that 50–67% of medication histories contained errors, most frequently because they included medications that the patient was no longer taking or because a medication was omitted.[14,15,17,19] Furthermore, studies have also demonstrated that up to 81% of medication histories for geriatric patients contained errors.[18,20] These errors in medication histories can result in inaccurate lists of patients' home medications, incorrect inpatient orders, and incorrect medication prescriptions at discharge.[6,21]

Many medication reconciliation errors have the potential for adverse effects.[22] Errors that involve high-alert medications pose an increased risk for patient harm.[22-25] Some studies have shown that up to 91% of medication reconciliation errors are clinically significant or had potential for harm, and 1–2% are serious or potentially life-threatening.[17,18] Furthermore, errors in medication orders at discharge are likely underreported and also have the potential to be life-threatening.[10,26,27]

In this study, we examined serious events involving medication reconciliation that were submitted to the Pennsylvania Patient Safety Reporting System (PA-PSRS)* in order to gain a better understanding of the ways in which patient safety may be compromised by problems and errors associated with the medication reconciliation process. Based on our findings, we have identified risk reduction strategies that may have the most tangible impact on patient safety.

Methods

We queried the PA-PSRS acute care database for events that were submitted by Pennsylvania facilities from January 1, 2015, to August 31, 2020. We searched free-text fields (i.e., "Event Details," "Event Recommendations," "Event Comments," "Event Sub Type Other," "MedERR source," and "MedERR ContributingFactors") for keywords relating to medication reconciliation, medication list, home medications, and home drugs along with truncations and alternate spellings for each, (e.g., "med rec," "med req," or "home meds").

We included events in our analysis if they met all of the following criteria:

- The event occurred in a hospital setting.
- The event was identified as a Serious Event† by the reporting facility.
- The event involved the process of medication reconciliation as defined by APhA (see introduction).[2]

We manually coded events to identify the following:

- Transition of care point that was associated with the proximate cause for the patient harm described in the event report.
- Stage of the medication reconciliation process at which failures most directly contributed to the event.
- Type of medication error that occurred as a result of the process failure.
- Medications involved in the event report.
- Circumstances of how the event was discovered or confirmed.
- Additional care or services required as a result of the event.

Figure 1: Harm Scores of Serious Events Related to Medication Reconciliation Submitted to PA-PSRS From January 1, 2015–August 31, 2020, N=93

Harm scores are assigned by reporting facilities. Definitions for each harm score are provided below.

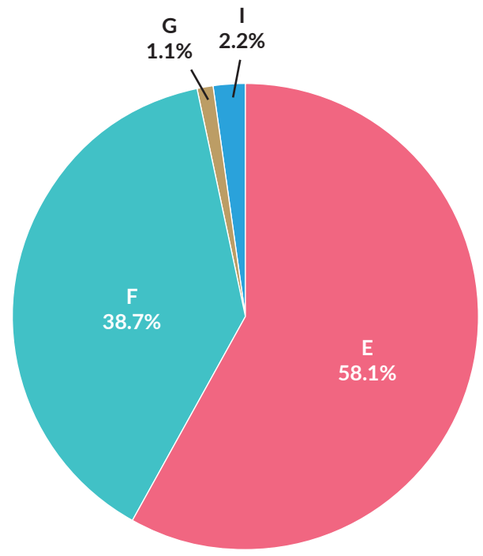
E – An event occurred that contributed to or resulted in temporary harm and required treatment or intervention

F – An event occurred that contributed to or resulted in temporary harm and required initial or prolonged hospitalization

G – An event occurred that contributed to or resulted in permanent harm

H – An event occurred that resulted in a near-death event (e.g., required intensive care unit care or other intervention necessary to sustain life)

I – An event occurred that contributed to or resulted in death



Note: Due to rounding, the percentages do not add up to 100%.

*PA-PSRS is a secure, web-based system through which Pennsylvania hospitals, ambulatory surgical facilities, abortion facilities, and birthing centers submit reports of patient safety–related incidents and serious events in accordance with mandatory reporting laws outlined in the Medical Care Availability and Reduction of Error (MCARE) Act (Act 13 of 2002).28 All reports submitted through PA-PSRS are confidential and no information about individual facilities or providers is made public.

†The MCARE Act (Act 13 of 2002)[28] defines a serious event as "An event, occurrence or situation involving the clinical care of a patient in a medical facility that results in death or compromises patient safety and results in an unanticipated injury requiring the delivery of additional health care services to the patient."

