Health Information Technology–Related Wrong-Patient Errors:

Context is Critical

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Wrong-Patient Errors During Ordering

Within the clinical encounter, wrong-patient errors during ordering of diagnostic images, labs, and medications have been a central focus of research efforts, given the prevalence of these errors. CPOE systems can facilitate wrong-patient errors due to poor usability, fragmented displays, and limited functionalities. For example, one study examining wrong-patient errors in radiology found that errors during order entry were the most frequent compared to other parts of the care process. Wrong-patient errors during medication ordering also have received considerable attention given the potential for significant patient harm if a patient receives the wrong medication or does not receive a medication that was intended for him/her.

Several improvement efforts have focused on enhancing CPOE systems to reduce the occurrence of incorrect order entry. Numerous studies implemented a HIT verification alert popup requiring prescribers to confirm a patient’s identity prior to signing off on an order, which was found to reduce the number of wrong-patient errors. However, this intervention can also increase user frustration. Clinical decision support systems integrated within CPOE systems have also been tested, though not all studies resulted in a decrease in wrong-patient errors. Other improvement efforts have involved limiting the number of patient charts open concurrently in the EHR to reduce the likelihood of selecting the wrong patient’s record. This solution showed early promise, recent studies have found that limiting the number of open charts made no significant difference in the number of wrong-patient errors.

Prior studies have also identified HIT enhancements to improve identification of wrong-patient errors in radiology. One study implemented radiopaque patient identification stickers as an additional check to ensure the patients’ conditions correlate with their imaging, and a second study involved capturing photographs of patients’ faces simultaneously with portable chest radiographs.

Wrong-Patient Errors During Medication Administration

Wrong-patient errors during medication administration have also been a prominent area of research given the frequency of errors and potential for significant patient harm. For example, one study reviewing safety reports from two hospitals found 10% of medication administration errors were related to wrong-patient errors. Similar to wrong-patient errors and CPOE systems, shortcomings in the design and implementation of barcode medication administration (BCMA) systems have been recognized as a challenge by some researchers. One study found 15 types of workarounds (steps performed out of sequence and unauthorized BCMA process steps) performed by nurses as a result of technology-related issues (e.g., connectivity, multiple scans needed to read barcodes), all of which had wrong-patient errors listed as a possible negative outcome. Additionally, previous literature investigating BCMA role in reducing wrong-patient medication administration errors have been inconsistent in terms of significance of results.
Study Focus
With the extensive research on HIT-related wrong patient errors and recognition that these errors persist, we analyzed patient safety event (PSE) reports with a focus on the contextual details of each report. We analyzed the general care process and clinical process step during which HIT wrong patient errors occurred and were discovered, whether the error reached the patient, and the impact on the patient or the event with harm. Importantly, we compared the clinical process steps involved for errors that reached the patient to those that were caught before reaching the patient. This approach affords the opportunity to identify the people, processes, or technology that may effectively enable the identification of wrong patient errors in the context of patient care.

Methods

Data Source and Selection
Data were comprised of all safety reports submitted to the Pennsylvania Patient Safety Reporting System (PA-PSRS®) between January 1 and December 31, 2019, which comprised 293,400 reports from 595 facilities. To identify possible HIT- and wrong patient-related reports, we used a three-pronged retrieval process that included reports in which the:

- Reporter assigned a subevent type category of “wrong patient” or similar subevent type (e.g., “wrong patient requested,” or “wrong patient transfused”) in the Transfusion event type category, or
- Reporter categorized the issue as HIT-related and the description contained a keyword (e.g., “wrong person”) indicating it may be wrong patient-related, or
- Report was identified as HIT-related from a machine learning algorithm, which was previously developed to identify HIT-related reports based on the free-text description in patient safety event reports, and contained a keyword indicating it may be wrong patient-related.  

This search returned 3,114 reports, which were manually reviewed for clinical process steps during which HIT wrong patient errors occurred and whether errors reached the patient. Following these analyses, we focus on the four general care processes in which errors occurred and determine the most common clinical process steps during which the errors occurred and how they were discovered.

General Care Process. The prominent general care processes in which HIT wrong patient errors occurred were radiology (n=295; 24.8%), medication (n=283; 22.8%), laboratory (n=241; 20.3%), and procedures (n=224; 18.8%), followed by administrative (n=95; 8.0%) and general (n=51; 4.3%).

