PENNSYLVANIA PATIENT SAFETY ADVISORY

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The *Pennsylvania Patient Safety Advisory* provides timely original scientific evidence and reviews of scientific evidence that can be used by healthcare systems and providers to improve healthcare delivery systems and educate providers about safe healthcare practices. The emphasis is on problems reported to the Pennsylvania Patient Safety Authority, especially those associated with a high combination of frequency, severity, and possibility of solution; novel problems and solutions; and problems in which urgent communication of information could have a significant impact on patient outcomes.

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Wrong-Patient Medication Errors: An Analysis of Event Reports in Pennsylvania and Strategies for Prevention

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ABSTRACT

During the period of July 1, 2011, through December 31, 2011, 813 wrong-patient medication errors were reported to the Pennsylvania Patient Safety Authority. These reports were analyzed to classify the events by node, related processes, possible causes, and contributing factors and to detect trends and noteworthy cases. Errors most often occurred during transcribing (38.3%, n = 311) and administration (43.4%, n = 353) and least during dispensing (5.2%, n = 42). Anti-infectives, opioids, and anticoagulants were the most common types of medications associated with wrong-patient events. While multiple factors may have contributed to each event, the most common were two patients being prescribed the same medication, improper verification of patient identification, and similar room numbers. Important risk reduction strategies include ensuring proper storage of medications and patient-specific documents, utilizing healthcare technology fully, limiting verbal orders, and improving patient verification throughout the medication-use process. (Pa Patient Saf Advis 2013 Jun;10[2]:41-9.)

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INTRODUCTION

Patient misidentification has been a long-standing problem that has permeated all aspects of healthcare and led to errors ranging from wrong-site surgeries to discharging infants to the wrong families to ordering incompatible blood. From 2006 to 2007, the United Kingdom National Patient Safety Agency (NPSA) received 24,382 reports of patients being mismatched to their care.[1] The Joint Commission, which has been tracking these errors since 1996, reviewed 152 sentinel events related to wrong-patient, wrong-site, and wrong-procedure events in 2011 alone.[2] Because of the prevalence of patient misidentification, some organizations have offered various risk reduction strategies. The Joint Commission targets improving the accuracy of patient identification as a National Patient Safety Goal (NPSG).[3] Internationally, NPSA has recommended the use and the standardization of patient identity wristbands in the United Kingdom.[1] The World Health Organization (WHO) has also proposed strategies to prevent patient misidentification.[4] Despite these and other efforts, few studies have been performed that have analyzed wrong-patient medication errors in particular. More importantly, there have been few recommendations on the specific safeguards that should be implemented throughout the medication-use process to prevent such errors.

Wrong-patient medication errors can be thought of as both an unordered-drug error for the patient who received the dose and an omission error for the patient for whom the dose was intended.[5] Although wrong-patient errors are often erroneously considered as administration of one patient's medications to another by a nurse, reports submitted to the Institute for Safe Medication Practices (ISMP) have shown that wrong-patient errors can originate from any phase in the medication-use process.[6] This analysis serves to uniquely review a large set of medication error events reported by Pennsylvania healthcare facilities to the Pennsylvania Patient Safety Authority in order to understand the various ways wrong-patient medication errors occur in each node of the medication-use process, identify trends and contributing factors, and provide risk reduction strategies to prevent these events from occurring.

METHODOLOGY

Due to the volume of reports submitted in a calendar year, medication error event reports from July 1, 2011, through December 31, 2011, that were categorized as "wrong patient" were queried from the Authority's Pennsylvania Patient Safety Reporting System (PA-PSRS) database. All fields of the event reports, including harm score and care area, were self-reported, but the medication name fields were adjusted during analysis if information on the medication involved in the error had been available in the event description. Medication name fields that were left blank or did not contain names of approved medications and were not able to be adjusted based on information in the event descriptions were categorized as "unknown." The medications were then categorized as being high-alert or not per *ISMP's List of High-Alert Medications*.[7] The event description fields were analyzed in detail in order to classify each event by node, related processes, and possible causes and contributing factors. Various trends were quantified using descriptive statistics.

AGGREGATE ANALYSIS

During the aforementioned reporting period, the Authority received 826 distinct medication error event reports from Pennsylvania healthcare facilities that were categorized as wrong-patient events. However, based on the event descriptions, 13 reports (1.6% of total reports) did not actually involve wrong-patient errors and were excluded from

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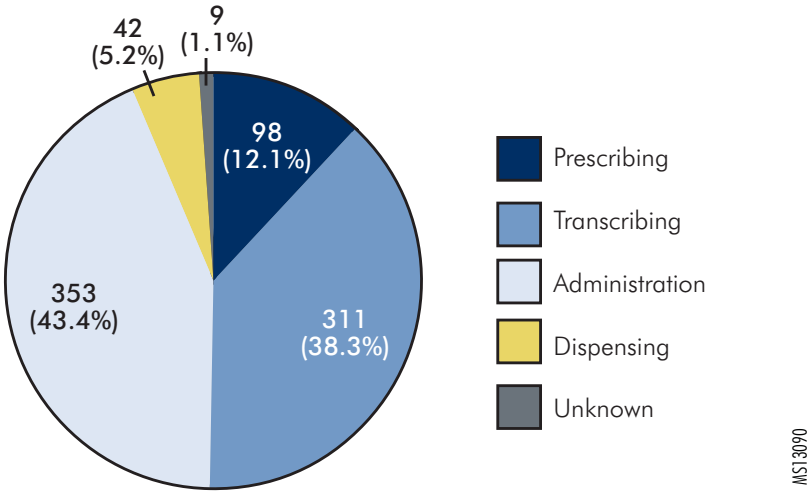
the analysis. The remaining 813 reports represent errors that occurred across the continuum of the medication-use process (from prescribing to administration and monitoring of medications), involved a wide range of medications, and occurred on various patient care units and departments.

The errors reported occurred during all nodes of the medication-use process (see Figure). The reported errors occurred most often during transcribing (38.3%, n = 311) and administration (43.4%, n = 353) and least during dispensing (5.2%, n = 42).

While there were many different medications involved, the most prevalent medications were similar to those reported in previous analyses of events reported to the Authority.[8,9] Insulin (4.3%, n = 35), heparin (2.6%, n = 21), and vancomycin (2.5%, n = 20) were the three most common medications involved in wrong-patient errors. Opioids were mentioned in 7.5% (n = 61) of event reports, and anticoagulants, such as warfarin and alteplase, were reported in 6.0% (n = 49) of event reports. Almost 13% (n = 104) of reports listed anti-infective medications as being involved in the event. A similar number of reports (12.7%, n = 103) involved more than one medication, and many reports did not specify which medication was involved in the wrong-patient error (16.6%, n = 135). Of the reports involving a known single medication, almost 30% (n = 169) were associated with high-alert medications. This finding is similar to one from a previous analysis in which one-fourth of reports submitted to PA-PSRS involved high-alert medications.[10]

Among the wrong-patient event reports submitted, most (26.3%, n = 214) were associated with medical-surgical units, and 22.1% (n = 180) were associated with the pharmacy. The third most common care area noted in the reports was the emergency department (9.8%, n = 80).

Figure. Wrong-Patient Errors by Node, as Reported to the Pennsylvania Patient Safety Authority, July 2011 to December 2011



Twenty-five reports (3.1%) involved pediatric patients. It is unclear, however, whether the locations noted in the event reports represent where the errors originated or where the errors were discovered.

Despite the variety of medication errors involving the wrong patient, few resulted in patient harm. Reporters self-categorized the events by harm score, which is adapted from the National Coordinating Council for Medication Error Reporting and Prevention (NCC MERP) Index for Categorizing Medication Errors.[11] Only three reports (0.4%) were categorized with harm score E, and one report (0.1%) was categorized with harm score F. A majority of the reports (84.1%, n = 684) were categorized as harm score C or less.

FOCUSED EVENT ANALYSIS

Wrong-Patient Errors during Administration

There were 353 wrong-patient errors that occurred during the administration node, which includes the range of tasks typically performed by nurses. When looking at the processes of administration, a majority of events occurred during actual medication administration (81.0%, n = 286), 15.6% (n = 55) occurred during medication procurement, and 3.4% (n = 12) occurred during monitoring. Medication procurement consists of a nurse obtaining the wrong medication from various medication storage areas (see Table 1). For example, multiple reports described a nurse selecting the wrong patient from the automated dispensing cabinet (ADC) screen when retrieving medications. Monitoring is defined as patient assessment activities that occur before or after administration of medications. The most prevalent monitoring error was related to laboratory test values (83.3%; n = 10), such as blood glucose results.

Many factors, and often more than one factor per event, contributed to patients receiving other patients' medications during actual medication administration. Most commonly, two patients were prescribed the same medication, and one received the medication dose intended for the other (14.3%, n = 41). The second most prevalent contributing factor was inadequate identification (ID) check (12.9%, n = 37), in which the event descriptions specifically mention failure

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Table 1. Medication Storage Areas Involved in Events Occurring during the Medication Procurement Process, as Reported to the Pennsylvania Patient Safety Authority, July 2011 to December 2011

MEDICATION STORAGE AREA	NO. OF REPORTS (N = 55)	% OF REPORTS
Automated dispensing cabinet	42	76.4
Unknown	6	10.9
Refrigerator	3	5.5
Pharmacy	3	5.5
Medication cart	1	1.8

to use two patient identifiers and to confirm identity with patient ID bracelets. In four reports (1.4%), the nurse used the patient's or family's acknowledgment of the name, which was incorrect, to verify identity. Rooming issues also contributed to wrong-patient administration errors (12.2%, n = 35). The nurse either confused the patient with a roommate or administered the medication to the wrong patient due to similar room numbers. Finally, not using the medication administration record (MAR) to properly identify the patient also contributed to 7.3% (n = 21) of events.

Examples of wrong-patient errors during administration include the following:

> *A patient told the nurse that she was another patient during the morning medication administration. The nurse did not check the patient's [ID] bracelet, and the patient received another patient's morning medications.*

> *The patient was in the hall, and the nurse called the name of a patient. The patient came down the hall, and the nurse asked the patient if this was her name. The patient responded "Yes." The nurse looked at a picture and then asked the patient where her wristband was since it was not on the patient. The patient responded, "I took it off a couple days ago." The nurse looked at the patient's picture and asked again, "Are you this patient?" The patient responded "Yes" and took the medications without questioning them. Later, the nurse realized that the two patients look very much alike.*

> *The nurse attempted to administer [a medication]. The nurse asked three adults in the room to verify the patient, since the patient was a pediatric patient and no ID bracelet was on. All three verified and allowed the nurse to give the medication to the patient when it was the wrong patient.*

> *The wrong patient profile was viewed on the screen. The nurse pulled Vicodin® for pain for a patient in 123A but was on the patient in 123B medication profile. The nurse entered the room and scanned the medication while still on the 123B profile. The scan matched and at this point, the nurse did not notice that he was on the wrong profile. The nurse approached 123A, scanned [the patient's] bracelet, and administered the medication without checking the screen to see if the correct patient was scanned.*

Wrong-Patient Errors during Transcribing

The second most prevalent node in which errors originated was transcribing. Transcribing was defined as the process that involves the transferring of a paper medication order to a patient's electronic or paper MAR. Nurses, pharmacists, unit clerks, and others can perform this task; however, few of the reports identify the personnel involved. Of the transcribing events, most errors were due to transferring orders into the wrong chart (81.4%, n = 253). Other errors occurred because the wrong patient's label was affixed to the order (18.3%, n = 57), and one error (0.3%) involved both a wrong label and the wrong chart.

Regarding contributing factors, multiple reports mentioned verbal orders (7.4%, n = 23), similar patient names (2.6%, n = 8), and/or the same or similar room numbers (1.6%, n = 5).

> *Nurse took a verbal order for one patient but placed it on the wrong patient's chart. The order was faxed to pharmacy but caught when in verification stage.*

Personnel catching and correcting the error was mentioned in 50.8% (n = 158) of the event reports involving transcribing. Of these, 81.6% (n = 129) of the errors were caught by a pharmacist, and 15.8% (n = 25) were caught by a nurse.

Wrong-Patient Errors during Prescribing

The predominant type of prescribing error involved a prescriber ordering a medication on the wrong chart (92.9%, n = 91). Various contributing factors were identified, but none were associated with more than 4.1% (n = 4) of reports. In one report, a physician gave a verbal order for a medication but did not use the patient's full name. In another example, a physician mistakenly ordered medications for the patient's wife, who was located in the same room.

Examples of wrong-patient errors during prescribing include the following:

> *The nurse found a medication delivered to the floor for a patient on an amiodarone infusion. There was no order found in the patient's chart [for this medication]. The pharmacist was notified, who reported that the cardiologist called asking for a "stat" amiodarone for a patient but only*

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gave the patient's last name. The pharmacist was made aware that the cardiologist was not seeing this patient. The pharmacist reported that no other patient with this name was in the hospital. It was later discovered that the patient was in the registration area but not yet admitted. The doctor had indicated that it was an urgent situation.

The doctor came to see the patient, while the nurse was in the room, and discussed the medications he was going to order. However, since the patient is in the same room with his wife, the doctor spoke to both of them. When the doctor told the husband what medications he was going to write, he also told them to the nurse and went to the desk to write orders. While looking over the copy of the orders, the nurse noticed they were written on an order sheet with the patient's wife's ID sticker on it. The nurse went to the wife's chart and saw that the doctor had written the orders in the wrong chart. The nurse called the pharmacy to stop the orders and called the doctor to verify that he did not want them on the wife and to take them again as verbal orders for the patient.

Wrong-Patient Errors during Dispensing

The least number of wrong-patient errors occurred during the dispensing node (5.2%; n = 42), the stage of the medication-use process that primarily takes place within the pharmacy. These errors were associated with either the processes of filling (57.1%, n = 24) or of delivery (42.9%, n = 18). A filling error is made when a medication prescribed for one patient is dispensed from the pharmacy for a different patient. Most of the filling errors (70.8%, n = 17) manifested as an incorrect patient-specific label being applied to a medication or medication package.

Levaquin® was ordered for a patient in room 456, and the medication was still unavailable. There was a Levaquin 750 mg sent for a patient in room 465, but he was not ordered it. When I called the pharmacy to inquire about it, the pharmacy said they had no recall of them sending the Levaquin for 465, but they said they did recall that it was sent for 456. The pharmacist was made aware that we had a bag with two Levaquin 750 in it but mislabeled with a 465 label on it.

A delivery error is made when a medication that is filled correctly is delivered for the incorrect patient, and this most often resulted in medication placed in the incorrect patient bin.

Patient was ordered Fioricet® every six hours as needed for headache. A pharmacist who was on the unit was approached by nursing about the delivery of the Fioricet, as it was not in the patient's drawer. The nurse happened to look in the medication drawer of another patient and discovered the Fioricet.

Contributing Factors Associated with Wrong-Patient Errors

Besides those mentioned above, several contributing factors that span the medication-use process were identified. Although the proportions were low, these characteristics were present in events that may have been prevented with system changes (see Table 2).

In roughly 6% (n = 52) of the events, reporters mentioned that one patient was confused with another because both patients were to receive the same medication. While most of the errors occurred during administration, four errors (7.7%) originated during prescribing. In one example, a physician prescribed warfarin for two patients but switched the doses. In another example, a nurse confused intravenous (IV) medication bags for two of his patients who were on the same medication. In the latter example, the medications for both patients were stored in the same area, and the report did not mention the use of mechanisms to confirm the correct medication (e.g., bar coding).

I had two patients who were due for vancomycin IV at 1800 last evening. Since I was all the way in the back hall, I removed both vancomycin [bags] from the fridge at the nursing station. When I hung the medication, I switched the bags by accident.

About 3.2% (n = 26) of errors involved verbal orders, with only one report describing the use during an urgent situation. ISMP has recommended that verbal orders be limited to use during emergencies and similar situations.[12] The following example typifies a verbal order that was transcribed onto the wrong patient's chart. Fortunately, a nurse had investigated and discovered the incorrect order. However, incorrect verbal orders are often difficult to catch because they

Table 2. Contributing Factors and Characteristics of Wrong-Patient Errors, as Reported to the Pennsylvania Patient Safety Authority, July 2011 to December 2011

CONTRIBUTING FACTOR OR CHARACTERISTIC	NO. OF REPORTS (N = 813)	% OF TOTAL REPORTS
Same medication	52	6.4
Verbal order	26	3.2
Similar patient name	25	3.1
Confusion with discharged patient	11	1.4
Caught by patient or family	10	1.2
Interruption	9	1.1

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necessitate the prescriber or the person who is receiving the order to realize the incorrect transcriptions.