When process failures involved more than one transition of care point, we identified the transition of care point with the error that most directly resulted in the patient harm described in the event report. When events described multiple medications, circumstances of event discovery/confirmation, or additional care/services, we independently included each of these in the analyses.

Results

Our initial query identified 10,100 events submitted to PA-PSRS from January 1, 2015, to August 31, 2020. After excluding events reported as incidents (harm score A–D)[§] events that were reported by facilities other than hospitals, and events that did not directly relate to the process of medication reconciliation, we identified 93 events that met inclusion criteria for further analysis.

Descriptive Analysis

Figure 1 shows the breakdown of harm scores that reporting facilities assigned to each serious event (n=93). Most events were assigned a harm score of E (58.1%; 54 of 93) or F (38.7%; 36 of 93); the remaining events were assigned a harm score of G (1.1%; 1 of 93) or I (2.2%; 2 of 93). None of the events in our analysis were assigned a harm score of H.

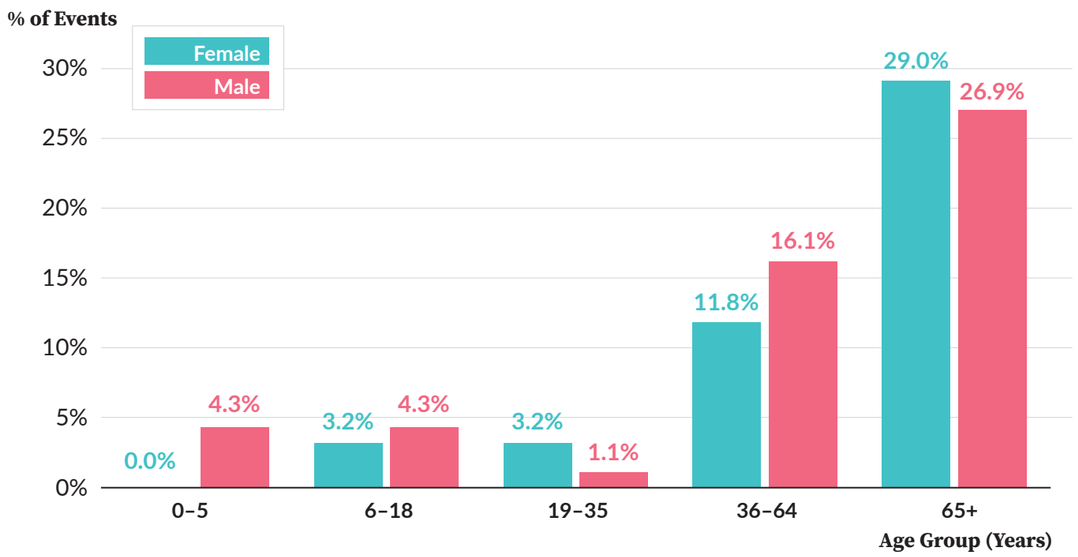
Reporting facilities also included the patient age and gender for each event. We grouped each of the 93 events by the following age groups: 0 through 5 years (young children), 6 through 18 years (school-aged children), 19 through 35 years (young adults), 36 through 64 years (middle-aged adults), and 65 years and older (older adults). Patients 65 years and older most commonly were associated with serious events related to medication reconciliation (55.9%; 52 of 93). Events more often involved male patients (52.7%; 49 of 93) than female patients (47.3%; 44 of 93). In **Figure 2**, we present the percentage of events by age group and gender.

Qualitative Analysis

Transitions of Care

We identified the transition of care point that was associated with the proximate cause for the event resulting in patient harm (**Figure 3**). Four events did not include enough information to determine which transition of care was associated with the event (unknown). Most of the events in our study occurred at admission/triage (69.9%; 65 of 93), and these often carried through the hospital admission (if admitted) and sometimes even to discharge or transfer to another unit/facility. Another 16.1% (15 of 93) of events occurred during medication reconciliation at discharge. Events related to discharge often went unrecognized until the patient

Figure 2: Percentage of Event Reports by Patient Age Group and Gender Involved in Serious Events Related to Medication Reconciliation Submitted to PA-PSRS From January 1, 2015–August 31, 2020, N=93



Note: Due to rounding, percentages do not add up to 100%.