For the qualitative analysis, a grounded theory approach was used.  

Figure 1. HIT Wrong-Patient Data Selection Process from PA-PSRS (Calendar Year 2019)

Qualitative Analyses
We report the general care process involved, the clinical process steps during which the HIT wrong patient error occurred and was discovered, whether errors reached the patient. Following these analyses, we focus on the four general care processes in which errors were most frequently involved to determine the most common clinical process steps during which the errors occurred and how they were discovered.

Descriptive Analyses

From the 293,400 reports submitted in calendar year 2019, 3,114 (1.1%) were initially identified as potentially HIT wrong patient errors and 3,189 (1.1%) were confirmed through expert review. We first present the descriptive analysis with harm score and facility type followed by the qualitative analysis of general care process, clinical process step during which HIT wrong patient errors occurred and were discovered, and whether the error reached the patient, with descriptions of the impact on the patient or how the error was caught.

Table 1: Frequency Counts, Percentages, Definitions, and Examples of Categories for General Care Process and Clinical Process Step

| General Care Process, N=1,189 | Frequency (%) | Definition | Example |
|-------------------------------|--------------|-----------|---------|
| Administrative | 95 (8.0%) | Reports related to registration, scheduling, admission, consent processing, billing, referrals, consults, scanning, faking, and uploading documents. | The wrong patient’s document was scanned into a patient’s electronic chart. |
| General | 51 (4.3%) | Reports that contain general language of HIT wrong-patient errors and do not identify whether an error was related to administrative, laboratory, medication, procedure, radiology, or other care process. | A nurse documented a patient’s weight in the incorrect electronic chart. |
| Laboratory | 241 (20.3%) | Reports related to the ordering, labelling, collection, processing, and/or documentation of results of a clinical specimen or other laboratory procedures. Includes reports related to a specimen or blood test that does not specify whether it is a point of care test. | A nurse drew labs on a patient that was not ordered for another patient. |
| Medication | 283 (23.8%) | Reports related to the ordering and labeling, and/or the prescribing, retrieval, administration and documentation of a medication. Includes reports related to the electronic medication administration record (eMAR) lookup and the correct selection of medications or wrong patients in an automated dispensing system. | A medication was ordered for a different patient than the one for whom it was intended. |
| Procedure | 224 (18.8%) | Reports related to the ordering, processing, interruption, and/or documentation of results for procedures. Includes reports related to preop procedures, surgery, dialysis, point of care tests (e.g., STAT, urinalysis, biopsies, transfusions, telemetry strips, and EKG/ECG). | The point-of-care urine analysis was performed under the wrong patient identification number. |
| Radiology | 295 (24.8%) | Reports related to the ordering, processing, interpretation, and/or documentation of results for imaging. Includes reports related to CT scans, ultrasounds, and MRIs. | A patient’s ultrasound was performed under the incorrect patient name. |
### Clinical Process Step, N=1,189