> *A verbal order was written for Diflucan® 100 mg once daily and A&D ointment as needed on the patient's chart. Later, another patient was complaining of itching, and the nurse received a report that an order was obtained. Upon investigation, no order was found on the other patient's chart. The charge nurse, while doing chart checks, found the order on the wrong patient's chart. The nurse who took the verbal order verified that it indeed was on the wrong patient.*

While patients with similar names can lead to error-prone situations, only 3.1% (n = 25) of reports mentioned this contributing factor. The low prevalence may be because many hospitals may already have mechanisms in place to prevent confusion between patients with similar names. In fact, the assumption that similar names are the cause of most wrong-patient errors may result in other failure points being ignored. The example below mentions that two patients had the same first letter of their last names, but this was likely not the only reason for the incorrect transcription.

> *An order for Imodium® 2 mg as needed was entered for the wrong patient on the same floor. Both patients involved shared the same first letter of their last name. The order was sent to the pharmacy two more times after the original was entered on the wrong patient. A different pharmacist entered the re-sent orders on the correct patient.*

Eleven reports (1.4%) described situations in which a patient was confused with a discharged patient. In one example, the confusion involved a discharged patient who had previously occupied the same bed. Two other examples described insulin pens of discharged patients being dispensed or used on current patients. Even documents from discharged patients were mistaken for those of current patients.

> *During the morning assessment, it was noticed that the previously infused antibiotic syringe on the IV pole with another patient's name on the medication label was connected to current patient. Correct medication and dose on the label. The name and date of birth were on the label for a discharged patient, from the previous day, [who had occupied the] same room and bed.*

> *The patient in this room was ordered a heparin drip based on an ECG [electrocardiogram] strip on the chart that showed a rhythm of atrial fibrillation. The ECG strip that was on the chart did not belong to this patient but was from the patient who had been in the room yesterday but had been discharged. The date on the ECG strip was from yesterday afternoon. The heparin drip was ordered this morning by the cardiology resident, and the error was found this afternoon during cardiology rounds by the cardiologist. The patient never received any heparin, and the order was discontinued as soon as it was discovered by the cardiologist.*

Finally, some reports described events in which patients or their family members caught wrong-patient errors. Below is an example that illustrates one such case.

> *I was called to the patient's room by the wife who noted, within 10 minutes of initiation of infusion, that the IV pump read vancomycin but the medication bag was labeled as acyclovir and with a different patient's name. Dose immediately discontinued and no reaction noted.*

RISK REDUCTION STRATEGIES

The reports of wrong-patient events submitted to the Authority reveal the complex nature of wrong-patient medication errors (see Table 3). While often thought to occur only during administration, these types of errors were identified in all phases of the medication-use process. Unfortunately, most of the reports did not explicitly describe the errors nor disclose the causes and contributing factors linked to the errors; however, these reports, observations from ISMP, and recommendations in the literature do suggest strategies that healthcare facilities may consider to decrease the risk of wrong-patient medication errors.

Improve Patient Verification for All Patient Encounters

While the Joint Commission has an NPSG of improving the accuracy of patient identification, the proper use of two patient identifiers may still not be performed at all times.[13,14] Such verification should be considered for all patient-associated tasks, including prescribing, reporting of test results, and communication of medication information between providers. A proper identification check not only consists of confirmation with the patient but also requires confirmation with the MAR or patient chart, patient armband, patient-specific medication labels, and/or other records.

Healthcare facilities may consider standardizing the two reliable patient identifiers that should be used for identification and verification. Several reports illustrate examples whereby patients with similar room numbers or the same drug were prescribed, dispensed, or administered a dose intended for another patient. Overreliance on patient location and the name of the medication ordered may have contributed to one event reported to the Authority about a pharmacy technician dispensing an insulin pen with the label of a previous patient located in the same bed attached to it. In fact, the Joint Commission's NPSG requires healthcare practitioners to use at least two patient identifiers (not the patient's room number or location) when providing care,

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Table 3. Descriptions of How Wrong-Patient Medication Errors Occur, by Node, as Reported to the Pennsylvania Patient Safety Authority, July 2011 to December 2011

NODE	REPORTED EVENT
Prescribing	Medication prescribed for a wrong patient with a similar room number
	Wrong chart selected during prescribing
	Patient given the wrong prescription
	Patient prescribed the dose for another patient on the same medication
	Patient prescribed medication based on data of another patient
	Medication prescribed for a wrong patient with a similar name
	Medication prescribed for a patient's relative instead of the patient
	Wrong chart selected in the computerized prescriber order entry system from multiple open charts
Transcribing	Order transcribed into the wrong chart
	Wrong label affixed to the order sheet
	Wrong patient chart selected during transcription due to similar name
	Verbal order transcribed for the wrong patient
	Orders transcribed for the wrong patient with a similar name
Dispensing	Wrong patient's label affixed to the medication
	Medication placed in the wrong patient's bin
	Medication dispensed for the wrong patient with a similar name
	Dose intended for another patient dispensed when both prescribed the same medication
Administration	Patient given a dose intended for another when both prescribed the same medication
	Improper check of patient identification before administration
	Roommate given medication
	Medication administered to a patient in a room with a similar room number
	Improper bar-code scanning procedures before administration
	Practitioner used the wrong patient's medication administration record
	Patient administered a dose intended for a patient with a similar name
	Medication in an unlabeled syringe given to the wrong patient
	Medication administered was another patient's medication that was accidentally left in the room
	Patient verified the wrong name before administration
	Patient administered a medication intended for an already-discharged patient
	Medication administered based on wrong patient's laboratory data
	Medication retrieved from automated dispensing cabinet under the wrong patient's profile
	Wrong medication retrieved from the refrigerator, pharmacy, or medication cart

Note: Error descriptions are based on a review of events reported to the Authority, observations from the Institute for Safe Medication Practices, and errors published in the literature.

treatment, and services. The intent is two-fold: (1) to reliably identify the individual as the person for whom the service or treatment is intended and (2) to match the service or treatment to that individual.[3]

Ensure Proper Storage of Medications and Patient-Specific Documents

Because medications are often dispensed in patient-specific doses or unit-of-use formulations, store these doses in a manner that does not cause confusion during retrieval for administration. For patient-specific doses, hospitals often use individual storage bins for each patient. If used, clearly label these bins and design them to facilitate medication delivery and retrieval. Moreover, some of the reports describe patients receiving the wrong medication because doses intended for other patients were placed in the former patients' rooms.

Similarly, store and return patient-specific documents in the patient's chart. For example, a misplaced monitoring sheet may result in an unnecessary treatment for another patient. Standardizing the labeling practices for paper documents, monitoring sheets, and lab results can decrease the risk of wrong-patient errors.

Lastly, institute procedures to remove medications and documents from active patient care areas when patients are discharged. In a few events reported to the Authority, medications prescribed for discharged patients remained and were administered to new patients.

Use Healthcare Technology Fully and Properly

Although not always easy to implement, technological innovations can enhance patient safety.[15] The paper transcription errors discussed earlier may have been avoided with computerized prescriber order entry (CPOE) systems that integrate with pharmacy computer systems. Many of these systems include various safety

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features, such as alerts, that can help detect inappropriate medication orders.

Although historical studies have shown error reduction up to 81%, CPOE systems can also lead to error risk.[16] Therefore, these systems need to be continually examined and enhanced. In one study, extra safety features were added to the existing CPOE system to help physicians verify patient identity before signing the orders electronically.[17] In another study done at a pediatric hospital, the patient's photograph was used to prompt the physician to confirm the correct patient prior to completing his order.[18] Furthermore, many hospitals limit the number of electronic charts that practitioners can have open at any one time so that there is decreased risk that the wrong chart is chosen. Finally, Adelman et al. found that 10.6% of the wrong-patient prescribing errors were juxtaposition errors in which the wrong patient is selected from a list of names by mis-clicking.[18]

In addition to CPOE, bar coding can be used to detect and prevent errors during dispensing and administration. For example, during the filling process, pharmacists and/or technicians can employ bar-code verification of the medication with the computer-generated patient label. Bar coding during medication administration can be a reliable double check if performed correctly. Some of the reports analyzed in this study stated that bar coding successfully detected the wrong-patient error; however, a number of reports indicated that improper use of scanning prevented the error from being caught. In these instances, nurses administered the medication first then scanned the patient's armband second, or nurses failed to check for a confirmation from the scanning prior to administration. ISMP has received many reports similar to the latter example and has described this problem in its newsletters.[19]

Hospitals often use ADCs as secure storage units for medications without fully using system capabilities to prevent errors. An ADC that allows nurses to override a majority of medications essentially eliminates a pharmacist's double check of the prescriber's order. The use of profiled ADCs (such that the prescribed and verified medications are the only medications that can be removed from the ADC) is one way to take advantage of built-in safety checks.

As technology evolves, organizations are encouraged to continue to understand the patient safety features of new systems and devices, as well as to identify the weaknesses and limitations of technology and prevent them from being exploited.

Limit the Use of Verbal Orders

Although essential in emergency situations, verbal orders in nonurgent conditions can result in errors early in the medication-use process that may not easily be caught downstream. Standardize policies that detail when verbal orders are appropriate, who may receive verbal orders, how to give and receive these orders, and the safety checks that should be used to prevent error. In an earlier example, the prescriber failed to provide appropriate identification and the pharmacist failed to confirm the patient's identity by reading back patient identifiers in the chart. Certain computer systems allow orders to be designated as verbal orders and, thus, require prescribers to cosign or review these orders.

Empower the Patient to Prevent and Detect Medication Errors

Engaging the patient and family members can be an added safeguard against harm from an error.[20] In several of the reports, patients or family members caught the wrong-patient error when they actively examined the medications being administered and questioned the reasons for the medications. They noticed IV bags with labels that had another patient's name, and in one event described earlier, a family member even noticed the medication mismatch on the IV bag and the IV pump.

Establish patient education programs to teach patients the importance of accurate patient identification during all points of contact and how staff should be verifying their identities. For example, if the facility uses bar-code identification, encourage the patient to speak up if his armband is not scanned prior to medication administration. In fact, WHO also "encourage[s] patients and their families or surrogates to be active participants in identification, to express concerns about safety and potential errors, and to ask questions about the correctness of their care."[4] Educate patients to ask questions about their medications and the purpose of their medications (e.g., see the Authority's Consumer Tips about medication safety). To accomplish this, some organizations have implemented programs in which patients and family members become active partners in ensuring patient safety. These programs include brief safety orientations for the patient upon admission, dedicated hotlines, and educational material listing questions that the patient should be asking the healthcare practitioners who care for them.

CONCLUSION

Wrong-patient medication errors can occur at any phase of the medication-use process. While events reported to the Authority suggest that these errors occurred most often during administration and transcription, implementing safety strategies at all nodes can help to ensure that the correct patient receives the correct medication.

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LEARNING OBJECTIVES

- Identify the nodes involved in wrong-patient medication errors reported to the Pennsylvania Patient Safety Authority.
- Identify the processes under each node that were involved in the wrong-patient medication errors reported to the Authority.
- Recognize the causes and contributing factors associated with wrong-patient errors.
- Select appropriate risk reduction strategies to prevent wrong-patient medication errors.

SELF-ASSESSMENT QUESTIONS

The following questions about this article may be useful for internal education and assessment. You may use the following examples or come up with your own questions.

1. Which of the following is the most prevalent node associated with wrong-patient errors reported to the Authority?
   a. Prescribing
   b. Transcribing
   c. Dispensing
   d. Administration

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SELF-ASSESSMENT QUESTIONS (CONTINUED)

Questions 2 through 4 refer to the following case.

Two patients, Patient A and Patient B, both suspected of having hospital-acquired pneumonia, were located in the same room. The physician taking care of Patient A asked the nurse to order vancomycin for that patient. The nurse had the electronic charts for both Patient A and Patient B open and accidentally entered the medication on Patient B's chart. The pharmacist verifying the order received a duplicate-medication alert from the computer system and realized that Patient B had already been started on vancomycin two days earlier. She called the nurse to clarify, and the nurse then realized that he had entered the medication on the wrong patient.

2. During which node of the medication-use process did the error occur?
   a. Prescribing
   b. Transcribing
   c. Dispensing
   d. Administration
3. What risk reduction strategy was in place that helped to identify the wrong-patient error?
   a. The proper use of bar-code scanning technology by the nurse
   b. The pharmacist's use of two patient identifiers during order verification
   c. The pharmacy computer system's alert that detected the inappropriate medication order
   d. The storage of each patient's vancomycin dose in separate bins
4. Which of the following strategies is most effective in preventing such errors?
   a. Limiting the use of verbal orders during nonurgent situations
   b. Implementing a procedure that requires a two-nurse verification to receive a verbal order
   c. Separating patients who have similar diagnoses into different rooms
   d. Allowing nurses to only have one patient's electronic chart open at a time

Questions 5 and 6 refer to the following case.

A nurse notified the physician that the patient in 216A was ready for her lumbar puncture and intrathecal methotrexate. The physician thought he heard 216B, went to the patient in 216B, and started explaining the procedure to him. The nurse walked in to prepare the patient for the procedure and noticed that the physician was talking to the wrong patient. The right patient received the procedure.

5. Which of the following factors most directly contributed to this event?
   a. Reliance on the room number to identify the patient
   b. Lack of standardized safeguards for chemotherapy agents
   c. Improper use of bar-code scanning of the medication and patient
   d. Lack of clinical decision support software in the computerized prescriber order entry (CPOE) system
6. Which of the following additional strategies is most beneficial to help prevent such errors?
   a. Limiting the use of verbal orders during nonurgent situations
   b. Placing patients receiving high-alert medications in private rooms
   c. Storing the medication in the automated dispensing cabinet (ADC) until needed
   d. Using two reliable patient identifiers for all patient-associated tasks

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Skin Integrity, Immobility, and Pressure Ulcers in Class III Obese Patients

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ABSTRACT

Immobility, excess adipose tissue, and changes in skin physiology place class III obese patients at risk for pressure ulcers, skin infections, and cuts, tears, abrasions, and lacerations. A review of five years of class III obese patient skin-related reports submitted to the Pennsylvania Patient Safety Authority identified that 20.7% of all skin-related event reports for class III obese patients with immobility issues were harmful skin-related events. This percentage is high compared with the percentage of harmful skin-related events (2.3%) out of all skin-related event reports submitted to the Authority in 2011. Pressure-related reports accounted for 85.0% of the skin integrity reports for class III obese patients with immobility issues, of which 57.7% were hospital-acquired conditions, 37.4% were present on admission, and 4.8% had no indication of the time the event occurred. The development and implementation of class III obese patient evidence-based skin care protocols and care plans, use of bariatric equipment, and effective communication are ways to mitigate the impact of immobility and skin challenges in class III obese patients. (Pa Patient Saf Advis 2013 Jun;10[2]:50-4.)

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Scan this code with your mobile device's QR reader to access the Authority's toolkit on this topic.

INTRODUCTION

Class III obese patients are identified as having a body mass index greater than or equal to 40[1] or weighing 100 pounds or greater than their ideal body weight.[2] Class III obese patients have an increased susceptibility to tissue injury, infections, and altered skin integrity resulting from the aberrant distribution of dense adipose tissue (e.g., weighted skin folds, overlying skin layers) and changes in skin physiology (e.g., moisture from excessive sweating, decreased perfusion).[3-9] The increased body mass is associated with functional limitations that predispose the class III obese patient to sitting, lying, or remaining in a sedentary, immobile position for extended periods of time.[10,11] Impaired mobility contributes to the prolonged compression of skin, and without relief of the pressure through repositioning, injury to the skin and underlying tissues can result. The ability of a class III obese patient to effectively reposition or alleviate the pressure on the skin and underlying tissues is greatly compromised, increasing the occurrence of sustained, unrelieved pressure, with shearing and friction forces on the skin resulting in skin breakdown and tissue injury.[3,4]

ANALYSIS OF PA-PSRS CLASS III OBESE PATIENT EVENT REPORTS

A query of five years of event reports—from January 1, 2007, through December 31, 2011—to the Pennsylvania Patient Safety Authority's Pennsylvania Patient Safety Reporting System (PA-PSRS) identified that 33.1% (n = 588 of 1,774) of all of the event reports for class III obese patients were skin integrity reports, which is higher than the 15.5% (n = 35,454 of 228,835) of skin integrity reports in the general PA-PSRS population in 2011.[12] The query was conducted on the narrative descriptions using the terms "obese," "morbidly obese," or "bariatric." A detailed analysis of the 588 skin integrity event reports identified immobility as a factor in 82.8% (n = 487) of the reports, of which 20.7% (n = 101 of 487) were Serious Events (i.e., adverse events resulting in patient harm). This percentage of class III obese patient skin integrity reports that were Serious Events is high compared with the 2.3% (n = 800 of 35,454) of Serious Event skin integrity reports in the overall PA-PSRS population in 2011.[12] The analysts conducted a detailed analysis of the class III obese patient skin integrity event reports in which immobility was a factor.