[§]The MCARE Act (Act 13 of 2002)[28] defines an incident as "An event, occurrence or situation involving the clinical care of a patient in a medical facility which could have injured the patient but did not either cause an unanticipated injury or require the delivery of additional health care services to the patient. The term does not include a serious event."

Figure 3: Transition of Care Point Associated With the Proximate Cause for Serious Events Related to Medication Reconciliation Submitted to PA-PSRS From January 1, 2015–August 31, 2020, N=93

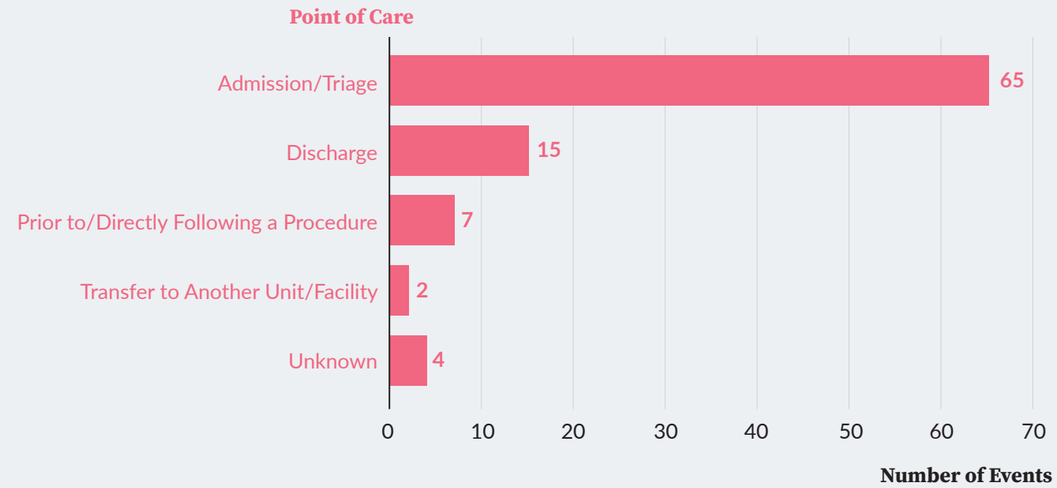


Figure 4: Stage of the Medication Reconciliation Process at Which Process Failures Occurred and Medication Error Types Associated With Serious Events Involving Medication Reconciliation Submitted to PA-PSRS From January 1, 2015–August 31, 2020, N=93

Medication Error Type	Stage at Which the Medication Reconciliation Process Failure Occurred						Total
	Source	Order Entry/ Transcription	Clinical Assessment/ Decision	Discharge Orders	Other	Unknown	
Wrong Dose	7	21	2	4	1	-	35
Dose Omission	2	13	3	6	-	1	25
Wrong Medication	9	2	1	-	1	2	15
Duplicate Therapy	-	2	6	-	-	-	8
Contraindication	-	-	3	-	2	-	5
Wrong Formulation	-	1	-	-	2	1	4
Unknown	-	-	-	-	-	1	1
Total	18	39	15	10	6	5	93

returned to the emergency room (ER) or was readmitted. The remaining events occurred either prior to or directly following a procedure or surgery (7.5%; 7 of 93), or during transfer to another unit or facility (2.2%; 2 of 93).

Process Failures and Medication Error Types

We analyzed each event to determine the stage of the medication reconciliation process at which failures most directly contributed to the event (**Figure 4**). We also determined the type of medication error that occurred as a result (**Figure 4**). Five events did not include enough information to determine the stage of the medication reconciliation process that contributed to the patient harm (unknown).