| Clinical Process Step | Error Occurred | Error Discovered | Definition | Example |
|-----------------------|----------------|------------------|------------|---------|
| Before or during imaging | 96 (8.1%) | 91 (7.7%) | Report states HIT wrong-patient error occurred or was discovered before or during imaging. Includes errors related to patient verification and scanning or entering wrong patient information into a HIT system before a medical imaging procedure, as well as those identified immediately after obtaining an image but before it was sent or uploaded for interpretation. | Outpatient MRI done on correct patient but under incorrect name on scanner. |
| Before or during labs | 37 (3.1%) | 15 (1.3%) | Report states HIT wrong-patient error occurred or was discovered before or during laboratory specimen analysis. Includes errors related to the collection of specimens, patient verification and scanning, or entering wrong patient information into a HIT system before analyzing specimen, as well as those identified immediately after analyzing specimen but prior to inputting results into a HIT system. | The operator entered the incorrect patient identifier into the analyzer. |
| Before or during medication administration | 24 (2.0%) | 40 (3.4%) | Report states HIT wrong-patient error occurred or was discovered before or during medication administration. Includes errors related to patient verification, scanning patient barcodes or medications when an automated dispensing system was not mentioned, and opening up the wrong patient chart during administration. | Patient was started on respiratory treatment that was ordered for a different patient. |
| Before or during procedure | 83 (7.0%) | 19 (1.6%) | Report states HIT wrong-patient error occurred or was discovered before or during a procedure, includes errors related to patient verification and scanning patient barcodes or entering patient identifiers into test equipment. | The incorrect patient identification number was entered into the point-of-care testing machine and utilized to perform and result the patient test. |
| Dispensing medication | 35 (2.9%) | 1 (0.1%) | Report states HIT wrong-patient error occurred or was discovered during the process of a clinician dispensing medication from a HIT system (e.g., dispensing system). | Medication found to have been pulled from Pyxis on wrong patient but administered to correct patient. |
| Documentation | 94 (7.9%) | 25 (2.1%) | Report states HIT wrong-patient error occurred or was discovered during clinician or staff documentation within a HIT system. Includes errors related to dictating, charting on the wrong patient, and e-messages containing wrong-patient information or being sent for the wrong patient. | Charted under the wrong patient in the electronic health record. |
| Inputting results | 74 (6.2%) | 2 (0.2%) | Report states HIT wrong-patient error occurred or was discovered related to incorrectly inputting results into a HIT system for a wrong-patient. Includes errors related to inputting lab or imaging results into a patient’s record with no explicit mention of whether the error was related to entering wrong-patient information before or during a procedure, lab or imaging. | Wrong patient results were entered into another patient’s chart. |
| Labeling | 21 (1.8%) | 2 (0.2%) | Report states HIT wrong-patient error occurred or was discovered during the labeling process and that resulted from mislabeled documents, specimen, equipment or printed images. Includes reports describing errors related to staff generating, handwriting, or retrieving labels to perform a test when "mislabeled" or "labeled" are not included in the narrative. | Specimen was mislabeled and now the results are in the incorrect patient chart. |
| Other | 10 (0.8%) | NA | Report states HIT wrong-patient error that occurred outside of the clinical process codes or as a result of a HIT system error (not user-error). Includes errors related to discharge. | Technician reported that there had been a system issue and the wrong patient images were in the wrong chart. |

### Table 2

| Clinical Process Step | Error Occurred | Error Discovered | Definition | Example |
|-----------------------|----------------|------------------|------------|---------|
| Prescribing/ordering | 498 (41.9%) | 19 (1.6%) | Report states HIT wrong-patient error occurred or was discovered during the ordering or prescription of medications, imaging, consults, referrals, or other clinical procedures. Includes errors related to consultation or physician requests, discharge, and orders for a wrong patient scanned into a HIT system. | Lab orders ordered under wrong patient. |
| Registration | 110 (9.3%) | 9 (0.8%) | Report states HIT wrong-patient error occurred or was discovered during the process of patient registration or admission. | Patient was admitted under an incorrect medical record number (MRN) belonging to a different patient. |
| Review of results | 2 (0.2%) | 286 (24.1%) | Report states HIT wrong-patient error occurred or was discovered when reviewing test results within a HIT system. Includes clinicians (e.g., pharmacy) reviewing orders and calling for verification. | Nurse opened incorrect patient chart and read order for oral contrast. |
| Reviewing information | 66 (5.4%) | 3 (0.3%) | Report states HIT wrong-patient error occurred or was discovered during the process of scanning care-related documents into a HIT system. Excludes orders scanned into a HIT system. | Auditing charts and found another patient’s paperwork scanned into wrong record. |
| Scanning documents | 20 (1.7%) | 2 (0.2%) | Report states HIT wrong-patient error occurred or was discovered during the process of scheduling a patient appointment, outpatient exam, or any other care process. | This patient was scheduled for an abdominal ultrasound but it was the wrong patient. |
| Scheduling | 18 (1.5%) | 524 (44.1%) | Report does not explicitly state how or at what point of care the HIT wrong-patient error occurred or was discovered. | The wrong patient information was found on patient’s chart. |