PA-PSRS CLASS III OBESE PATIENT SKIN INTEGRITY EVENT REPORTS

Immobility was identified in class III obese patient PA-PSRS event report narratives when the narrative descriptions indicated patients needed moderate or maximum assistance when turning, transferring, or ambulating or when patients were on bed rest or had conditions indicative of immobility (e.g., ventilator dependency, recent surgery, limb infections, limb amputations, preexisting pressure ulcers).

The skin integrity event report narratives were analyzed and categorized according to four different types of conditions: (1) pressure-related conditions that were present on admission or were a hospital-acquired condition; (2) cuts, tears, or lacerations; (3) conditions involving weight of skin on skin; and (4) skin infections. The analysis of pressure-related conditions, accounting for 85.0% (n = 414 of 487) of the skin integrity event reports for this patient population, included all clearly identified pressure ulcers and any type of skin injury (e.g., blisters, ecchymotic areas) that occurred as a result of pressure.

Class III obese patients have a different mechanism underlying the development of a pressure ulcer. In thin patients, the pressure of the bony prominences injure the tissue covering the bone.[13,14] In class III obese patients, the excess adipose tissue creates pressure from the weight of the tissue. When skin lays on top of skin, the weight, lack of air circulation, and moisture with poor tissue perfusion set up conditions for a pressure ulcer

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to develop.[15] For example, the weight of an abdominal pannus can cause skin breakdown (i.e., a pressure ulcer) over the pubic area due to the weight of the extra tissue along with the moisture leading to skin breakdown underneath the pannus. Pressure ulcers and pressure-related skin issues predominated the reported skin integrity event issues, followed by cuts, tears, or lacerations; events involving weight of skin on skin; and skin infections (see Table). Many of the event reports had more than one conditional attribution occurring at the time of the event report (e.g., many of the events involving weight of skin on skin were also counted as pressure-related events). The Table shows a summary of the event types.

The majority of the pressure-related conditions (85.7%, n = 355 of 414) were identified as pressure ulcers. An analysis of the pressure-related event time of occurrence showed that 57.7% (n = 239) were hospital-acquired conditions, 37.4% (n = 155) were present on admission, and the remaining 4.8% (n = 20) did not indicate the time the condition occurred. An analysis of preexisting conditions that can contribute to poor skin conditions revealed that 26.7% (n =130 of 487) of the patients had diabetes, 12.3% (n = 60) had venous stasis, 6.0% (n = 29) were incontinent, and 3.9% (n = 19) had poor hygiene.

Skin integrity issues identified in class III obese patients are described in the following PA-PSRS reports:

> *The patient presented to the hospital with multiple areas of skin breakdown. The patient is morbidly obese and has stage I [skin] breakdown on both upper and lower buttocks. Underneath the [abdominal] pannus has stage II-III [skin] breakdown and is discolored (green, yellow). The creases in the arms also have stage II breakdown.*

> *The patient has a dark purple area at the waistline posteriorly from the right lateral side of the mid-back that is 28 cm wide and 3 cm in length. The skin is intact, [but the discoloration] is from folds of tissue compressing the area. Possible deep-tissue injury. The patient is morbidly obese and is on a [bariatric] bed with low-air-loss surface. It requires six nurses to turn the patient.*

> *When the therapist was preparing the patient for therapy, a blood-filled blister was noted on the right buttock, which was not present when treatment was given two days prior. The patient is alert and oriented but immobile due to obesity, [and their] nutritional status is poor. The patient has been on a bariatric plexus mattress since admission. The patient was admitted for wound care treatment of bilateral lower-buttock wounds, which are healing in response to established treatment.*

> *The patient was admitted from another facility with cellulitis with a multiple-stage wound. The patient is obese, with most wounds in the folds of skin. The left hip has a stage III wound, [and] the right leg has a stage IV wound in the skin folds of the leg.*

> *An extremely obese female patient was admitted to the hospital with tenderness in the left flank and severe pain in the left lower back. The patient's hospitalization was complicated by uncontrolled diabetes mellitus, hypertension, and a possible infection. The patient developed a pressure ulcer on the right buttocks, which progressed to stage III during the hospital stay despite wound care treatment at onset of the skin breakdown. [The patient's] nutritional status was suboptimal.*

Table. Pennsylvania Patient Safety Reporting System Class III Obese Patient Skin Integrity Event Reports (N = 487)

SKIN INTEGRITY CONDITIONS	NO. OF EVENTS	% OF EVENTS
Pressure ulcers—hospital-acquired condition	239	49.1
Pressure ulcers—present on admission	155	31.8
Cuts, tears, or lacerations	92	18.9
Weight of skin on skin	75	15.4
Infections	27	5.5
Total*	**588**	

* Total exceeds the number of reports (487) due to multiple conditions occurring in patients.

HOSPITAL STATEWIDE SURVEY

In July 2012, the Authority conducted a hospital statewide survey (35.3% response rate) that included questions about class III obese patient skin care protocols.[16] The survey results identified that 40.7% (n = 24 of 59) of respondents had skin care protocols in place, and 20.3% (n = 12) of respondents indicated that there was no physical assessment or medical care protocol for obese patients.

WAYS TO PREVENT SKIN INTEGRITY ISSUES

Class III Obese Patient Evidence-Based Protocols

The development of class III obese patient evidence-based protocols helps staff to provide safe patient care.[17-19] Best practice includes performing an initial skin assessment followed by periodic reassessment, maintenance of good hygiene, keeping the skin dry, performing a nutritional analysis, repositioning patients, and use of specialized bedding and equipment.[3,8,20,23-26] Coupling skin care protocols with ongoing routine in-service training for staff is essential to make sure that staff are up to date on class III obese patient protocols and care pathways.[17] In addition to skin-related protocols and care pathways, sensitivity training needs to be a part of class III obesity skin care protocols.[16,21,22]

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Clinical Skin Assessments and Care

An in-depth, head-to-toe skin assessment is imperative, with emphasis on the areas of weighted skin folds, excessive moisture or perspiration, and incontinence and on points of increased friction and pressure.[3,4,19] Inclusion of the Braden scale as part of the skin assessment assists in identifying patients at risk for the development of a pressure ulcer.[4] The Braden scale does not predict the occurrence of a pressure ulcer but rather indicates a heightened risk for the development of a pressure ulcer based on a score that evaluates six characteristics: sensory perception, moisture, activity, mobility, nutrition, and friction/shear.[23,24] A study by Swanson et al. identified that obese patients who were assessed with both high-risk mobility and friction/shear scores had a higher prevalence of ulcers compared with non-obese patients with both high-risk scores.[25]

The clinical care aspect of the care plan needs to focus on keeping all areas of the skin dry and free of bodily excretion (i.e., perspiration, excrement, and exudates) and on reducing pressure and friction. There are specific approaches to address basic skin care protection, incontinence management, and repositioning.[4,26,27] Perineal care needs to be performed each time a patient is incontinent.[4] Creams that have zinc oxide, dimethicone, or petrolatum provide barriers to moist areas.[4] Another approach is to use moisturizers or emollients to prevent fluid loss and protect the skin from drying;[26] however, falls precautions must be implemented if moisturizers or emollients are applied on or near the feet. Repositioning patients every two hours can reduce the chance of pressure-related issues.[8,28] When repositioning patients, check and free up all tubes or catheters that may have become located in skin folds or underneath patients.[28]

Patient Skin Care Routine Assessments

During the clinical assessment of the patient's skin, an assessment of the patient's skin care routine provides insight into the hygiene practices of the patient and presents opportunities for patient education to improve future skin hygiene practices.[27,29] One way patients can maintain good skin hygiene is by having them use long-handled, soft-bristle shower brushes to clean areas of their bodies they might otherwise not reach.[27] Another aspect of the patient's hygiene practice to evaluate is the different approaches used to keep the skin folds clean. Not all skin hygiene approaches may be beneficial.[27] For example, cornstarch-based powder is a home remedy that has the potential to incubate yeast and is harmful when managing skin folds.[27]

Bariatric Equipment Use

Bariatric-size equipment is another way to address skin integrity issues. Measuring the patient's weight, height, and abdominal girth is the first step to ensuring that the appropriate-size equipment is obtained.[4,16] Securing the appropriate-size equipment for class III obese patients can help reduce some of the challenges with keeping this patient population's skin safe.[27] Pressure-redistribution devices for sitting and sleeping are another way to reduce pressure for immobile patients.[4,26] For example, bariatric beds with low-air-loss mattresses and specially designed frames provide comfort for class III obese patients.[28] Another type of bed-related equipment, a trapeze can increase the patient's mobility while decreasing friction on skin during movement.[4,20]

Proper use of equipment is essential in providing safe patient care and is illustrated in the following PA-PSRS event report:

> *The patient was noted to have darkened (purple) areas to [their] bilateral buttock [with one side worse than the other]. The patient's skin [was] reported by the nurse to be "sloughing off" in [several] areas [of the buttocks]. The patient reported that [she] had been put on the bedpan [and left on it for a couple of hours during the day]. Wound care was initiated by the nurse.*

Patients with reduced mobility need frequent monitoring, especially in cases in which bedpans are used. When possible, patients should be offered a bariatric-size commode rather than a bedpan to keep patients mobile and reduce pressure from a bedpan.[30]

Communication

Clear and effective communication among staff and between staff and their patients is the first step to proactively reducing the occurrence of skin integrity issues. Staff-to-staff communication needs to convey: (1) the patient's condition and any new changes in their skin, (2) equipment acquisition issues, and (3) transferring and repositioning issues, including timing of repositioning, the patient's capability in participating, and identifying the number of staff required to reposition or transfer the patient along with the type of equipment needed to safely move the patient.

Staff-to-patient communication requires sharing information about the patient's condition and plan of care so that everyone understands the reasons behind the decisions for the patient's care. Information sharing can occur formally with planned educational materials or informally (e.g., throughout the day, when vital signs are taken, during the delivery of meals, when patients use their nurse call light).

LIMITATIONS

The 487 PA-PSRS class III obese patient skin integrity event reports identified for this analysis underrepresent the actual number of class III obese patients who experienced skin integrity events during hospitalization. PA-PSRS event intake forms do not specifically request the patient's weight or body mass index, except for the medication intake form. The search of the PA-PSRS event reports relied on the subjective assessments provided by the individuals reporting the events. Limitations associated with the statewide survey response rate reflect

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potential response biases toward hospitals that care for class III obese patients or underestimate the number of issues associated with class III obese patients.

CONCLUSION

Immobility coupled with excess skin and adipose tissue and changes in skin physiology has resulted in a high percentage of pressure ulcers and pressure-related issues in class III obese patients in Pennsylvania. Cuts, tears, or lacerations; issues involving weight of skin on skin; and skin infections were also problematic in this patient population. The development and communication of evidence-based class III obese patient protocols that address clinical skin care assessments and care plans, equipment use, hygiene practices, and educational programs are ways to proactively address skin conditions, whether the conditions are present on admission or acquired in the hospital.

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LEARNING OBJECTIVES

- Recall the definition of a class III obese patient.
- Recognize the Braden subscale characteristics used to identify class III obese patients who are at risk for developing pressure ulcers.
- Recognize the appropriate patient assessments for securing the proper type of equipment for class III obese patients.
- Distinguish between treatments that are and are not beneficial for maintaining good skin integrity in a class III obese patient.

SELF-ASSESSMENT QUESTIONS

The following questions about this article may be useful for internal education and assessment. You may use the following examples or develop your own questions.

1. Complete the following sentence. The definition for a person with class III obesity is a person with a body mass index (BMI) greater than or equal to 40 or _____
   a. a BMI of 35 with one comorbidity.
   b. weighing 100 pounds above his or her ideal weight.
   c. a BMI of 35 with two comorbidities.
   d. weighing 100 pounds or greater than his or her ideal weight.
2. A study by Swanson et al. identified that obese patients who had high-risk scores on two Braden subscale characteristics had a higher prevalence of pressure ulcers compared with nonobese patients. One characteristic was mobility. Which was the second characteristic?
   a. Activity
   b. Friction/sheer
   c. Sensory perception
   d. Moisture
3. Which of the following actions does not provide useful information when identifying and securing bariatric equipment for class III obese patients?
   a. Measuring the patient's height
   b. Measuring the patient's weight
   c. Measuring the patient's skin folds
   d. Measuring the patient's abdominal girth
4. Which of the following actions is not a discussed prevention method used to reduce the chance of skin-related problems for class III obese patients?
   a. Checking and freeing up all tubes or catheters that can get caught in skin folds or under a patient every time the patient is repositioned
   b. Repositioning the patient every three hours
   c. Performing a head-to-toe skin assessment
   d. Securing bariatric-size equipment
5. Which of the following skin treatments is not beneficial for maintaining good skin integrity in a class III obese patient?
   a. Use of moisturizers or emollients
   b. Use of zinc oxide creams, dimethicone, or petrolatum
   c. Use of cornstarch
   d. Performing perineal care every time the patient is incontinent

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Spotlight on Electronic Health Record Errors: Paper or Electronic Hybrid Workflows

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ABSTRACT

In a previous Pennsylvania Patient Safety Advisory *article, analysts read 3,099 narrative reports relevant to health information technology (HIT) from the Pennsylvania Patient Safety Authority's database and tagged each report using a previously published classification taxonomy developed specifically for HIT. In the course of that review, analysts identified 85 reports of a specific type of error: errors related to miscommunication arising from dual use of electronic and paper documentation. The use of a hybrid workflow, in which both electronic and paper systems are used for documentation, is often found in care areas transitioning from a paper-based to fully electronic (i.e., electronic health record [EHR]) documentation procedure. Hybrid workflows may occur as a planned transitional step during the implementation of an EHR system or may arise as a workaround in which paper is used to supplement electronic systems. This article describes the type of events related to the use of a hybrid workflow and provides recommendations on reducing the use of hybrid workflows. (Pa Patient Saf Advis 2013 Jun;10[2]:55-8.)*

INTRODUCTION

The Pennsylvania Patient Safety Authority published an analysis of patient safety events related to the use of electronic health records (EHRs) reported through the state's mandatory reporting system in the December 2012 issue of its *Pennsylvania Patient Safety Advisory*.[1] This research was motivated in part by the 2011 Institute of Medicine (IOM) report *Health IT and Patient Safety: Building Safer Systems for Better Care*,[2] which noted a lack of hazard and risk reporting data on health information technology (HIT). The IOM report considered this lack of reporting data to be a hindering factor in ongoing efforts to improve the safety of HIT systems. The *Advisory* article identified EHR-related events reported through the Authority's Pennsylvania Patient Safety Reporting System database and applied a previously published classification taxonomy specific to HIT.[3]

In the course of manually reviewing EHR-related reports in the Authority's database, analysts identified several general error types and trends that warranted further study. In this article, analysts focus on errors related to hybrid medical records workflows, in which a mix of paper and electronic media is used to maintain the medical records for a single patient. These errors largely include omission and duplication of tasks due to miscommunication among caregivers and can pose serious risk to patients.

METHODS

The 85 cases used in this analysis were identified from a prior data set of 3,099 EHR-related incident reports queried for the December 2012 *Advisory* article. Shortly after beginning the manual review of queried event reports for the December article, analysts noticed several reports that dealt with miscommunication due to dual use of electronic and paper documentation practices, an error type that did not neatly fit into any one category of the Magrabi et al. error classification taxonomy used in the December analysis.[3] Analysts then created a tag for this type of hybrid-workflow error and considered it for each of the 3,099 manually reviewed reports that were deemed relevant to EHRs, identifying 85 reports relevant to hybrid workflows.