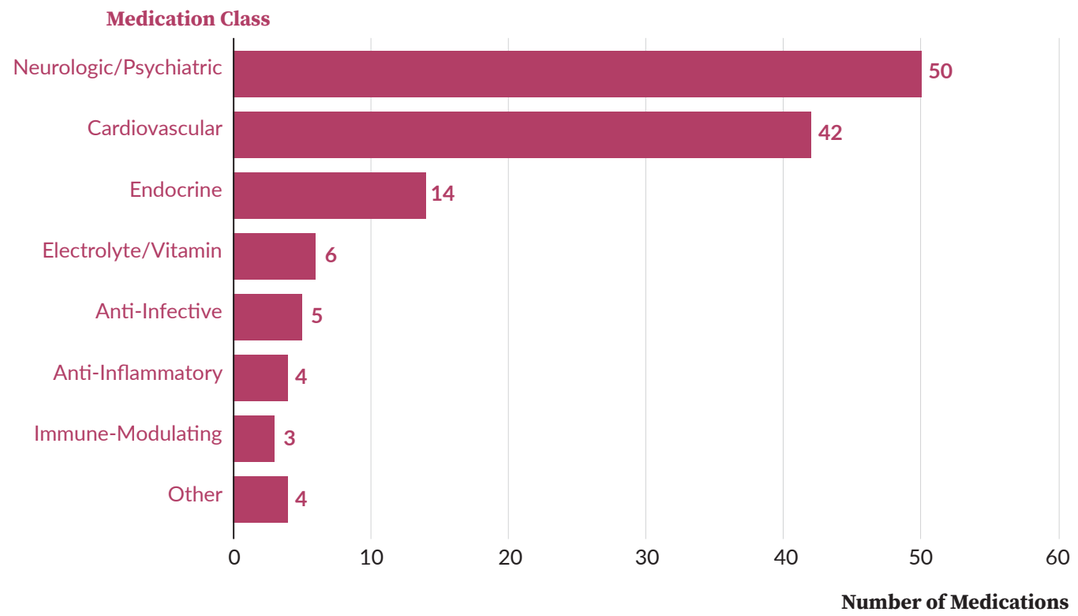
Failures in the process of electronic order entry or transcription of information to the documented home medication list occurred in 41.9% (39 of 93) of the events. These events included missed orders, decimal place errors, orders where the total daily dosage was confused for individual dosages, orders for the wrong type of insulin or dosing errors for U-500 insulin, or entry of duplicate orders for the same medication. These resulted in the following medication error types: wrong dose (n=21), dose omission (n=13), wrong medication (n=2), duplicate therapy (n=2), and wrong formulation (n=1).

Failures involving the source of information contributed to 19.4% (18 of 93) of the events. These events involved incorrect, outdated, or illegible information provided by patients, family members, transferring facilities, old electronic records from a previous admission, or using the wrong patient's information. The resulting medication error types were wrong dose (n=7), wrong medication (n=9), and dose omission (n=2).

Clinical assessments or decisions contributed to 16.1% (15 of 93) of the events. In these events, the clinician either missed an important piece of clinical information or made a clinical decision that resulted in a medication error that resulted in patient harm. For example, events included decisions to stop a medication without tapering, to hold a medication without offering a therapeutic alternative, or to discontinue a medication without stopping a related medication (e.g., discontinuing furosemide without holding/monitoring potassium). Other examples include decisions to order new medications with similar actions as home medications, not assessing for when the last medication was taken or medication patch was applied, or not assessing for known drug allergies. Medication error types were duplicate therapy (n=6), contraindication (n=3), dose omission (n=3), wrong dose (n=2), and wrong medication (n=1).

Process failures in medication reconciliation related to discharge orders contributed to 10.8% (10 of 93) of the events. Dosage errors, omitted orders, and instructions that were unclear or that differed from the discharge medication list contributed to these types of events. The resulting medication error types were dose omission (n=6) and wrong dose (n=4).

Figure 5: Frequency of Medication Classes by System in Serious Events Related to Medication Reconciliation Submitted to PA-PSRS From January 1, 2015–August 31, 2020, N=128



Several other process failures occurred during the medication reconciliation process (6.5%; 6 of 93). These included communication or procedural errors in which the physician was not made aware that a patient had taken a contraindicated medication prior to a procedure, the home medication list was incorrectly marked as updated, medications were ordered that were not on formulary or that required special instructions, or instructions for storage and administration of home medications were not clear. Medication error types that resulted were wrong formulation (n=2), contraindication (n=2), wrong medication (n=1), and wrong dose (n=1).

Circumstances of Event Discovery or Confirmation

We analyzed the events to determine the circumstances of how, when, or who was involved in discovering or confirming the event. Many events included more than one indication that led to the event being discovered or confirmed. Six events did not include enough information to determine what additional services were required (unknown). Most events described that a change in patient condition was one of the first indications that a medication reconciliation error had occurred (76.3%; 71 of 93). Chart/case reviews prompted by the physician team during changes to care plans, a change in patient condition, or subsequent investigation following unexpected patient outcomes or review of medication orders by the pharmacist during daily reviews were mentioned in 26 events (28.0%; 26 of 93). The patient, family, caregiver, guardian, primary care provider, and/or patient's community pharmacy were also described in events as either identifying or confirming that a medication discrepancy occurred (24.7%; 23 of 93). Some events described discovery at or after discharge or transfer that resulted in a return to the ER, readmission, or return to the procedure area (19.4%; 18 of 93). Some events also mentioned that abnormal lab values indicated the need for further assessment to determine whether a medication error had occurred (10.8%; 10 of 93). Several miscellaneous indications included electronic alerts related to critical lab values or during medication order entry/verification, dispensing, or administration; a billing grievance (for unexpected charges); or excessive bleeding during a procedure (3.2%; 3 of 93).