### Analysis of Whether the Report Reached Patient.

Distinct from the severity level entered by the reporter, as part of our analysis, we identified whether the error described by the reporter reached the patient. Of the 1,189 errors, 290 (24.4%) reached the patient. The 501 (42.1%) did not reach the patient, and for 398 reports (33.5%), there was insufficient information to determine if the error reached the patient. Of the 290 errors that reached the patient, over one-third of reports resulted in inaccurate medication administration (n=110; 37.9%); followed by wrong test or procedure performed (n=65; 22.4%) and retest, redraw, or reimage due to results going to the wrong patient (n=56; 19.3%), shown in Table 2. Of the 501 HIT wrong-patient errors that did not reach the patient, errors were frequently caught by a nurse, technician, or other healthcare staff (n=303; 60.5%). There was insufficient information in 161 (32.1%) HIT wrong-patient reports that did not reach the patient to determine how the error was caught. Very few errors were reported as being caught by a physician or advanced practice provider (n=16; 3.2%); HIT system (n=12; 2.4%); or patient, caregiver, or family member (n=9; 1.8%). All frequency counts and percentages for categories related to impact on the patient and how the errors were caught are displayed in Table 2, and frequency counts and percentages of whether a HIT wrong-patient error reached the patient, by the clinical process step during which it occurred and was discovered, are shown in Table 3.
Of the 113 medication-related errors that reached the patient, the most frequent identifiable clinical process steps during which errors occurred included prescribing/ordering (n=25; 32.9%) and before or during imaging (n=22; 18.6%), similar to errors that reached the patient. The most frequent identifiable clinical process steps during which errors were discovered included reviewing information (n=27; 17.0%). Additional details regarding errors involving radiology clinical process steps are in Table 4.

Medication-Specific Reports. Of the 283 medication-related reports, 113 (39.9%) reached the patient, 134 (47.3%) did not reach the patient, and for the remaining 36 reports (12.8%) there was insufficient information to determine whether the error reached the patient. Of the 113 medication-related errors that reached the patient, the most frequent identifiable clinical process steps during which errors occurred included prescribing/ordering (n=46; 51.9%) and before or during imaging (n=38; 42.5%), similar to errors that reached the patient. The most frequent identifiable clinical process steps during which errors were discovered included reviewing information (n=27; 17.0%). Additional details regarding errors involving medication clinical process steps are in Table 5.

Laboratory-Specific Reports. Of the 241 laboratory-related reports, 61 (25.3%) reached the patient, 66 (27.4%) reports did not reach the patient, and for the remaining 114 reports (47.3%) there was insufficient information to determine whether the error reached the patient. Of the 61 laboratory-related errors that reached the patient, the most frequent identifiable clinical process steps during which errors occurred included prescribing/ordering (n=31; 50.8%) and before or during labs (n=11; 18.0%). The most frequent identifiable clinical process steps during which errors were discovered included reviewing of results (n=20; 32.8%) and reviewing information (n=8; 13.1%).

Of the 66 laboratory-related errors that did not reach the patient, the most frequent identifiable clinical process steps during which errors occurred included prescribing/ordering (n=29; 43.9%) and before or during labs (n=11; 16.7%), similar to errors that reached the patient. The most frequent identifiable clinical process steps during which the error was discovered included reviewing of results (n=18; 27.3%) and reviewing information (n=14; 21.2%), also similar to errors that reached the patient. Additional details regarding errors involving laboratory clinical process steps are in Table 6.

Procedure-Specific Reports. Of the 224 procedure-related reports, 23 (10.3%) reached the patient, 76 reports (33.9%) did not reach the patient, and for the remaining 125 reports (55.8%) there was insufficient information to determine whether the error reached the patient. Of the 23 procedure-related errors that reached the patient, the most frequent identifiable clinical process steps during which errors occurred included before or during procedure (n=7; 29.2%), prescribing/ordering (n=5; 21.7%), and reviewing information (n=4; 17.4%) and reviewing information (n=2; 8.7%).

Of the 76 procedure-related errors that did not reach the patient, the most frequent identifiable clinical process steps during which errors occurred included before or during procedure (n=18; 23.7%), prescribing/ordering (n=11; 14.4%), and before or during imaging (n=10; 13.2%). The most frequent identifiable clinical process steps during which errors were discovered included reviewing of reports (n=12; 15.8%) and, different from errors that reached the patient, reviewing information (n=17; 22.4%). Additional details regarding errors involving procedure clinical process steps are in Table 7.