RESULTS

Classification by Harm Score

Of the 85 identified reports, 77 (91%) were reported as "event, no harm" (i.e., an error did occur, but there was no adverse outcome for the patient) and 7 (8%) were reported as "unsafe conditions" that did not result in a harmful event. Only one report involved temporary harm to the patient related to receiving the wrong dosage form (extended-release instead of standard tablets) of a narcotic:

> *Physician ordered "Oxycodone 30 mg PO q 4 h [by mouth, every four hours]." At 0600, that order was entered in [the computerized order entry (CPOE) system] as "Oxycodone ER [extended release] 30 mg PO q 4 h" and verified in Meditech by RN [registered nurse]. That was then administered by nine different nurses. The paper MAR [medication administration record] that pharmacy viewed and verified was actually done correctly stating "Oxycodone 30 mg PO q 4 h." The order in [the CPOE system] was never verified by pharmacy.*

In this case, it appears that the pharmacy did not have access to the electronic order, and the solution would be to redesign workflow so that the pharmacy verifies orders printed from the CPOE. Overall, the harm score pattern for reports related to hybrid paper and electronic workflows closely resembled the harm score pattern for all EHR-related reports identified in the December 2012 article.

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Classification by Event Type

Of the 85 identified reports, the most commonly used event type assigned by reporters was "medication error" (n = 63, or 74% of reports). Within medication errors, the most commonly used event type classification was "wrong medication" (22%), followed by "dose omission" (19%) and "extra dose" and "other" (each with 13%).

Extra Dose or Overdose

Events classified by the reporter as "extra dose" (n = 11) , as well as 5 of the 19 events classified as wrong-medication errors, included reports of potential overdoses related to miscommunication as to whether a patient had already received a medication, such as the following:

> *Written order for Toradol [ketorolac tromethamine] 30 mg on patient's emergency room chart. Medication administered by nurse and documented in electronic medical record, not on paper emergency room chart. Second nurse also saw order and administered medication again.*

Dose Omission

Events related to dose omission medication errors (n = 16) included six reports related to orders or documentation written on paper but never entered into electronic systems and seven reports of electronic orders not being properly printed or written onto the paper medication administration worksheets (e.g., Kardex) used by clinicians. Examples of these two types of errors are as follows:

> *Orders in paper chart were not transferred to computer. These included "NPO till procedure completed, 1 gm Ancef [cefazolin] IV [intravenous] on call to OR [operating room] . . ., and VS q15 x 4." These had been written on paper chart at 1800. The Ancef was not profiled on MAR, and the rest of the aforementioned orders are also not present on [the CPOE system].*

> *[Patient] ordered heparin through PE/DVT [pulmonary embolism/deep-vein thrombosis] assessment order sheet. Med entered in pharmacy information system but not transcribed to Kardex or current MAR for administration. Dose overlooked. No harm reported.*

DISCUSSION

Hybrid workflows may arise by design as a necessary transitional state between all-paper and all-electronic workflows or as an unintended workaround. Although meaningful use incentives have increased EHR adoption projects in the last several years,[4] these projects do not always lead smoothly to fully electronic workflows.[5] Funding gaps, competing priorities, and a lack of industry education have left many facilities in extended or indefinite transitional periods in which both paper and electronic systems are maintained.[6] Even in a nominally all-electronic workflow, hybrid workflows can arise as a workaround if clinicians supplement use of an electronic system with handwritten notes as documentation aids.[7] The ways in which hybrid workflows are used are likely to be unique to each facility or care area, with differences arising from a combination of EHR functionality, local workflows, and organizational policies and procedures.[8]

Hybrid workflows raise the potential for medical error: if clinicians need to check for information in multiple locations, clinicians may be more likely to overlook some information.[4] Hybrid systems also pose logistical and legal challenges for facilities. A 2008 study of Indian Health Service (IHS) clinics in Billings, Montana, found that allowing providers to choose between using paper and electronic systems as they transitioned to an EHR system required health information management (HIM) staff to complete and compile the legal patient record from both paper and electronic sources at the end of every day, stressing HIM resources and doubling the time to perform release-of-information requests.[9] In order to meet the logistical and legal challenges of hybrid workflows, facilities need to create and maintain documentation of where different pieces of their medical records are stored.[10] In designing this documentation process, facilities may wish to conduct a comprehensive workflow analysis on the process of accessing all the data required to fulfill release of information requests.[11]

Avoiding the challenges of a hybrid system may include preventing one from developing: instead of lingering in a hybrid transitional state, facilities may wish to focus on finishing the transition from a wholly paper to a wholly electronic workflow as completely and in as short a time frame as possible. The American Health Information Management Association considers a complete transition from a paper to EHR system to be best practice and offers practical advice for ensuring the quality and integrity of a facility's legal health record throughout the transition period, including factors to consider when developing policies and procedures for when electronic information can be printed out in a hybrid environment:[6]

- Timeliness, as paper printouts will not contain updated electronic information.
- Money spent on generating, managing, securing, and destroying papers, compact discs, external storage drives, and other media could be better spent on making sure access to electronic information is pervasive.
- Risk of allowing users to make notes on paper copies, which would then need to be retained as part of the legal health record and could lead to confusion when the paper record and the electronic record contain different information.

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Barriers and facilitators for EHR adoption can arise from many factors, including system, user, organizational, and environmental attributes, as well as support from others.[12] Technical design of the system is key, as usability and usefulness can significantly impact staff acceptance and use.[13]

However, the nontechnical details of the implementation of a new electronic system (e.g., policy development, management of the workflow changes required for the transition) may be just as important as the design of the system itself,[14] and a review of best-practice literature for technology implementation identified several key components for the successful design and implementation of new electronic systems:[15,16]

- Identifying a single person who is responsible and accountable for the implementation's success
- Selecting an EHR technology platform that can meet workflow needs, configuring its user interface to permit users to safely and efficiently grasp a complex process, and populating the EHR system with content that is relevant to clinical practice
- Studying current, pre-electronic workflows to determine what changes will be needed when moving to an electronic workflow
- Designing and carrying out pilot testing in enough clinical locations so that the results can be applied to the remainder of the facility
- Seeking appropriate participation from end users (e.g., nurses, physicians, other caregivers) in all phases of the implementation
- Continually evaluating the safety and effectiveness of implemented systems, including error reporting and incident investigation

Additional resources for successful EHR implementation planning are available from many groups, including the Healthcare Information Management Systems Society,[17] the United Kingdom's National Health Service,[18] the Office of the National Coordinator for Health Information Technology's regional extension offices for support of small rural and critical access hospitals,[19] and the Agency for Healthcare Research and Quality (AHRQ).[20] Specific AHRQ resources relevant to this article include a report on mitigating the unintended consequences of EHR implementation,[21] a toolkit for workflow assessment in HIT,[22] and a searchable knowledge library.[23]

Limitations

The provenance of the data set used as the basis of this report may have shaped the type of reports included: they were selected during manual review of reports identified through a query intended to identify EHR-related events. There are likely many more reports in the Authority's database related to miscommunication while using hybrid paper and electronic workflows; however, this type of error is a complex issue not amenable to simple query searching.

CONCLUSIONS

This analysis indicates that hybrid workflows contribute to medical errors reported to the Authority. Use of a hybrid workflow can lead to miscommunication among caregivers when orders and administration information differ between paper and electronic systems. This miscommunication can lead to medication errors like dose omissions and extra doses, which can cause serious harm to patients. Therefore, facilities should consider the implications of hybrid documentation workflows, especially if they are facing a recent or planned implementation of EHR systems. Facilities that have transitioned to EHR systems may wish to periodically monitor clinical workflow to determine whether hybrid workflows are developing in response to user challenges with the electronic system.

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Results of the PA-HEN Organization Assessment of Safe Practices for a Class of High-Alert Medications

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ABSTRACT

Proactively assessing practices and processes that involve high-alert medications such as anticoagulants, insulin, and opioids can enable hospitals to identify the weaknesses that exist within their medication-use systems. As a part of the Pennsylvania Hospital Engagement Network adverse drug event collaboration, a 45-item organization assessment tool was developed to assess the safety of opioid practices in hospitals, identify opportunities for improvement, and enable participating hospitals to compare their results with the aggregate results of all participating hospitals in Pennsylvania. Almost 60% (n = 17) of participating hospitals in the project completed the assessment. The highest-scoring items in the assessment were the use of standardized pain scales, the use of commercially available or pharmacy-prepared opioid solutions, and the availability of standardized preprinted order forms or computerized prescriber order entry (CPOE) order sets for patient-controlled analgesia therapy. The lowest-scoring items were inclusion of the mg/kg or mcg/kg dose along with the calculated patient-specific doses for pediatric parenteral opioid orders, pharmacists' ability to easily access the patient's opioid status, and restriction of the use of long-acting opioids to opioid-tolerant patients. Findings from the assessment revealed opportunities to improve medication safety and established a baseline of current practices regarding opioid use that can be used to evaluate ongoing improvement. (Pa Patient Saf Advis 2013 Jun;10[2]:59-66.)

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INTRODUCTION

Proactively assessing practices and processes in the medication-use system, especially those involving high-alert medications such as anticoagulants, insulin, or opioids, can provide hospitals with valuable information about the weaknesses that exist within their systems before harmful events occur. As the harm from errors involving high-alert medications can be potentially devastating, proactively identifying the risks associated with opioid use should be considered a priority by hospitals.

Pennsylvania Patient Safety Authority analysts developed an assessment tool for the Pennsylvania Hospital Engagement Network (PA-HEN) adverse drug event (ADE) opioid project to help participating hospitals assess the safety of practices in their facility, identify opportunities for improvement, and compare their experiences with the aggregate results of other participating hospitals in Pennsylvania. The aggregate findings also may be used to develop an action plan for the PA-HEN collaboration for implementing recommended error reduction strategies in order to assist hospitals in enhancing safety with this class of medications.

This article provides a descriptive analysis of the key findings from the assessment, with a focus on areas where significant improvements in opioid medication safety are needed.

METHODS

Hospital Team

Since medication use is a complex, interdisciplinary process, the value and accuracy of the assessment would be significantly reduced if it was completed by a single discipline. Therefore, hospitals were asked to establish an interdisciplinary team consisting of as many of the following key personnel (or similar personnel) as possible:

- Chief medical officer
- Nurse executive
- Director of pharmacy
- Clinical information technology specialist
- Medication safety officer or manager
- Risk management and quality improvement professionals
- At least two staff nurses from different specialty areas
- At least two staff pharmacists (one clinical and one distribution)
- At least one active staff physician who regularly orders opioids

The hospital's team was charged with the responsibility to accurately and honestly evaluate the current status of opioid practices in its facility. Also, hospital leadership was asked to provide their team with sufficient time to complete the assessment.

Instrument

The organization assessment comprised 15 demographic questions, followed by 45 assessment items subdivided into the nodes of the medication-use process (i.e., prescribing, order review, compounding, product storage, administration, and monitoring), as well as items addressing overall organizational structure and patient-controlled analgesia (PCA) therapy. Unless otherwise stated, assessment items refer to opioids

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prescribed, dispensed, and administered to all inpatients and outpatients typically seen in most hospitals, including patients admitted from the emergency department and ambulatory surgery/procedure units.

As necessary, each team was to investigate and verify the level of implementation with other healthcare practitioners external to the team. When a consensus on the level of implementation for each assessment item was reached, hospitals selected the appropriate choice for each item within the assessment.

To simplify the scoring process, for the majority of the assessment items, hospitals had the following scoring options and corresponding definitions to indicate their level of implementation of practices:

- **Not implemented.** This item has not been implemented within the hospital.
- **Partially implemented.** This item has been partially implemented in some or all areas of the hospital, or this item has been fully implemented in some areas of the hospital.
- **Fully implemented.** This item is fully implemented throughout the hospital.

Therefore, the choice of "Fully implemented" should only have been selected if all components of the item were present in all areas of the hospital. If only one or some of the components had been partially or fully implemented in some or all areas of the hospital, a choice of "Partially implemented" was selected.

Distribution

The assessment was distributed in June 2012 by e-mail to hospitals participating in the PA-HEN ADE project. It was also posted to the PA-HEN ADE project collaboration pages on the Authority's Patient Safety Knowledge Exchange (PassKey), a secure website to share information, ideas, and solutions. Each participating hospital was asked to complete and submit only one assessment. If multiple hospitals from a single health system were participating, each individual hospital was to complete the assessment individually.

From September until December 2012, facilities submitted their assessment data by means of an online data submission tool available on PassKey.

RESULTS

Tables 1 and 2 list the assessment items on which hospitals scored highest and lowest, respectively. The complete results of the assessment can be found online at http://patientsafetyauthority.org/ADVISORIES/AdvisoryLibrary/2013/Jun;10(2)/Pages/home.aspx.

Organization Characteristics

Of the 29 participating hospitals in the PA-HEN ADE project, 58.6% (n = 17) completed the assessment. Of the hospitals responding, 35.3% (n = 6) had fewer than 100 beds, 35.3% (n = 6) had 100 to 299 beds, 11.8% (n = 2) had 300 to 499 beds, and 17.6% (n = 3) had 500 beds or more. These hospitals provided a range of services. Roughly 94.1% (n = 16) provided pediatric services, 70.6% (n = 12) provided oncology services, 52.9% (n = 9) provided trauma services, 29.4% (n = 5) provided neonatal intensive care services, and 17.6% (n = 3) provided transplant services.

Table 1. Pennsylvania Hospital Engagement Network Opioid Organization Assessment Items Scored Highest by Hospitals (N = 17)*,†

ITEM NO.	ITEM DESCRIPTION	% NOT IMPLEMENTED	% PARTIALLY IMPLEMENTED	% FULLY IMPLEMENTED
2	The organization uses a standardized pain scale(s) appropriate to the patient population to assess a patient's level of comfort/pain.	0.0	5.9	94.1
17	Pharmacy purchases commercially available parenteral opioid infusions or prepares opioid infusions in the pharmacy (i.e., nurses do not prepare opioid infusions).	0.0	5.9	94.1
37‡ §	Standardized preprinted order forms/CPOE [computerized prescriber order entry] order sets are used for PCA [patient-controlled analgesia].	6.3	N/A	93.8
18	A pharmacist double-checks all opioid products before they are dispensed from the pharmacy, including those opioids placed into ADCs [automated dispensing cabinets].	0.0	11.8	88.2
21	Morphine and HYDROmorphone are segregated from one another in pharmacy storage.	5.9	5.9	88.2

* Based on percentage of "Fully implemented" responses. In cases in which multiple items had the same percentage of "Fully implemented" responses, items were ranked based on percentage of "Partially implemented" responses.

† Percentages may not add up to 100% because of rounding.

‡ One particpating organization indicated that it does not provide intravenous PCA therapy (item no. 33) and was directed to skip the remaining assessment items. Therefore, only 16 out of 17 hospitals answered item no. 37.

§ Item no. 37 contained "No" and "Yes" answer choices. "No" answer selections are categorized as "Not implemented," and "Yes" answer selections are categorized as "Fully implemented."

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Table 2. Pennsylvania Hospital Engagement Network Opioid Organizatoin Assessment Items Scored Lowest by Hospitals (N = 17)*, †

ITEM NO.	ITEM DESCRIPTION	% NOT IMPLEMENTED	% PARTIALLY IMPLEMENTED	% FULLY IMPLEMENTED
9	Parenteral opioid orders include the mg/kg or mcg/kg dose for pediatric patients along with the total calculated patient-specific dose (e.g., morphine 0.1 mg/kg x 15 kg = 1.5 mg IV every 4 hours prn severe pain).	58.8	23.5	17.6
13	Pharmacists have easy access to the patient's opioid status (opioid-naïve/opioid-tolerant) and take it into consideration when profiling or reviewing orders for opioids.	58.8	23.5	17.6
10	Long-acting opioids (e.g., fentaNYL patches, MS Contin® 100 and 200 mg tablets, OxyCONTIN® doses greater than 40 mg) are restricted for use in opioid-tolerant patients and are *not* used for acute pain management.	52.9	29.4	17.6
3‡	Pain management protocols define opioid-naïve and opioid-tolerant patients and outline the differences in the management of these patients.	52.9	17.6	5.9
6§	Standardized preprinted order forms/CPOE [computerized prescriber order entry] order sets are used to prescribe oral and parenteral opioids. (This question does not apply to PCA [patient-controlled analgesia] therapy.)	52.9	N/A	47.1
40**	Smart infusion pumps with computer software that is capable of alerting the user to unsafe opioid doses (i.e., soft and hard stops) are utilized when PCA is administered.	50.0	6.3	43.8
5	Equianalgesic dosing charts for oral, parenteral, and transdermal opioids (e.g., fentaNYL patches) have been established and are easily accessible to all practitioners when prescribing, dispensing, and administering opioids.	47.1	23.5	29.4

* Based on percentage of "Not implemented" responses. In cases in which multiple items had the same percentage of "Not implemented" responses, items were ranked based on percentage of "Partially implemented" responses.