Additional Care or Services

We also identified additional care or services required as a result of each event. Many events described multiple additional services that were required to correct the error or support the patient. Nine events did not include enough information to determine what additional services were required (unknown). Many of the events indicated the need for readmission, hospitalization, emergency care, intensive care, or transfer to a higher level of care (58.0%; 54 of 93). Other additional care or services included additional medications for reversal or support (37.6%; 35 of 93); additional monitoring or testing (32.3%; 30 of 93); an increased length of stay (8.6%; 8 of 93); additional consults (6.5%; 6 of 93); the need for additional oxygen, intubation, or ventilator support (6.5%; 6 of 93); a code or rapid response team (RRT) being called (4.3%; 4 of 93); and the need for rehabilitation in a nursing home or long-term care (2.2%; 2 of 93).

Medications

We reviewed all 93 events to identify the medication or medications involved; 92 events listed one or more medications. A total of 124 specific medications were mentioned by name, and 4 additional medications were not named but were specified by a class, such as a cardiovascular medication or a nonsteroidal anti-inflammatory drug (NSAID), so we analyzed a total of 128 medications. We classified each medication by system (**Figure 5**) and then by pharmacologic class. Neurologic or psychiatric medications were the most common (39.1%; 50 of 128), followed by cardiovascular medications (32.8%; 42 of 128), endocrine medications (10.9%; 14 of 128), electrolytes or vitamins (4.7%; 6 of 128), anti-infectives (3.9%; 5 of 128), anti-inflammatories (3.1%; 4 of 128), immune-modulators (2.3%; 3 of 128), gastrointestinal medications (0.8%; 1 of 128), hepatic medications (0.8%; 1 of 128), respiratory medications (0.8%; 1 of 128), and urologic medications (0.8%; 1 of 128).

The most common pharmacologic classes of neurologic or psychiatric medications were anticonvulsants (42.0%; 21 of 50), opioids (14.0%; 7 of 50), benzodiazepines (12.0%; 6 of 50), antipsychotics (10.0%; 5 of 50), muscle relaxants (10.0%; 5 of 50), and antidepressants (6.0%; 3 of 50). Other pharmacologic classes with only one medication were a dopamine agonist, a potassium channel blocker, and a mood stabilizer. Patients with errors in dosing of anticonvulsants or benzodiazepines most often experienced seizures. Patients with errors in dosing of opioids experienced a range of symptoms, including hypoxia, respiratory distress, loss of consciousness, lethargy, and somnolence.

The most common pharmacologic classes of cardiovascular medications were beta-blockers (21.4%; 9 of 42), diuretics (16.7%; 7 of 42), anticoagulants (14.3%; 6 of 42), angiotensin-converting-enzyme (ACE) inhibitors/angiotensin II receptor blockers (9.5%; 4 of 42), alpha agonists (9.5%; 4 of 42), calcium channel blockers (9.5%; 4 of 42), and antihyperlipidemics (7.1%; 3 of 42); other pharmacologic classes with only one medication were alpha blockers, antiarrhythmics, neprilysin inhibitors, and nitrates. Patients with errors in dosing of ACE inhibitors, alpha agonists, alpha blockers, beta blockers, and calcium channel blockers experienced changes in heart rhythm, heart rate (e.g., bradycardia or tachycardia), and blood pressure (e.g., hypotension). Errors in dosing of anticoagulants resulted in bleeding, stroke, a deep vein thrombosis, and death.

The most common pharmacologic class of endocrine medications was insulin (71.4%; 10 of 14). Other classes were oral antidiabetic agents (21.4%; 3 of 14) and a hormone (7.1%; 1 of 14). Patients with errors in dosing of insulin and oral antidiabetics experienced hyperglycemia or hypoglycemia, depending on the nature of the error. The most common class of electrolytes/vitamins was elements (83.3%; 5 of 6). Among 4 patients with errors in dosing of potassium, all experienced hyperkalemia as a result of the error. The two classes of anti-infectives were antibiotics (60.0%; 3 of 5) and antivirals (40.0%; 2 of 5).