Discussion

While there are national patient safety goals, extensive research, and specific safety improvement tools focused on reducing HIT-related wrong-patient errors, our descriptive and qualitative analyses of thousands of reports from over 500 healthcare facilities show that HIT-related wrong-patient errors persist. Of the 293,400 reports submitted to PA-PSRS in calendar year 2019, 3,114 (1.1%) were initially identified as potential HIT wrong-patient errors using a three-pronged retrieval process and 1,189 (0.4%) were confirmed through expert review. Findings from the qualitative analysis revealed that nearly 90% of the wrong-patient errors were associated with radiology (24.4%), medication (23.4%), laboratory (20.3%), or procedure (18.8%) general care processes, shown in Table 1. While most of the HIT wrong-patient related error reports reviewed described errors that did not reach the patient, 24.4% of the reports described errors that did. When the
errors reached the patient, our analyses show that the impact on the patient was frequently inaccurate medication administration (37.9% of errors reaching the patient) or the wrong test or procedure performed on the patient (22.4% of errors reaching the patient), both of which are issues that have the potential for significant patient harm. (See Table 2.)

Healthcare worker (e.g., nurse, technician, or other healthcare staff) workflow processes and verbal communication practices with patients, family members, and other staff often caused errors before they reached and potentially harmed the patient. These findings underscore the role of humans as a safety “line of defense” in complex healthcare environments. Within the reports, there were few instances of physicians and advanced practice providers; HIT systems, such as alerts; or patient, caregiver, or family members catching errors, which may be due to the underreporting of those details or events.22

Focusing on Processes Associated With Catching Errors

Unique to our HIT wrong-patient error analysis is the focus on where the error occurred and where it was discovered. Across all 1,189 general care processes, most errors occurred during prescribing/ordering (n=498; 41.9%) replicating previous research.6 When it could be determined how errors were discovered, it was primarily through reviewing information (n=286; 24.1%).

Looking at the prominent general care processes individually and analyzing where the error occurred and where it was discovered for reports that reached the patient and those that did not, reveals important differences that are not appreciated when findings are collapsed across general care processes. Where there are patterns of clinical process steps that are serving to discover errors before reaching the patient, a safety science and resilience engineering approach of learning from these instances and expanding these practices can be used. Our analyses identified several interesting patterns.

- For radiology-related wrong-patient errors, nearly 50% of errors occurred during the ordering process, and when these errors were caught before reaching the patient, it was just before or during imaging as well as when reviewing information. These clinical process steps served to catch over 60% of the errors that did not reach the patient.
- For medication-related wrong-patient errors, over 70% of errors occurred during prescribing or ordering, and when these errors were discovered, before reaching the patient, it was during the review of results, review of information, or before or during labs.
- For procedure-related wrong-patient errors, over a third of the errors occurred before or during the procedure, and when these errors were caught, before reaching the patient, over 70% of the time it was when reviewing information or just before or during the procedure.

Reviewing information was a critical process step for catching errors before they reached the patient in all four general care processes, confirming the importance of taking time to deliberately review patient identifiers. For three of the four general care processes, the time just before or during the clinical activity was also important for catching errors before they reached the patient, suggesting that time-outs and other deliberate actions to pause activity may be important for catching errors.

Recommendations for Reducing Wrong-Patient Errors

Based on our analyses, previous literature, and recommendations from other organizations, we highlight the following:

- As this study and previous studies have found, wrong-patient errors were often during the ordering process. We recommend reviewing provider workflow processes to ensure it includes checking at least two patient identifiers.24 Additionally, EHR ordering screens may be cluttered, making it difficult to find patient identifiers, and these identifiers may not always be consistently displayed across different screens.23 Therefore, using existing toolkits to optimize HIT and workflow processes may be beneficial.
- Task interruptions have been identified as a potential cause of wrong patient errors during the ordering process.23,24 As a result, we recommend ordering providers develop strategies to manage interruptions, including:10
  - Placing orders in an environment that is not prone to interruptions.
  - When interrupted, attempt to complete the task or place the order, then go back at this reminder.
  - When interrupted, ask the person interrupting you to wait for a few minutes while you complete the task of placing the order.
  - We recommend that healthcare facilities review their safety reports related to wrong patient errors to determine where existing issues reside. Interview providers and other staff to determine where they believe hazards are. Ask providers and staff about clinical process steps that they believe serve to discover errors before they reach patients, as well as where gaps exist. Once successful processes are identified, the application of these processes should be expanded.
  - Across the four prominent general processes of radiology, medication, laboratory, and procedure, reviewing information was important for catching errors before they reached patients. Reiterating this importance of reviewing information and rewarding staff when these behaviors are observed will serve to reinforce this practice.
  - Reviewing of information just before or during the clinical activity was also important for discovering errors before reaching the patient. Healthcare facilities should reinforce the importance of identity verification before and during clinical activities and determine whether specific time-outs or other deliberate pauses would be beneficial.