† Percentages may not add up to 100% because of rounding.

‡ Item no. 3 included a fourth answer choice: "Not applicable: Our hospital does not have pain management protocols." This answer was selected by 23.5% of respondents.

§ Item no. 6 contained "No" and "Yes" answer choices. "No" answer selections are categorized as "Not implemented," and "Yes" answer selections are categorized as "Fully implemented."

** One participating organization indicated that it does not provide intravenous PCA therapy (item no. 33) and was directed to skip the remaining assessment items. Therefore, only 16 out of 17 hospitals answered item no. 40.

Hospitals were asked to list all of the opioids currently used by their practitioners to provide parenteral pain management. Every hospital (n = 17) indicated that they used morphine and HYDROmorphone, while 94.1% (n = 16) stated they used fentaNYL and 70.6% (n = 12) stated they used meperidine. A majority of hospitals (70.6%, n = 12) stated that morphine was the primary opioid used in their facility, followed by HYDROmorphone (23.5%, n = 4). One facility (5.9%) mentioned that it did not have a primary opioid prescribed for parenteral pain management.

Hospitals were asked if they had an interdisciplinary pain management team and if so, which disciplines were represented on that team. Only six hospitals (35.3%) stated they had such a team; each of those teams was composed of at least an anesthesia provider, nurse, and pharmacist.

Opioid Status

As discussed in the March 2013 issue of the *Pennsylvania Patient Safety Advisory*,[1] the PA-HEN ADE project's opioid knowledge assessment, used to assess practitioners' knowledge of opioids, revealed significant gaps in the knowledge of opioids. Specifically, practitioners scored low when asked to determine a patient's opioid status (i.e., opioid-naïve versus opioid-tolerant). The question asked practitioners to identify the treatment regimen that would make a patient tolerant to opioids. Only one of the four proposed orders was correct. Overall, only 29.1% of all hospitals answered the question correctly; 34.2% of physicians, 25.5% of nurses, and 40.5% of pharmacists answered correctly. In addition, 52.9% of all practitioners answered "all of the above"; 49.3% of physicians, 57.4% of nurses, and 37.8% of pharmacists thought any one of the treatment regimens would classify a patient as opioid-tolerant.

This assessment also included items to identify gaps in an organization's practices

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regarding a patient's opioid status, including the following:

- No. 3: Pain management protocols define opioid-naïve and opioid-tolerant patients and outline the differences in the management of these patients.
- No. 10: Long-acting opioids (e.g., fentaNYL patches, MS Contin® 100 and 200 mg tablets, OxyCONTIN® doses greater than 40 mg) are restricted for use in only opioid-tolerant patients.
- No. 13: Pharmacists have easy access to the patient's opioid status and take it into consideration when profiling or reviewing orders.
- No. 38: PCA basal infusion rates are not routinely ordered for opioid-naïve adult patients.

The first three items listed above were among the lowest-scoring items in the entire assessment. More than half of participating hospitals stated that these items were not in place.

Patient Screening and Assessment

Certain patient characteristics and preexisting conditions place patients at a higher risk for adverse events. These characteristics include sleep apnea, preexisting respiratory conditions, morbid obesity, and concurrent use of other drugs that are central nervous system and respiratory depressants.[2]

The assessment included a number of items that asked hospitals about specific patient criteria or elements that should be considered when prescribing opioids, as well as patient assessments that should be performed before and after the administration of an opioid.

For example, hospitals were asked to identify the elements for which patients are screened that might affect the dose, monitoring parameters, or appropriateness of general opioid use (no. 7). The most commonly selected elements for general opioid use were allergies (94.1%, n = 16), age (88.2%, n = 15), and weight (76.5%, n = 13). The elements selected least often were obstructive sleep apnea (29.4%, n = 5), asthma/chronic obstructive pulmonary disease (35.3%, n = 6), and opioid status (47.1%, n = 8); these items were also the lowest-scoring items for elements screened before PCA therapy (see Figure 1).

Patients are at highest risk for opioid-induced respiratory depression during the first 24 hours of opioid therapy, and the apnea-hypopnea index in sleep apnea patients is highest on the third night after surgery and remains above the preoperative baseline out to the seventh postoperative night.[3,4] Pre- and postadministration assessment and monitoring are critical to preventing and mitigating respiratory depression. Although respiratory rate is an important parameter to obtain, clinically significant respiratory depression is not defined by a specific number of respirations per minute.[5] Rather, it is defined by several characteristics of a patient's respiratory status and is compared with the patient's baseline respiratory status. For example, a proper respiratory assessment during opioid treatment requires the nurse to watch the rise and fall of the patient's chest to determine the rate, depth, and regularity of respirations.[6] In addition, sedation is a very sensitive indicator of impending opioid-induced respiratory depression and precedes clinically significant episodes. Therefore, a comprehensive assessment by nursing of respiratory status goes along with an assessment of sedation and requires more than counting a patient's respiratory rate over a 30- or 60-second period.

Items that addressed specific elements that are a part of patient assessments performed by nurses for patients receiving opioids were broken down into four distinct items:

- No. 25a: *Prior* to the administration of oral opioids, nurses perform a baseline assessment.
- No. 25b: *Prior* to the administration of parenteral opioids, nurses perform a baseline assessment.
- No. 26a: *Following* the administration of oral opioids, nurses perform a postadministration assessment within the hospital-designated time frame.
- No. 26b: *Following* the administration of parenteral opioids, nurses perform a postadministration assessment within the hospital-designated time frame.

Across all four items, the most commonly selected elements that hospitals indicated were assessed were pain level and level of sedation (see Figures 2 and 3). It should be noted that assessing the pain level does not constitute a complete assessment for a patient on opioid therapy. In fact, the least frequently selected elements in the assessment across all four items included pulse oximetry, capnography, heart rate, blood pressure, and quality of respirations. Interestingly, nurses assessed fewer elements after the administration of either an oral or parenteral opioid as compared with before administration.

The previously published results of the opioid knowledge assessment also revealed that practitioners had difficulty identifying which medications could potentiate the effects of an opioid, specifically HYDROmorphone, on ventilation.[1] Overall, only 51.5% of all practitioners answered the question correctly; 47.6% of physicians, 49.9% of nurses, and 59.6% of pharmacists answered correctly. In addition, practitioners struggled to select the most important predictor of respiratory depression in patients receiving intravenous (IV) opioids. Overall, only 22.4% of all practitioners answered the question correctly as sedation level; 33.0% of physicians, 20.1% of nurses, and 16.0% of pharmacists answered correctly. Thus, both project assessments identified weaknesses in identifying factors contributing to respiratory depression and in having processes in place to detect patients experiencing respiratory depression.

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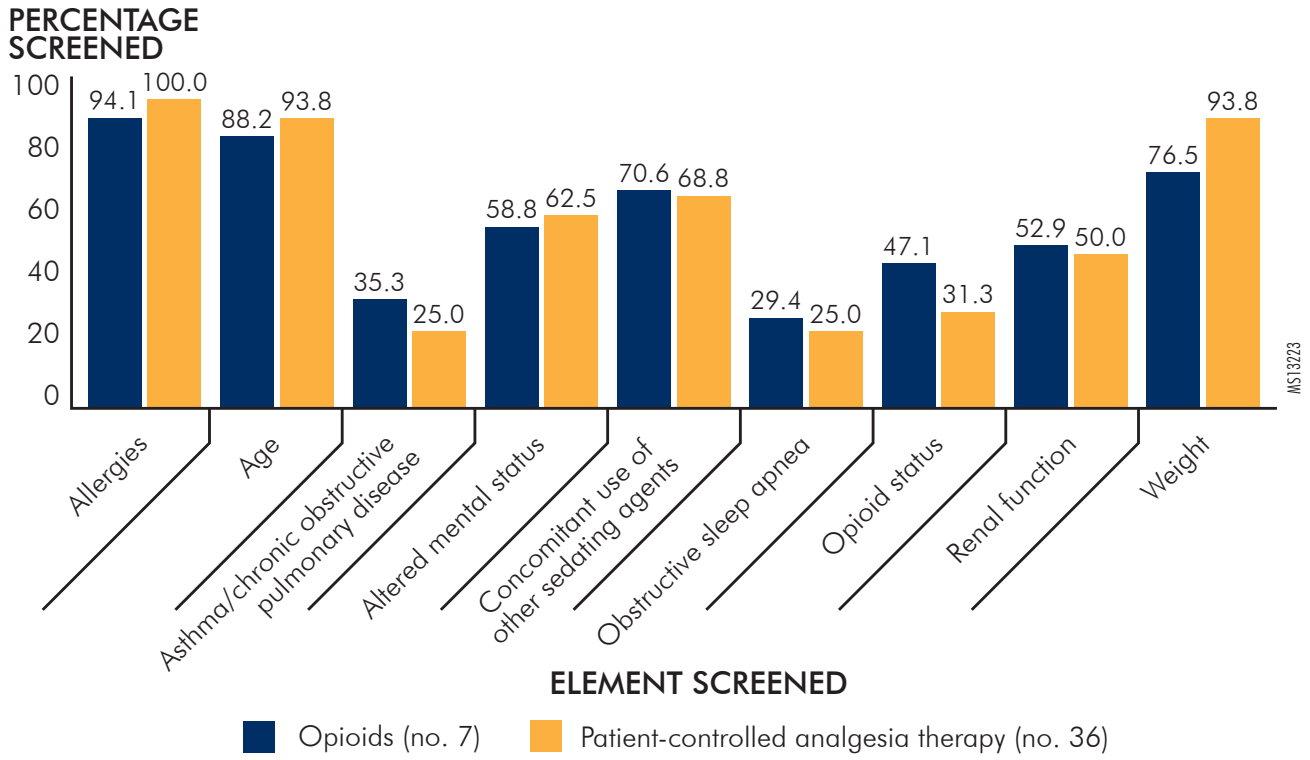
Figure 1. Elements That Patients Are Screened for When Opioids and Patient-Controlled Analgesia Therapy Are Prescribed



Note: **Results are for item no. 7 ("Patients are screened for the following elements which might affect the dose, monitoring parameters, or appropriateness of opioid use...") and item no. 36 ("Patients are screened for the following elements which might affect the dose, monitoring parameters, or appropriateness of PCA use...").**

Standardization

The organization assessment queried about standardized practices in place for safe opioid use. Examples of items addressing the standardization of practices include the following:

- No. 1: Current pain management protocols and guidelines for opioid use are available to guide prescribers, pharmacists, and nurses when opioids are prescribed, dispensed, administered, or monitored.
- No. 2: The organization uses a standardized pain scale(s) appropriate to the patient population to assess a patient's level of comfort/pain.
- No. 6: Standardized preprinted order forms/computerized prescriber order entry (CPOE) order sets are used to prescribe oral and parenteral opioids.
- No. 15: Concentrations of parenteral opioid infusions for adult patients are standardized to a single concentration per drug and are used in at least 90% of the cases.
- No. 16: Concentrations of parenteral opioid infusions for pediatric patients (including neonates) are standardized to a single concentration per drug and are used in at least 90% of the cases.
- No. 37. Standardized preprinted order forms/CPOE order sets are used for PCA.

Standardized protocols and order sets, either electronic or preprinted in paper systems, that incorporate pain and sedation scales can serve as a guide to help clinical personnel quickly and accurately select the appropriate dose of medication and adjust it as needed. Well-designed standard order sets, both in electronic and paper formats, can improve safe medication use by the following means:[8,9]

- Integrating and coordinating care by communicating best practices through multiple disciplines, levels of care, and services
- Modifying practice through evidence-based care
- Reducing variation and unintentional oversight through standardized formatting and clear presentation of orders
- Enhancing workflow with pertinent instructions that are easily understood, intuitively organized, and suitable for direct application to current information management systems

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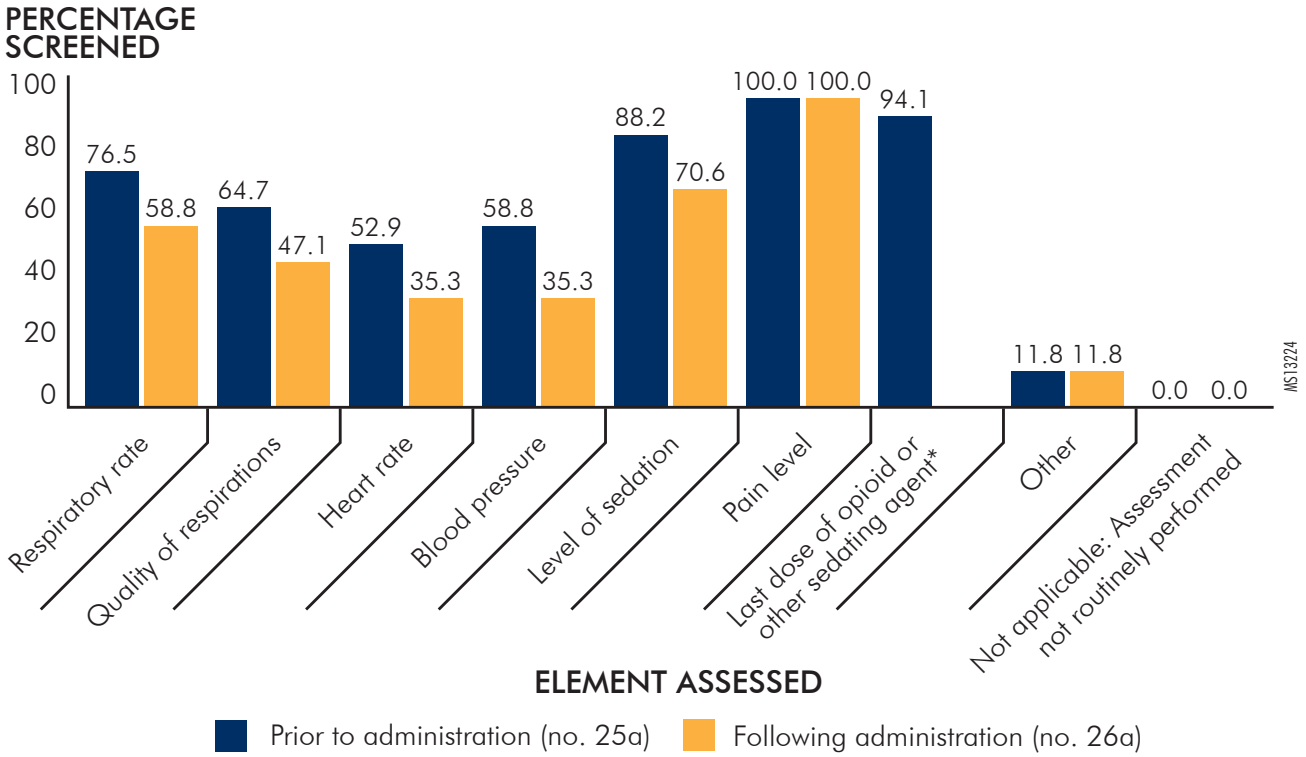
Figure 2. Assessments Performed by Nurses Prior to and Following Administration of Oral Opioids



Note: **Results are for item no. 25a ("Prior to the administration of oral opioids, nurses perform a baseline assessment of the following..."). and item no. 26a ("Following the administration of oral opioids, nurses perform a postadministration assessment within the hospital-designated time frame of the following...").**

** "Last dose of opioid or other sedating agent" was not an answer selection for item no. 26a.*

- Reducing the potential for medication errors through integrated safety alerts and reminders
- Reducing unnecessary calls to physicians for clarifications and questions about orders

However, if standard order sets are not carefully designed, reviewed, and maintained to reflect best practices and ensure clear communication, they may actually contribute to errors. In relation to opioids, one study demonstrated that the implementation of standard order sets for PCA therapy resulted in a dramatic decrease in the number of cases of severe respiratory depression and increased use of the order set for patients new to opioid therapy.[10] Furthermore, changing the order sets to improve medication safety did not appear to negatively affect patients' satisfaction with pain management.