The most common pharmacologic classes across all medications (those involved in 5 or more events) were anticonvulsants (16.4%; 21 of 128), insulin (7.8%; 10 of 128), beta blockers (7.0%; 9 of 128), diuretics (5.5%; 7 of 128), opioids (5.5%; 7 of 128), anticoagulants (4.7%; 6 of 128), benzodiazepines (4.7%; 6 of 128), antipsychotics (3.9%; 5 of 128), and muscle relaxants (3.9%; 5 of 128); the specific medications in each of these pharmacologic classes is detailed in **Figure 6**. The most common single medications were levetiracetam (5.5%; 7 of 128), baclofen (3.9%; 5 of 128), clonazepam (3.1%; 4 of 128), clonidine (3.1%; 4 of 128), and potassium (3.1%; 4 of 128).

Figure 6: Most Common Pharmacologic Classes[a] in Serious Events Related to Medication Reconciliation Submitted to PA-PSRS From January 1, 2015–August 31, 2020, n=76

[a]Most common pharmacologic classes were defined as those with 5 or more occurrences.

Table 1: Strategies to Reduce the Risk of Medication Reconciliation Errors

Defined Roles/ Responsibilities	Consider use of a dedicated pharmacy role for medication reconciliation to assist with the following processes[5,16-18,20,30-32] • Collecting medication histories • Calling community pharmacies, primary or specialty physicians, family members, or care home for clarifications • Reconciling medication discrepancies with providers during admission, care transitions, changes in care plan, transfers, and discharge • Educating providers and patients when medication questions arise If a dedicated role is not possible for all patients due to resource constraints, consider use of a dedicated pharmacy role for the following high-risk patients or transitions of care[5,6,11,16,19,20,22,27] • Elderly (age 65 and older) • Polypharmacy (as defined by the facility) • Specified transitions of care, such as admissions through the emergency department
Medication Indication	Include the purpose or reason the patient is taking the medication on the home medication list and throughout all documentation systems for medication orders, care planning, and discharge planning[33]
Standardized Processes	Develop standardized processes to ensure all clinicians follow consistent procedures throughout the continuum of care[2,5,10,23,29] • Standardized processes such as interview questions or prompts to collect accurate medication histories ▪ Include prompts for use of over-the-counter medications, patches, herbals, and other drug or alcohol use ▪ Include prompts to verify patient identification for communication regarding medications over the phone or paper lists that are exchanged • Standardized processes to provide discharge medication instructions ▪ Highlight medications that are new or have been stopped or changed ▪ Develop processes to communicate medication changes to patient's pharmacy ▪ Develop a standardized format for medication orders, such as directions for taking, purpose of the medication, and expected side effects ▪ Determine if prescriptions need to be written and whether patient is able to fill the prescription for all home medications ordered ▪ Encourage patient to take this documentation to all follow-up physician appointments and to the community pharmacy ▪ Add updated medications to patient portal information
Triggers and Alerts	Review facility lists and processes for high-alert medications[25,42] • Consider adding anticonvulsants to facility lists of medications that trigger additional alerts, monitoring, or laboratory testing • Identify triggers and bundled orders at the point of ordering to ensure appropriate monitoring is ordered for the medications prescribed • Identify triggers and bundled orders in the electronic medical record to ensure laboratory or other monitoring results are routinely reviewed
Information Technology	Develop shared electronic medication lists[40,41] • Develop technologies to assist sharing of live/current patient medication histories across care areas, with community pharmacies and primary care physicians, and between hospital visits • Encourage and educate patients on the use of patient portals on mobile devices to reference and double-check their current medication list

Discussion

Medication reconciliation is complex and requires extensive resources, effective processes, clear and consistent communication and documentation, and active participation by the patient and healthcare providers. It also necessitates that these steps be implemented at every transition point and change in therapy throughout the continuum of care. Medication reconciliation errors have potential to result in patient harm. A 2012 study of medication errors related to medication reconciliation reported to PA-PSRS showed that 67.3% of events reached the patient, and of these events, 3.6% resulted in patient harm and 17.4% required monitoring to prevent harm.[29]