Table 3: Total Frequency Counts and Percentages for Whether a HIT Wrong-Patient Error Did or Did Not Reach the Patient by the Clinical Process Step in Which It Occurred and Was Discovered

| Error Occurred | Before or during imaging | Before or during labs | Before or during medication administration | Before or during procedure |
|----------------|--------------------------|-----------------------|------------------------------------------|---------------------------|
| Total          | All                      | Reached Patient       | Did Not Reach Patient                    | Insufficient Information  |
| All            | 1,189 (100%)             | 290 (100%)            | 501 (100%)                               | 299 (100%)                |
| Before or during imaging | 96 (8.1%)            | 22 (7.7%)             | 48 (9.5%)                                | 26 (6.5%)                 |
| Before or during labs | 37 (3.1%)                | 11 (3.8%)             | 11 (2.2%)                                | 15 (3.8%)                 |
| Before or during medication administration | 24 (2.0%)          | 21 (7.2%)             | 2 (0.4%)                                 | 1 (0.3%)                  |
| Before or during procedure | 83 (7.0%)            | 9 (0.3%)              | 21 (4.2%)                                | 53 (13.3%)                |
| Dispensing medication | 35 (2.9%)              | 20 (6.9%)             | 9 (1.8%)                                 | 6 (1.5%)                  |
| Documentation | 94 (7.9%)                | 8 (2.8%)              | 50 (10.0%)                               | 36 (9.0%)                 |
| Inputting results | 74 (6.2%)              | 13 (4.5%)             | 17 (3.4%)                                | 44 (11.1%)                |
| Labeling | 21 (1.8%)                | 7 (2.4%)              | 10 (2.0%)                                | 4 (1.0%)                  |
| Other | 10 (0.8%)                | 1 (0.3%)              | 5 (1.0%)                                 | 4 (1.0%)                  |
| Patient engagement | --                      | --                    | --                                       | --                        |
| Prescribing/ordering | 498 (41.9%)           | 141 (48.6%)           | 267 (53.3%)                              | 90 (22.6%)                |
| Registration | 110 (9.3%)               | 22 (7.7%)             | 21 (4.2%)                                | 67 (16.8%)                |
| Review of results | 1 (0.1%)               | 1 (0.3%)              | 1 (0.2%)                                 | --                        |
| Reviewing information | 2 (0.2%)               | 1 (0.3%)              | 1 (0.2%)                                 | --                        |
| Scanning documents | 66 (5.6%)               | 5 (1.7%)              | 22 (4.4%)                                | 39 (9.8%)                 |
| Scheduling | 20 (1.7%)                | 3 (1.0%)              | 10 (2.0%)                                | 7 (1.8%)                  |
| Insufficient information | 18 (1.5%)             | 5 (1.7%)              | 7 (1.4%)                                 | 6 (1.5%)                  |
| Total |

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### Table 4: Radiology Frequency Counts and Percentages for Whether a HIT Wrong-Patient Error Did or Did not Reach the Patient by the Clinical Process Step in Which It Occurred and Was Discovered

| Error Occurred                        | All   | Reached Patient | Did Not Reach Patient | Insufficient Information |
|---------------------------------------|-------|-----------------|-----------------------|--------------------------|
| Before or during imaging              | 96 (32.5%) | 22 (31.1%) | 48 (30.2%) | 26 (40.0%) |
| Before or during labs                 | -     | -               | -                     | -                        |
| Before or during medication administration | -     | -               | -                     | -                        |
| Before or during procedure            | -     | -               | -                     | -                        |
| Dispensing medication                | -     | -               | -                     | -                        |
| Documentation                         | 1 (0.3%)  | -               | -                     | 1 (1.5%)                |
| Inputting results                    | 17 (5.8%)  | 5 (7.0%)    | 6 (3.8%)              | 6 (9.3%)                |
| Labeling                              | 1 (0.3%)   | -               | -                     | 1 (1.5%)                |
| Other                                 | 2 (0.7%)   | -               | 1 (0.6%)              | 1 (1.5%)                |
| Patient engagement                   | -     | -               | -                     | -                        |
| Prescribing/ordering                 | 147 (49.8%) | 36 (50.7%) | 94 (59.1%) | 17 (26.2%) |
| Registration                         | 20 (6.8%)  | 5 (7.0%)     | 6 (3.8%)              | 9 (13.9%)               |
| Review of results                    | -     | -               | -                     | -                        |
| Reviewing information                | -     | -               | -                     | -                        |
| Scanning documents                   | 2 (0.7%)   | -               | 2 (1.3%)              | -                        |
| Scheduling                           | 4 (1.4%)   | -               | 1 (0.6%)              | 3 (4.6%)                |
| Insufficient information             | 5 (1.7%)   | 3 (4.2%)    | 1 (0.6%)              | 1 (1.5%)                |
| Total                                 | 295 (100%) | 71 (100%)   | 159 (100%) | 65 (100%)  |