The first item in the assessment asked if hospitals have current pain management protocols and guidelines for opioid use available to guide prescribers, pharmacists, and nurses when opioids are prescribed, dispensed, administered, and monitored. Roughly one-third (35.3%, n = 6) of the hospitals indicated that this item was not in place, while almost half (47.1%, n = 8) stated that this item was partially implemented.

Almost all (94.1%, n = 16) hospitals stated they used a standardized pain scale appropriate to the patient population to assess a patient's level of comfort/pain. However, their responses to whether range-of-dose orders for parenteral opioids included the organization's approved pain scale to assist nurses in determining the appropriate dose to administer (e.g., Give 1 mg for moderate pain [scale 4-7] and 2 mg for severe pain [scale 8-10]) were diverse. Three hospitals (17.6%) stated they did not allow range-of-dose orders, five (29.4%) stated this was fully implemented, and nine (52.9%) indicated that they sometimes or never followed this practice.

Less than half of the hospitals (47.1%, n = 8) revealed that they used standardized preprinted order forms or CPOE order sets to prescribe oral and parenteral opioids. Of these, only 37.5% (n = 3) included the recommended doses for parenteral opioids to guide appropriate dosing of opioids and 25.0% (n = 2)

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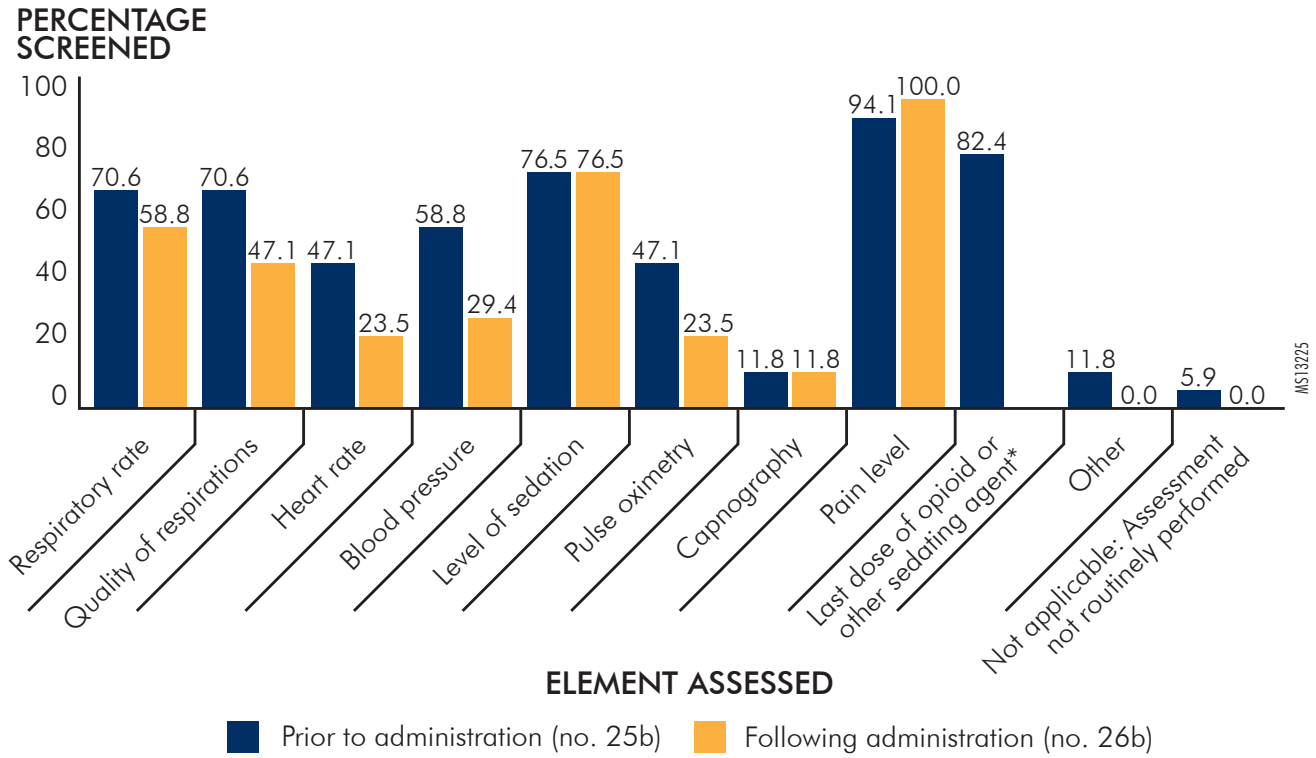
Figure 3. Assessments Performed by Nurses Prior to and Following Administration of Parenteral Opioids



Note: **Results are for item no. 25b ("Prior to the administration of parenteral opioids, nurses perform a baseline assessment of the following...") and item no. 26b ("Following the administration of parenteral opioids, nurses perform a postadministration assessment within the hospital-designated timeframe of the following...")**

** "Last dose of opioid or other sedating agent" was not an answer selection for item no. 26b.*

included orders for naloxone and directions for use on those forms. When combining those hospitals that did not have standardized order forms (52.9%, n = 9) with those that did not include recommend doses of opioids or orders for naloxone, 64.7% (n = 11) of the hospitals either did not provide guidance to prescribers on appropriate dosing or did not include an order for naloxone with the ordered opioid.

The opioid knowledge assessment asked practitioners which dose of IV HYDROmorphone best represents an equianalgesic dose of IV morphine 2 mg.[1] Overall, 67.2% of participants correctly selected IV HYDROmorphone 0.4 mg. Providing equianalgesic dosing charts within facilities can assist practitioners in appropriately converting a dose of one opioid (e.g., morphine) to an equivalent dose of another opioid (e.g., HYDROmorphone) or when converting from an oral formulation (e.g., oral morphine) to a parenteral formulation (e.g., IV morphine). When asked whether hospitals had established equianalgesic dosing charts and made them easily accessible to all practitioners when prescribing, dispensing, and administering opioids, five hospitals (29.4%) had fully implemented this strategy, while almost half (47.1%, n = 8) stated this was not in place.

It could be assumed, then, that the aforementioned items reveal that many hospitals are not providing prescribers with guidance for the appropriate use of opioids and thus are relying solely on the knowledge and education of their prescribers and pharmacists to catch inappropriate selection and dosing of opioids. But when asked whether pharmacists had access to a patient's opioid status, almost 60% (n = 10) of facilities stated that the pharmacy did not have access to or did not take this into consideration when profiling or reviewing orders, while nearly 24% (n = 4) of hospitals sometimes provided this access. In addition, in the demographic section of the assessment, hospitals were asked whether their pharmacy order entry systems provided the following functionalities:

- Dose range checking for maximum single doses
- Dose range checking for maximum total daily doses
- Hard stops (catastrophic doses) for doses known to cause serious harm

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Nearly 53% (n = 9) of participating hospitals stated that their system could check for maximum single doses, but less than a quarter (n = 4) provided maximum total daily doses checks and only 5.9% (n = 1) had hard stops for catastrophic doses. Therefore, most hospitals are relying solely on the diligence of their clinical staff to catch inappropriate doses of opioids.

CONCLUSION

Findings from the PA-HEN Organization Assessment of Safe Opioid Practices demonstrate an opportunity to improve medication safety with the use of opioids within hospitals. Hospitals that completed the opioid organization assessment spent considerable time evaluating their medication-use systems and demonstrated an exemplary commitment to safety, regardless of the results. Equally important, this organization assessment established a baseline of current practices around opioid use that can be used to evaluate improvement and identify statewide priorities. Certainly, technological solutions such as CPOE, bar coding, and fully integrated information systems can be helpful in improving safe practices with opioids. However, as these survey findings show, there is ample room for improvement with less costly and less difficult-to-implement error reduction strategies such as standardizing processes and practices within each organization.

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Infection Control Challenges: Pennsylvania Nursing Homes Are Making a Difference through Implementation of Best Practices

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ABSTRACT

The Pennsylvania Patient Safety Authority began work in 2010 to assess how implementing evidence-based infection control best practices impacted healthcare-associated infection (HAI) rates in Pennsylvania nursing homes. Ten nursing homes with high HAI rates (H-HAI) and 10 with low HAI rates (L-HAI) were evaluated and compared using a standardized assessment tool in tandem with site visits by an Authority patient safety analyst. The evaluation showed limited adoption of best practices in H-HAI nursing homes. In 2012, the 10 H-HAI nursing homes were reassessed using the same standardized assessment tool and a follow-up interview. Improvements to implementation of best practices were reported for all infection control domains and implementation categories. Infection rates from March through May 2012 were compared with the same baseline period for 2010. The analysis showed a 16% decrease in the mean overall infection rate for these 10 H-HAI facilities. Follow-up assessment identified facilitators and successful methods for implementing best practices in infection control, as well as continued barriers and opportunities for improvement. These results suggest that incorporation of infection control best practices in nursing homes may be associated with decreased infection rates and that identification of focus areas for improvement may be achieved through self-assessment using a standardized assessment tool. (Pa Patient Saf Advis 2013 Jun;10[2]:67-75).

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INTRODUCTION

In 2010, the Pennsylvania Patient Safety Authority began to study the impact of various levels of implementation of infection prevention best practices on healthcare-associated infection (HAI) rates in Pennsylvania nursing homes and to assess patterns of care that could be targeted for improvement. In phase I of the project, Pennsylvania nursing homes were sorted into performance quartiles based on HAI reports submitted to the Authority. Ten nursing homes in the bottom quartile with high HAI rates (H-HAI) and 10 nursing homes in the top quartile with low HAI rates (L-HAI) were identified from HAI reports submitted to the Authority from March through May 2010. Authority analysts conducted on-site assessment visits with these 20 facilities from October through November 2010 using the Authority's Long-Term Care Best-Practice Assessment Tool.[1]

This standardized tool measures the level of implementation of current best practices in seven infection control domains: hand hygiene, environmental control, urinary tract infection (UTI), respiratory tract infection (RTI), gastrointestinal (GI) and multidrug-resistant organism (MDRO) infection, skin and soft-tissue infection (SSTI), and outbreaks. The tool also measures the extent of best-practice implementation within six categories: (1) incorporation of best practices into a facility's infection control plan, (2) formal policies and procedures, (3) educational programs, (4) documentation methods, (5) monitoring of process and outcome measures, and (6) assigned accountability with follow-up by managers and leaders. Implementation of 50 evidence-based infection prevention practices based on clearly defined interventions found in the literature was assessed during these on-site visits through a detailed analysis of the facility's self-assessment using the best-practice assessment tool, record reviews, observational rounds, and staff interviews. Facilities were provided with a summary report of assessment findings, including both strengths and opportunities for improvement, along with suggestions and supporting resources and tools.

Examination of the differences between L-HAI and H-HAI nursing homes' applications of specific best practices revealed that H-HAI nursing homes had limited adoption of 45 of the 50 best practices. The interviews and observations identified multidisciplinary implementation barriers in H-HAI nursing homes at the leadership, physician, clinical, and support staff levels. Patterns of care that nursing homes could target for improvement were also identified. The study suggested that moving best practices from evidence to the bedside by fully implementing those practices at a higher level in each of the six implementation categories might be associated with lower infection rates.[2] The suboptimal patterns of care and the barriers to implementation identified in H-HAI nursing homes during phase I of the project provided a targeted focus for the Authority's follow-up activities. To support the Authority's goal to minimize HAIs in Pennsylvania nursing homes, phase II of the project was initiated in 2012. In phase II, H-HAI nursing homes were reevaluated to determine their level of progress in implementing infection control best practices and the potential impact of any progress on infection rates.

METHODS

Beginning in February 2012, the 10 H-HAI facilities identified in phase I were contacted for follow-up. Follow-up involved assessment of progress in implementing infection control best practices in response to the summary report and suggestions for improvements provided to facilities during site visits made in October 2010. The facilities varied in size from less than 30 to over 400 beds (with a median of 115 beds) and included a cross section of corporate and single-owner facilities providing transitional care, nursing care, rehabilitation, and subacute care.

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Best-Practice Implementation

Between February and April 2012, all 10 H-HAI nursing home infection prevention designees (IPDs) again completed the Long-Term Care Best-Practice Assessment Tool in tandem with an interview by a patient safety analyst. Four facilities were interviewed by telephone, and six were interviewed during site visits. Nursing home staff participating in the follow-up interviews included administrators, directors of nursing, and infection prevention staff. Scores on the Long-Term Care Best-Practice Assessment Tool were compared between the two time periods, with discussion of the actions taken as a result of the baseline assessment and the Authority's suggestions for improvement, any additional actions taken in response to the baseline assessment process, and any continued challenges or barriers to implementation of best practices.

Infection Rates

In preparation for follow-up assessment interviews, infection rates were analyzed for the most recent quarter for which there was complete data, September through November 2011. These infection rates were compared with baseline rates from March through May 2010 for the purpose of discussion during the interviews. At completion of follow-up, infection rate data from March through May 2012 was analyzed. This quarter was utilized for final project analysis in order to control for potential seasonal variation in infection rates. For the purpose of this project, the preintervention quarter refers to March through May 2010 and the postintervention quarter refers to March through May 2012.

Raw infection data and rates per 1,000 resident-days, as well as unit-specific HAI data, were used for evaluation. The data on HAI incidence and rates was calculated using HAI events reported by the nursing homes to the Authority's Pennsylvania Patient Safety Reporting System (PA-PSRS) as required by Pennsylvania Act 52 of 2007.[3]

Cost Estimates

Costs were calculated using HAI cost data published by Alessi et al.[4] and adjusted to 2012 dollars. These HAI costs have been estimated based on diagnostic testing, procedures, and treatments related to each infection episode treated in the nursing home.

RESULTS

Best-Practice Implementation

Comparing baseline and follow-up scores on the Long-Term Care Best-Practice Assessment Tool, the 10 H-HAI facilities increased the number of elements with 100% implementation across all seven infection control domains, as well as in each of the six implementation categories. During the baseline period, the H-HAI facilities had lower levels of full implementation of best practices compared with the L-HAI facilities in all elements assessed. At follow-up assessment, the H-HAI nursing homes had increased their full implementation of best practices beyond the baseline levels previously demonstrated by the L-HAI nursing homes in five of the seven infection control domains and in five of the six implementation categories (see Figure 1).

The two infection control domains in which the H-HAI nursing homes continued to score lowest in full implementation of best practices were hand hygiene and UTIs. The two implementation categories scoring lowest were incorporation of best practices into the facility's infection control plan and monitoring of process and outcomes. Figures 2 and 3 illustrate the difference in implementation of best-practice elements within each of these infection domains and across implementation categories in H-HAI nursing homes compared with L-HAI nursing homes.

Hand hygiene. Out of all of the implementation categories, the H-HAI nursing homes reported the greatest increase in standard documentation of hand hygiene best practices, with 37% full implementation at baseline and 83% at follow-up assessment. This exceeded the baseline level of full implementation reported in L-HAI facilities (61%). Most of this improvement was due to enhanced staff education practices and improved documentation of environmental and leadership rounds. Progress was also made in the implementation category of monitoring of process and outcomes, moving from 31% to 56% full implementation. This level of implementation still lagged behind the L-HAI group, which reported 66% full implementation of monitoring. Improvement in this category was due to incorporation of methods to monitor use of hand hygiene products and through direct observation of best-practice compliance during periodic environmental and leadership rounds.

The specific element labeled "the facility has an individualized program to monitor hand hygiene compliance" scored the lowest within the domain. The majority of H-HAI facilities had not fully implemented a formal hand hygiene monitoring program. Facilities that were successful in this area tended to be nursing homes associated with acute care hospitals. In these settings, formal programs established for hand hygiene monitoring within the hospital were able to be shared and adapted to long-term care. Despite guidelines and resources to design and implement a monitoring program, H-HAI nursing homes unsuccessful in this area cited lack of personnel, time, and processes as barriers to implementing a formal program.

Very small increases in full implementation of best practices of 3% to 6% were reported for all other implementation categories within the domain of hand hygiene (see Figure 2).

UTIs. At baseline, incorporation of best practices in UTI prevention into H-HAI facility infection control plans was reported at much lower levels than in L-HAI nursing homes (32% versus 75%, respectively). At follow-up, H-HAI facilities still reported lower levels of

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performance in this implementation category, with an increase to only 40%.