In **Table 1**, we present strategies to reduce the risk for medication reconciliation errors. Standardization and development of clear roles and responsibilities for medication reconciliation can help to ensure accuracy and prevent errors that can lead to patient harm.[2, 5-11] Researchers have described decreased readmissions, fewer returns to the ER, and up to a 66% reduction in medication discrepancies when using standardized processes and a dedicated pharmacist or pharmacy technician to collect medication histories and coordinate the medication reconciliation process.[5,16-18,20,30-32]

Our analysis indicated that most of the medication reconciliation errors occurred during admission/triage (69.9%), and another 16.1% occurred during discharge. The literature suggests that because medication reconciliation can be resource intensive, interventions focused on a specific transition point (such as in the emergency department, on admission, or at the time of discharge) can help reduce medication reconciliation errors.[5,11,16,19,22,27] Furthermore, 55.9% of the events in our study occurred in those 65 years and older. The literature also suggests a focus on specific high-risk groups (such as the elderly, those taking many home medications, or those with comorbidities) for more intensive medication reconciliation interventions.[6,11,20]

Knowing why a patient takes a particular medication can help to prevent many types of medication reconciliation errors by helping a clinician to better understand how the patient's clinical history and diagnoses correlate with the medication list. The Joint Commission already recommends including the indication for a medication along with the patient's diagnosis during continuous care planning.[33] Thus, ensuring that the medication indication is included on medication orders, home medication lists, patient discharge sheets, and pharmacy prescriptions can further enhance clinician critical thinking to prevent medication errors as well as enhance the patient's understanding of why they are taking particular medications.

In our analysis, we identified several pharmacologic classes that are currently included on the Institute for Safe Medication Practices (ISMP) acute care high-alert medication list and that can result in patient harm if used in error, such as opioids, selected beta blockers, anticoagulants, and insulin.[25,34-37] However, the anticonvulsant pharmacologic class was most predominant in our analysis of serious events (16.4%; 21 of 128 medications), and this class is not currently included on the ISMP acute care high-alert medication list.[25] Although our analysis revealed that events involving anticonvulsants were common across the age spectrum, research concerning the potential hazards of errors in dosing of anticonvulsants is limited. Two studies specifically in the pediatric population have shown that up to 24% of pediatric patients with epilepsy had errors in orders for anticonvulsants during transitions of care resulting in an additional risk for seizures.[38, 39] Thus, facilities should consider adding anticonvulsants to their facility lists of medications that trigger additional alerts, monitoring, or laboratory testing to prevent errors from occurring or provide an early warning system to identify errors before they cause harm.

We found that process failures related to obtaining accurate information from the source contributed to 19.4% of serious medication reconciliation events. In addition, in 24.7% of analyzed events, a family member, guardian, care home, primary care provider, or community pharmacy was able to help identify or confirm that a medication reconciliation event had occurred. Thus, standarized processes for validating and communicating medication histories during transitions of care, such as standardized medication history interview questions and standardized discharge processes, can help prevent medication reconciliation events.[6, 8] In addition, electronic medical records systems that can communicate home medications across computer systems or through patient portals on mobile devices, which can be accessed by patients at physician offices, the pharmacy, during hospital admission, or discharge, can also help to improve medication histories and prevent medication reconciliation errors.[40, 41]

Limitations

Despite mandatory event-reporting laws in Pennsylvania, our data are subject to the limitations of self-reporting. Portions of this analysis were limited by the amount and quality of information provided in the free-text and optional data fields. It is also important to note that medication reconciliation events—especially those that occur at discharge—may not be immediately realized, and therefore, not reported. Thus, the number of serious events and severity of the outcomes may be more substantial than those captured through PA-PSRS reporting.

Notes

This analysis was exempted from review by the Advarra Institutional Review Board.

Conclusion

Medication reconciliation continues to pose significant challenges for patient safety due to the complex set of processes involved throughout the continuum of patient care. In our analysis of serious events, we identified process breakdowns across many transitions of care, with the most frequent involving the process of order entry/transcription and occurring during admission/triage. Of particular note, we found that anticonvulsants were the most common pharmacologic class of medications involved in serious events. Risk reduction strategies, such as defined roles for medication reconciliation; listing reasons/indications for medications; and consideration for adding anticonvulsants to facility processes for high-alert medications that trigger additional warnings, monitoring, or laboratory testing, may help reduce patient harm associated with errors in the medication reconciliation process.

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