### Table 5: Medication Frequency Counts and Percentages for Whether a HIT Wrong-Patient Error Did or Did not Reach the Patient by the Clinical Process Step in Which It Occurred and Was Discovered

| Error Occurred                        | All   | Reached Patient | Did Not Reach Patient | Insufficient Information |
|---------------------------------------|-------|-----------------|-----------------------|--------------------------|
| Before or during imaging              | -     | -               | -                     | -                        |
| Before or during labs                 | -     | -               | -                     | -                        |
| Before or during medication administration | -     | -               | -                     | -                        |
| Before or during procedure            | -     | -               | -                     | -                        |
| Dispensing medication                | -     | -               | -                     | -                        |
| Documentation                         | 1 (0.4%)  | -               | -                     | 1 (0.9%)                |
| Inputting results                    | 4 (1.4%)   | -               | 1 (0.9%)              | -                        |
| Labeling                              | -     | -               | -                     | -                        |
| Other                                 | -     | -               | -                     | -                        |
| Patient engagement                   | -     | -               | -                     | -                        |
| Prescribing/ordering                 | 206 (72.8%) | 66 (58.4%) | 114 (85.1%) | 26 (72.2%)  |
| Registration                         | -     | -               | -                     | -                        |
| Review of results                    | -     | -               | -                     | -                        |
| Reviewing information                | -     | -               | -                     | -                        |
| Scanning documents                   | -     | -               | -                     | -                        |
| Scheduling                           | -     | -               | -                     | -                        |
| Insufficient information             | 1 (0.4%)   | -               | 1 (0.8%)              | -                        |
| Total                                 | 283 (100%) | 113 (100%) | 134 (100%) | 36 (100%)  |

| Error Discovered                      | All   | Reached Patient | Did Not Reach Patient | Insufficient Information |
|---------------------------------------|-------|-----------------|-----------------------|--------------------------|
| Before or during imaging              | -     | -               | -                     | -                        |
| Before or during labs                 | -     | -               | -                     | -                        |
| Before or during medication administration | -     | -               | -                     | -                        |
| Before or during procedure            | -     | -               | -                     | -                        |
| Dispensing medication                | -     | -               | -                     | -                        |
| Documentation                         | 1 (0.4%)  | -               | -                     | 1 (0.9%)                |
| Inputting results                    | 1 (0.4%)   | -               | 1 (0.8%)              | -                        |
| Labeling                              | -     | -               | -                     | -                        |
| Other                                 | -     | -               | -                     | -                        |
| Patient engagement                   | 4 (1.4%)  | 2 (1.8%)    | 2 (1.5%)              | -                        |
| Prescribing/ordering                 | 10 (3.5%)  | 4 (3.5%)    | 5 (3.7%)              | 1 (2.8%)                 |
| Registration                         | -     | -               | -                     | -                        |
| Review of results                    | -     | -               | -                     | -                        |
| Reviewing information                | -     | -               | -                     | -                        |
| Scanning documents                   | -     | -               | -                     | -                        |
| Scheduling                           | -     | -               | -                     | -                        |
| Insufficient information             | 105 (37.1%) | 61 (54.0%) | 20 (15.0%) | 24 (66.7%)  |
| Total                                 | 283 (100%) | 113 (100%) | 134 (100%) | 36 (100%)  |
### Table 6: Laboratory Frequency Counts and Percentages for Whether a HIT Wrong-Patient Error Did or Did not Reach the Patient by the Clinical Process Step in Which It Occurred and Was Discovered