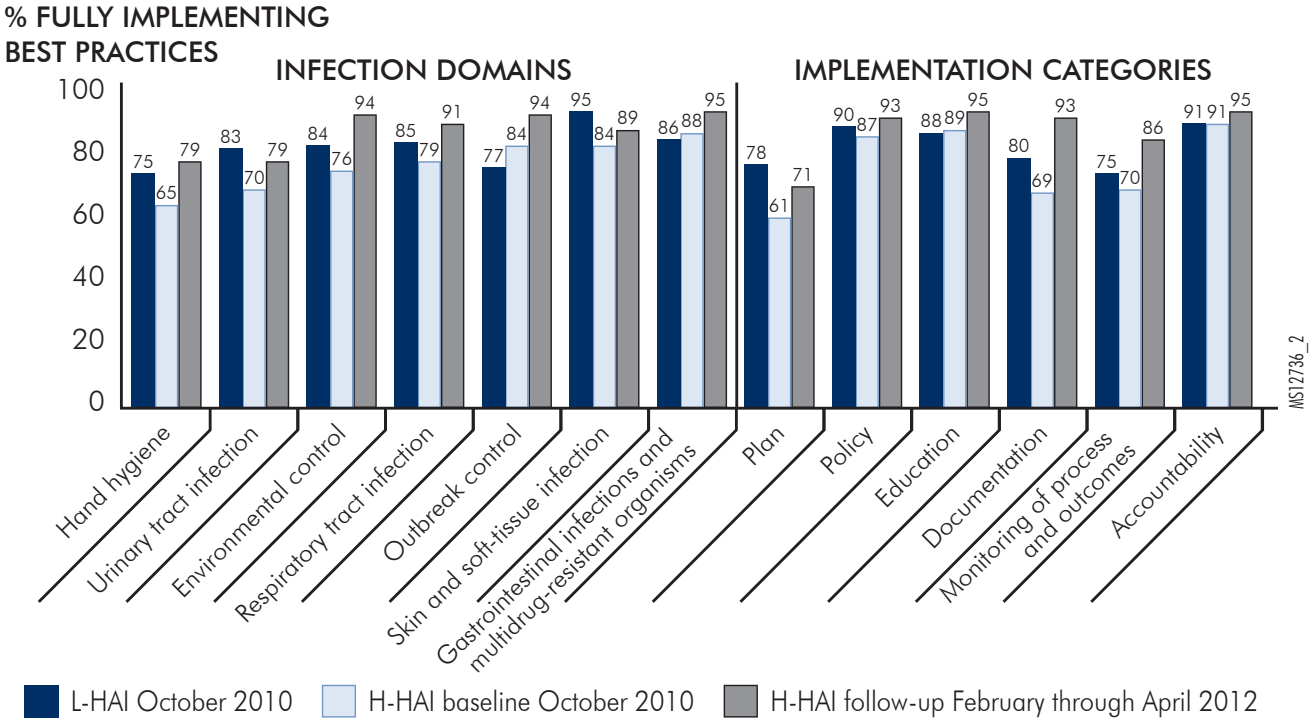
Most notably, none of the H-HAI facilities, compared with four of the L-HAI facilities, had incorporated the element "standing orders are in place to remove Foley catheters if criteria are not met" into their infection control plans. This element had the lowest reported levels of full implementation across all L-HAI and H-HAI nursing homes. In discussions during follow-up assessment, nursing home staff described reluctance on the part of the medical staff to create such standing orders. This was attributed to a fear of inappropriate catheter removal in the setting of unclear documentation of clinical indication for the catheter, especially upon admission from the hospital, and lack of immediate access to urology consultants.

The second element for which H-HAI nursing homes reported less full implementation across several categories was "the facility has instituted a toileting and hydration program." This was not viewed as a proactive measure that is part of a UTI prevention plan. The greater focus for these facilities was on assessing for catheter necessity (e.g., adoption of written criteria for use of Foley catheters and documentation of necessity) and measures to prevent infection in residents requiring catheters (e.g., use of Foley securement devices, maintaining closed systems). For these elements, and across several of the implementation categories, H-HAI nursing homes reported higher levels of full implementation at follow-up compared with L-HAI facilities (see Figure 3).

Despite these challenges in implementing best practices, the 10 H-HAI nursing homes were able to decrease their mean UTI rate by 45.9%, from 0.61 to 0.33 UTIs per 1,000 resident-days (see the Table). Seven of the 10 were able to decrease their catheter-usage-days. Overall, catheter-days in the H-HAI group decreased by 32.9%, from 6,992 total catheter-days in the preintervention quarter to 4,692 in the postintervention quarter. Of the seven facilities with decreased catheter-usage-days, three were able to achieve decreases of 65% or greater, attributing their success to having physicians or nurse-practitioners available daily on-site who were engaged in the process of UTI prevention, assessing catheter necessity upon admission and immediately removing catheters if criteria were not met.

Environmental control. H-HAI nursing homes increased the level of full implementation of all elements within the domain of environmental control, with the greatest increases in the implementation categories of documentation and monitoring of process and outcomes. Facilities described environmental services team engagement as a key strategy to achieving improvements. At follow-up, nursing leadership and administrators were more aware of environmental services protocols

Figure 1. Percentage of Full Implementation of Best Practices in Nursing Homes with High Rates of Healthcare-Associated Infections (H-HAI) and Nursing Homes with Low Rates of Healthcare-Associated Infections (L-HAI)



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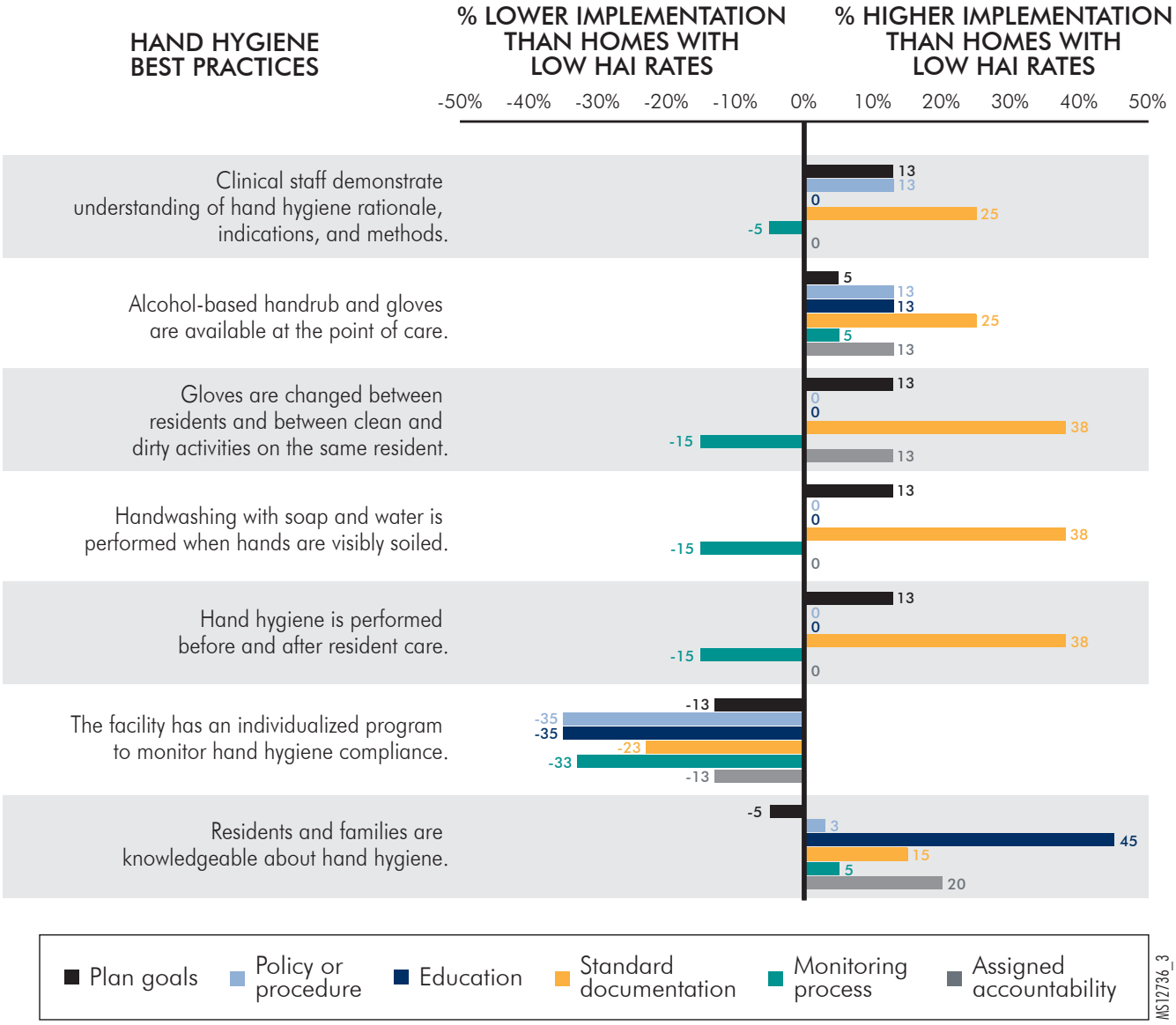
and quality assurance measures used to monitor and document adherence to best practices (e.g., using checklists for disinfecting surfaces, monitoring usage of gloves and other supplies such as hand sanitizer and surface wipes). In addition, environmental services team members had greater awareness of the clinical rationale supporting these best practices. The IPDs in particular cited a strong partnership with the environmental services supervisor as being a key component to implementing and sustaining best practices in infection control.

At follow-up, H-HAI nursing homes reported higher levels of full implementation of all infection control elements and across all implementation categories within this domain than baseline L-HAI facilities, with the exception of incorporation of

(continued on page 72)

Figure 2. Comparison of Implementation of Hand Hygiene Best Practices for Nursing Homes with High Rates of Healthcare-Associated Infections (HAIs) and Nursing Homes with Low HAI Rates



Note: **Implementation percentages for nursing homes with high HAI rates are from follow-up assessments completed February through April 2012. Implementation percentages for nursing homes with low HAI rates are from baseline assessments completed in October 2010.**

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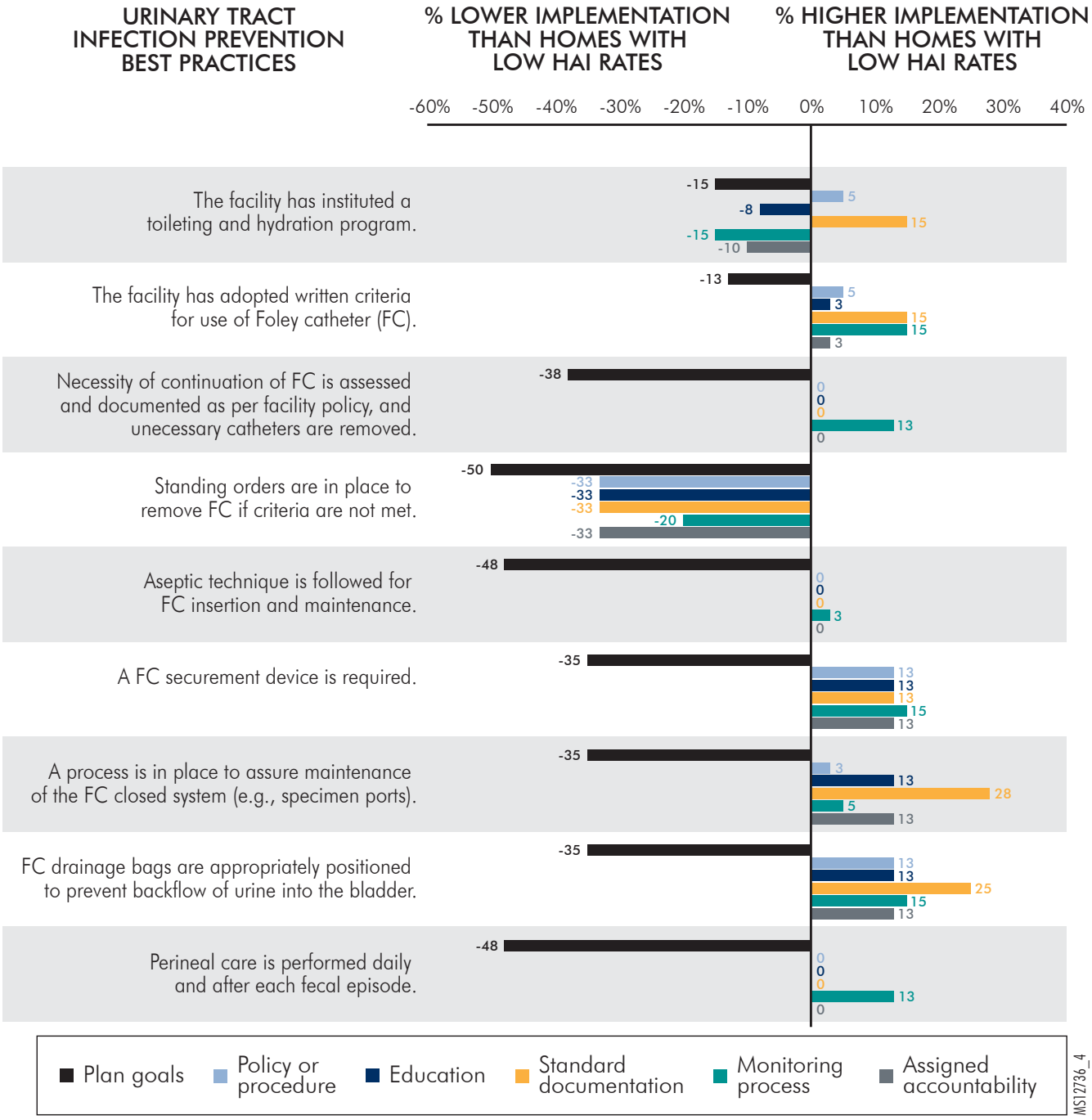
Figure 3. Comparison of Implementation of Urinary Tract Infection Prevention Best Practices for Nursing Homes with High Rates of Healthcare-Associated Infections (HAIs) and Nursing Homes with Low HAI Rates



Note: **Implementation percentages for nursing homes with high HAI rates are from follow-up assessments completed February through April 2012. Implementation percentages for nursing homes with low HAI rates are from baseline assessments completed in October 2010.**

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(continued from page 70)

best-practice elements into facility infection control plans.

RTIs. At baseline assessment, H-HAI nursing homes reported 79% overall full implementation of best practices for prevention of RTIs. At follow-up, they had increased that percentage to 91% overall. The implementation categories with the greatest increases were documentation and monitoring of best practices. The elements that these nursing homes described as most challenging with regard to documentation and monitoring were "respiratory equipment is cleaned and disinfected between treatments," "use of single-dose aerosolized medications whenever possible," and "use of sterile single-use catheter and sterile fluid for suctioning open systems." These facilities employed creative methods for documenting completion of these processes, such as bagging equipment to indicate that it had been disinfected. Documentation and monitoring of best practices and partnership with respiratory care services to evaluate policies and procedures were cited as being crucial, particularly in facilities with residents on mechanical ventilation.

At follow-up, H-HAI nursing homes reported higher levels of full implementation of best practices than baseline L-HAI nursing homes in all implementation categories, with the exception of incorporation of best practices into the infection control plan. This remained the lowest-scoring implementation category despite increasing from 52% at baseline to 68% at follow-up. L-HAI nursing homes reported 79% full implementation in this category.

Seven of the 10 H-HAI nursing homes showed improvements in overall RTI rates; however, the pooled mean for the group showed a slight increase, mostly attributed to large increases in lower RTI rates at two of the facilities (see the Table).

Outbreak control. H-HAI facilities scored higher in full implementation of best practices in outbreak control at both baseline and follow-up assessment (84% and 94%, respectively, compared with 77% for L-HAI facilities). The only element that had yet to be fully implemented at 3 of the 10 H-HAI nursing homes was "facility has developed a specific case definition for outbreaks." During follow-up assessments, these nursing homes described developing case definitions and protocols as they encountered new organisms or outbreaks. IPDs expressed having difficulty finding case definitions in the literature and from professional guidelines. Facilities were particularly concerned with outbreaks related to emerging pathogens, such as norovirus or carbapenem-resistant enterobacteriaceae.