| Error Occurred          | Laboratory | Did Not Reach Patient | Insufficient Information |
|-------------------------|------------|-----------------------|--------------------------|
| Before or during imaging| All        | 26 (22.8%)            | --                       |
| Before or during labs    | Reached    | 1 (0.9%)              | --                       |
| Before or during medication administration | -- | -- | -- |
| Before or during procedure | -- | -- | -- |
| Dispensing medication   | --         | --                    | --                       |
| Documentation           | --         | --                    | --                       |
| Inputting results       | --         | --                    | --                       |
| Labeling                | --         | --                    | --                       |
| Other                   | --         | --                    | --                       |
| Patient engagement      | --         | --                    | --                       |
| Prescribing/ordering    | --         | --                    | --                       |
| Registration            | --         | --                    | --                       |
| Review of results       | --         | --                    | --                       |
| Reviewing information   | --         | --                    | --                       |
| Scanning documents      | --         | --                    | --                       |
| Scheduling              | --         | --                    | --                       |
| Total                   | All        | 241 (100%)            | 66 (100%)                |

### Table 7: Procedure Frequency Counts and Percentages for Whether a HIT Wrong-Patient Error Did or Did not Reach the Patient by the Clinical Process Step in Which It Occurred and Was Discovered

| Error Occurred          | Procedure | Did Not Reach Patient | Insufficient Information |
|-------------------------|----------|-----------------------|--------------------------|
| Before or during imaging| All      | 82 (56.6%)            | 52 (41.6%)               |
| Before or during labs    | Reached  | 9 (39.1%)             | 21 (27.6%)               |
| Before or during medication administration | -- | -- | -- |
| Before or during procedure | -- | -- | -- |
| Dispensing medication   | --       | --                    | --                       |
| Documentation           | --       | --                    | --                       |
| Inputting results       | --       | --                    | --                       |
| Labeling                | --       | --                    | --                       |
| Other                   | --       | --                    | --                       |
| Patient engagement      | --       | --                    | --                       |
| Prescribing/ordering    | --       | --                    | --                       |
| Registration            | --       | --                    | --                       |
| Review of results       | --       | --                    | --                       |
| Reviewing information   | --       | --                    | --                       |
| Scanning documents      | --       | --                    | --                       |
| Scheduling              | --       | --                    | --                       |
| Total                   | All      | 224 (100%)            | 76 (100%)                |

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Table 6: Laboratory Frequency Counts and Percentages for Whether a HIT Wrong-Patient Error Did or Did not Reach the Patient by the Clinical Process Step in Which It Occurred and Was Discovered

Table 7: Procedure Frequency Counts and Percentages for Whether a HIT Wrong-Patient Error Did or Did not Reach the Patient by the Clinical Process Step in Which It Occurred and Was Discovered
Improving HIT to Reduce Wrong-Patient Errors

In addition to improving clinical processes to reduce wrong-patient errors, there is also an opportunity to improve the design of HIT systems. Additional research is needed to identify effective solutions and we recommend the following areas for further exploration:

- Several studies have found HIT safeguards alerting clinicians of potential wrong-patient errors during the ordering process, as well as other factors. Taking these factors into consideration when designing HIT may reduce the occurrence of wrong-patient errors.

- Several studies have shown that design interventions of HIT, such as making patient facial photographs visible to a provider during the ordering process, have been found to be effective in reducing the occurrence of these errors. We encourage incorporating such designs in combination with other strategies, including improvements to the working environment and verbal communication.

Limitations

PSE reports provide one lens for examining the safety hazards in healthcare facilities and are recognized as being underreported. Reporting is influenced by an organization’s event reporting culture and the ease of reporting, as well as other factors. It is likely that not all HIT wrong-patient events that occurred were reported. Additionally, when entering reports, the reporter is not required to specify clinical process steps in which an error occurred, was discovered, or how it was caught, resulting in only a subset of reports having this information. It is also worth noting that while the descriptive analysis showed there was only one report with data on the source of harm, this may underrepresent the actual number of reports that are discovered, or how it was caught, resulting in only a subset of reports having this information. It is also worth noting that while the descriptive analysis showed there was only one report with data on the source of harm, this may underrepresent the actual number of reports that are discovered, or how it was caught, resulting in only a subset of reports having this information.

Conclusion

HIT wrong-patient errors continue to occur across different general care settings and are a significant patient safety consequence. Identifying clinical process steps that are serving to catch errors before they reach the patient can provide additional insight into ways to prevent errors from forming patients.

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