SSTIs. H-HAI nursing homes had high levels of full implementation of best practices in SSTI prevention at both baseline and follow-up (84% and 90%, respectively). Despite this improvement, the H-HAI group was still unable to match the level of the L-HAI group. L-HAI facilities reported the highest levels of best-practice implementation in this domain, at 95% overall.

H-HAI nursing homes decreased their rate of SSTIs by 21.3% between these two time periods, from 0.61 to 0.48 infections per 1,000 resident-days (see the Table). The subcategory of cellulitis had the highest baseline rate of 0.32 infections per 1,000 resident-days, which decreased 9.8% to 0.28 infections per 1,000 resident-days in the postintervention quarter. The facilities with higher rates at baseline, facilities 1 and 10, were able to bring their rates down by 77.3% and 87.8%, respectively. They attributed their success to having rigorous pressure ulcer prevention and wound care protocols with dedicated wound care nurses. They also described performing root-cause analysis to identify the source of SSTIs and implementing corrective measures (e.g., using checklists for disinfection of common equipment, improving communication between the nursing home wound care nurse and the acute care wound care team for residents transitioning back and forth between the hospital and the nursing home).

As found across the other domains, incorporation of best-practice elements into the facility infection control plan was scored the lowest, with only 5 of the 10 facilities fully incorporating these elements.

GI and MDRO infections. At baseline, H-HAI nursing homes reported high levels of full implementation of best practices in GI infection and MDRO infection prevention. At follow-up, H-HAI facilities increased their implementation level to 95% overall in this domain. These nursing homes described successfully identifying and containing several outbreaks of *Clostridium difficile* and norovirus during the period between assessments by combining the best-practice elements of outbreak control, environmental control, hand hygiene, and GI and MDRO infection prevention. Despite increased implementation of best practices and decreased GI infection rates in 7 of the 10 H-HAI nursing homes, the pooled mean GI infection rate increased 10% from the preintervention quarter and the postintervention quarter (see the Table).

The element scoring lowest in full implementation within this domain was "antimicrobial monitoring in place for all residents receiving antibiotics." Antibiotic stewardship is recognized as a challenge in long-term care facilities nationally.[5] One facility described an effective program in which the medical director shared personalized reports with prescribers detailing antibiotic usage and infection rates for their patients compared with those of their peers. Several facilities discussed the challenge in educating the nursing staff regarding definitions for infections that require treatment, as many prescribers report ordering antibiotics at the request of nursing staff based on positive microbiology culture results alone.

Infection Rates

Improvements in overall infection rates were achieved in 8 of the 10 H-HAI

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Table. H-HAI Nursing Home Pre- and Postintervention Infection Rates (per 1,000 resident-days), by Infection Type

INFECTION TYPES	FACILITY 1	FACILITY 2	FACILITY 3	FACILITY 4	FACILITY 5	FACILITY 6	FACILITY 7	FACILITY 8	FACILITY 9	FACILITY 10	POOLED MEAN RATES
Gastrointestinal tract infection											
2010	0.64	2.88	0.20	0.07	0.54	0.95	0.74	0.37	0.41	0.11	**0.40**
2012	0.00	1.99	0.41	0.13	0.27	0.33	0.54	0.88	0.20	0.00	**0.44**
Respiratory tract infection											
2010	2.86	0.00	2.76	1.57	1.79	1.12	0.87	0.91	0.21	0.22	**1.20**
2012	1.30	0.00	0.21	0.99	1.15	0.33	0.18	2.22	1.21	0.34	**1.21**
Skin and soft-tissue infection											
2010	2.86	0.96	0.00	0.65	0.18	0.52	0.62	0.54	0.62	0.90	**0.61**
2012	0.65	0.00	1.24	0.33	0.00	0.57	0.18	0.75	0.40	0.11	**0.48**
Symptomatic urinary tract infection											
2010	0.95	0.96	0.59	1.20	0.63	0.69	0.00	0.32	0.21	0.56	**0.61**
2012	0.33	0.00	0.21	0.36	0.09	0.25	0.00	0.56	0.20	0.00	**0.33**
Other											
2010	0.00	0.00	0.00	0.07	0.27	0.09	0.87	0.00	0.62	0.22	**0.15**
2012	0.00	0.00	0.00	0.03	0.00	0.08	0.00	0.00	0.20	0.22	**0.04**

Note: Shaded cells indicate decreased infection rates or sustained zero infections. Data is for March to May for 2010 and 2012, respectively. Pennsylvania nursing homes were sorted into performance quartiles based on healthcare-associated infection (HAI) reports submitted to the Pennsylvania Patient Safety Authority from March through May 2010. For the purposes of this study, "H-HAI" nursing homes are the 10 facilities identified from the bottom quartile with high rates of HAIs.

nursing homes between the baseline preintervention quarter and postintervention quarter. The pooled mean rate for the 10 H-HAI nursing homes decreased from 2.97 to 2.49 infections per 1,000 resident-days between these two quarters (see Figure 4). This equals a 16.2% decrease in the mean infection rate compared with baseline. Despite improvements, 6 of the 10 H-HAI nursing homes remained in the bottom quartile of state infection rates for the postintervention quarter. Three nursing homes moved into the third quartile, and one moved into the second quartile.

A one-tailed Wilcoxon signed-rank test was applied to the overall infection rates for the 10 HAI nursing homes during these two quarters. The resultant *z*-score was 1.86, indicating that the decrease in infection rates was significant at the p value <0.05. Next, a random-effects meta-analysis of incidence rates was conducted that compared the 10 H-HAI nursing homes with a control group. The control group consisted of 40 nursing homes from the same quartile as the 10 H-HAI nursing homes that were matched in terms of both baseline resident-days and baseline infection rates. This analysis showed that while the 10 H-HAI facilities showed significant improvement, the improvement did not differ significantly from improvement in the control group. Further study is warranted given the decreased infection rates in some of the control group nursing homes over the same time period.

As illustrated in the Table, 4 of the 10 H-HAI nursing homes (facilities 1, 2, 5, and 7) decreased infection rates in all five infection type categories between the preintervention quarter and the postintervention quarter. Facilities 4, 6, and 9 improved in four infection type categories, and facilities 3 and 10 improved in three categories. Facility 8, which had the largest increase in overall infection rate (see Figure 4), showed increases in four of five infection type categories while maintaining zero infections in the category labeled "other."

For these 10 H-HAI facilities during the two quarters, the greatest rate decrease between the baseline preintervention quarter and the postintervention quarter (73.3%) was noted in the category of "other" infections (including osteomyelitis and primary bloodstream infections), with

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infections per 1,000 resident-days decreasing from 0.15 to 0.04. Decreases were also seen in SSTIs and in symptomatic UTIs in residents both with and without indwelling urinary catheters. Slight increases were seen in GI infection and RTI rates for the group, despite improved rates in 7 of the 10 H-HAI nursing homes for these two infection types.

Cost Estimates

The number of HAIs reported in the preintervention quarter and the related costs were compared with the postintervention quarter. The 10 H-HAI nursing homes reported a combined 18.8% decrease in the raw number of HAIs, from 367 to 298. Using Alessi et al.'s HAI cost estimates that account for variance in cost according to the types of infections prevented,[4] this translates to a 9% decrease in overall costs for GI infections, RTIs, SSTIs, and symptomatic UTIs, potentially saving $14,827 in the 10 H-HAI nursing homes in the postintervention quarter alone. Actual cost savings were likely much higher, as the cost of infections labeled as "other" are not included in Alessi et al.'s estimates. Even greater savings could be anticipated because this long-term care HAI cost estimate does not include additional costs related to HAIs such as nursing labor costs, physician visits, and hospitalization expenses.[4]

DISCUSSION

Phase II follow-up interviews with infection control and administrative staff revealed facilitators and barriers to full implementation of infection control best practices in nursing homes.

Facilitators

Beyond successful methods mentioned that led to improvements in specific infection control domains, IPDs, directors of nursing, and nursing home administrators described factors that facilitated successful improvements in implementing best practices, including the following:

- Supportive and engaged leaders
- Medical director engagement in infection control practices
- Leadership rounding
- Multidisciplinary teamwork
- Accessibility of supplies necessary for infection control practices at the point of care
- Use of checklists
- Root-cause analysis for infections of concern or outbreaks
- Peer monitoring
- Provision of infection-control-specific education to staff
- Sharing process and outcome data with staff

Barriers

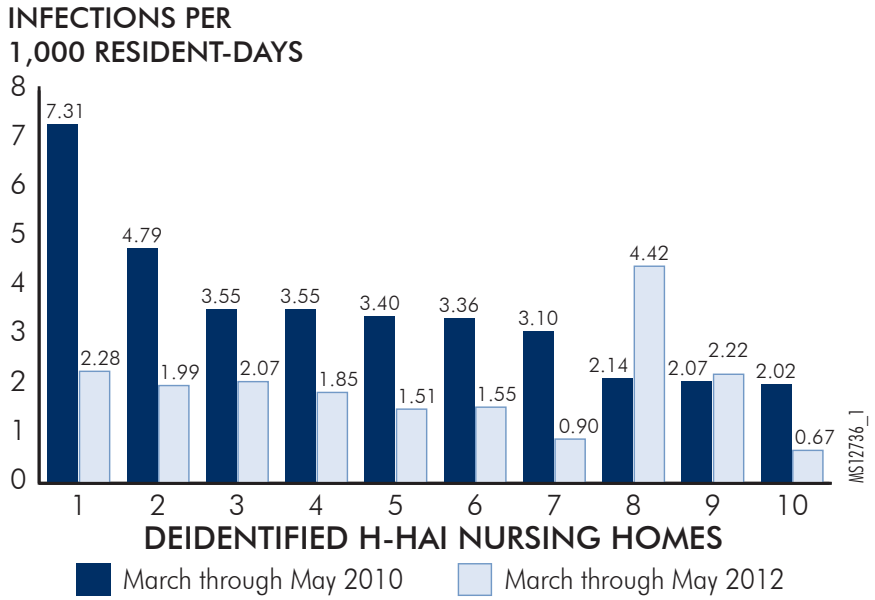
In addition to the domain-specific barriers already described, multiple facility-wide barriers continue to pose a challenge across domains, including the following:

- High acuity
- Low staffing
- Infection preventionist "wears multiple hats"
- Limited consultant services
- Limited ability to make environmental modifications

These challenges are mirrored in the US Department of Health and Human Services' *National Action Plan to Prevent Healthcare-Associated Infections: Roadmap to Elimination*'s chapter on long-term care facilities.[5] Among the challenges cited in the national action plan are lack of a committed, trained infection preventionist and support personnel; IPDs working only part-time and having multiple titles; limited staff; and lack of committed resources. The majority of IPDs for these 10 H-HAI nursing homes are not certified in infection prevention; rather, they are nurses who have received varying degrees of education in infection prevention, and most have additional responsibilities and roles (e.g., assistant director of nursing, wound care nurse, nurse educator).

Environmental modifications can be a challenge in facilities due to limited funding for renovations or corporate

Figure 4. Mean Overall Infection Rates for Nursing Homes with High Rates of Healthcare-Associated Infections (H-HAI)



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guidelines that provide for a uniform and homelike appearance across facilities (which may limit the ability to make desired changes). Several IPDs expressed frustration over not being able to make modifications such as removing carpet or installing wall-mounted hand sanitizer dispensers or personal protective equipment cabinets throughout the facility. This can also be a regulatory compliance concern, as current rules exist that restrict the placement of alcohol-based hand sanitizer dispensers in nursing homes to specific locations.[6] Providing access to antibacterial hand gel and surface wipes at the point of care has also been a specific challenge in facilities where there is concern that residents with cognitive impairment may misuse these products.

Incorporation of best-practice elements, such as those listed in the Authority's Long-Term Care Best-Practice Assessment Tool, into facility infection control plans was limited in this project. Most H-HAI facilities felt that current policies and procedures were sufficient to address these elements and had not thought it was necessary to include them in their infection control plan. In addition, some of the facilities with corporate or hospital ownership perceived that they had limited control over revisions to their infection control plans.

LIMITATIONS

The results reported as part of this project are limited by several factors. Degree of best-practice implementation was self-evaluated and self-reported by facilities. Analysis of infection rates relies upon nursing home compliance with HAI reporting to the Authority. Validation of facility data was limited to evidence that could be provided in the context of follow-up assessment interviews (e.g., infection tracking logs, in-service records, revised policies) and did not include direct clinical observations. The sample size of 10 H-HAI nursing homes is small, and in order to achieve diversity in size and patient population, participants were selected based on perceived compliance with reporting requirements and consistent reporting of utilization data (i.e., resident-days and catheter-days) as determined by Authority analysts. Therefore, the sample was not random. Lastly, practices from the new norovirus guideline published by the Centers for Disease Control and Prevention after development of the Long-Term Care Best-Practice Assessment Tool were not available for the GI and outbreak control domain assessments.

CONCLUSION

This article describes the methods by which 10 nursing homes with high infection rates were able to successfully implement infection control best practices and decrease their infection rates as a result of collaboration with the Authority and through the process of self-assessment using the Long-Term Care Best-Practice Assessment Tool.

This project provided the opportunity for H-HAI facilities to measure progress with implementation of infection control best practices by taking stock of improvement efforts undertaken between the baseline and follow-up assessment periods and exploring the potential link between these improvements and changes in infection rates. Examination of best-practice elements with continued low levels of implementation helped to refocus attention on targeted areas still needing guidance and improvement. Lessons learned will be used to inform future Authority educational programs targeting reduction and prevention of HAIs in all Pennsylvania nursing homes, in accordance with Act 52.[3,7]

Acknowledgments

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NOTES

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Quarterly Update on Wrong-Site Surgery: Trying to Hold the Gains

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Thirteen wrong-site procedures were reported to have occurred in Pennsylvania operating suites during the most recent reporting quarter (January through March), of which nine were reported to have occurred during March alone. Three of the procedures were hand operations at the wrong site. Three were lumbar spine operations done at the wrong level. Another two were wrong-site pain blocks; one illustrates the importance of using all relevant documents, as well as the patient, to verify the site marking:

> *[After the] time-out was done, the nurse noticed that the surgeon injected local lidocaine into the patient's left mid-back and placed needles in the left mid-back in preparation of the transforaminal injection. The nurse questioned the surgeon regarding the proper side. The procedure was stopped. The surgeon verified that the correct side was the right; the needles were removed, and the procedure was then performed on the right T-12 area as scheduled. During the investigation of the event, the surgeon stated that during the marking process he asked the patient if the left side was the correct side. He stated that the patient did not dispute this, so he proceeded to mark the patient for a left thoracic procedure. As the nurse read the consent during time-out, the surgeon did not recognize that the marking was incorrect and proceeded with the procedure according to the marking.*

Two patients had multiple procedures that were more than they consented for. In both cases, the extra procedures were commonly paired with the consented procedures. Presumably, the surgeons were on autopilot and the operating room staffs were not maintaining situational awareness. One other patient had a graft harvest taken from the wrong site, illustrating the importance of having the harvest site specified in all the relevant documents. One procedure was done on the wrong patient due to a complication with the identification process.

The one wrong-site anesthesia block done this quarter was an intra-articular injection done by the operating surgeon, showing the importance of including any block in a time-out and referencing the mark during the time-out:

> *In OR [operating room], circulating RN [registered nurse] prepped an unshaven, unmarked left leg. During the "time-out" the surgeon injected block medication into the left knee. The consent listed the right leg. The right knee had been shaved before the operation and marked by both patient and surgeon in pre-op. Once aware of the injection to the wrong site, the process stopped. Confirmation was made that the right leg was the accurate side. The patient was re-prepped and re-draped. Surgery on the accurate site was completed.*

Near-miss reports from this quarter also illustrate the importance of the principles associated with avoiding wrong-site surgery.[1]

The correct site of the operation should be specified when the procedure is scheduled:

> *OR schedule listed incorrect site of surgery. Schedule stated ORIF [open reduction internal fixation] of left hip. The correct site was right [hip]. The OR consent was correct, x-rays were correct, and site identification was also correct.*

The correct operation and site should be specified on the informed consent:

> *Patient presented to OR with both signed anesthesia consent and procedure consent. Upon reading consent, noticed that site (right vs. left) was not specified on consent. This was noticed before time-out. Informed physician, who confirmed that left side was the correct side by showing the MRI [magnetic resonance imaging] study on the computer as well as showing that he had marked the left side. Physician indicated he would correct the consent.*

Scan this code with your mobile device's QR reader to access the Authority's toolkit on this topic.

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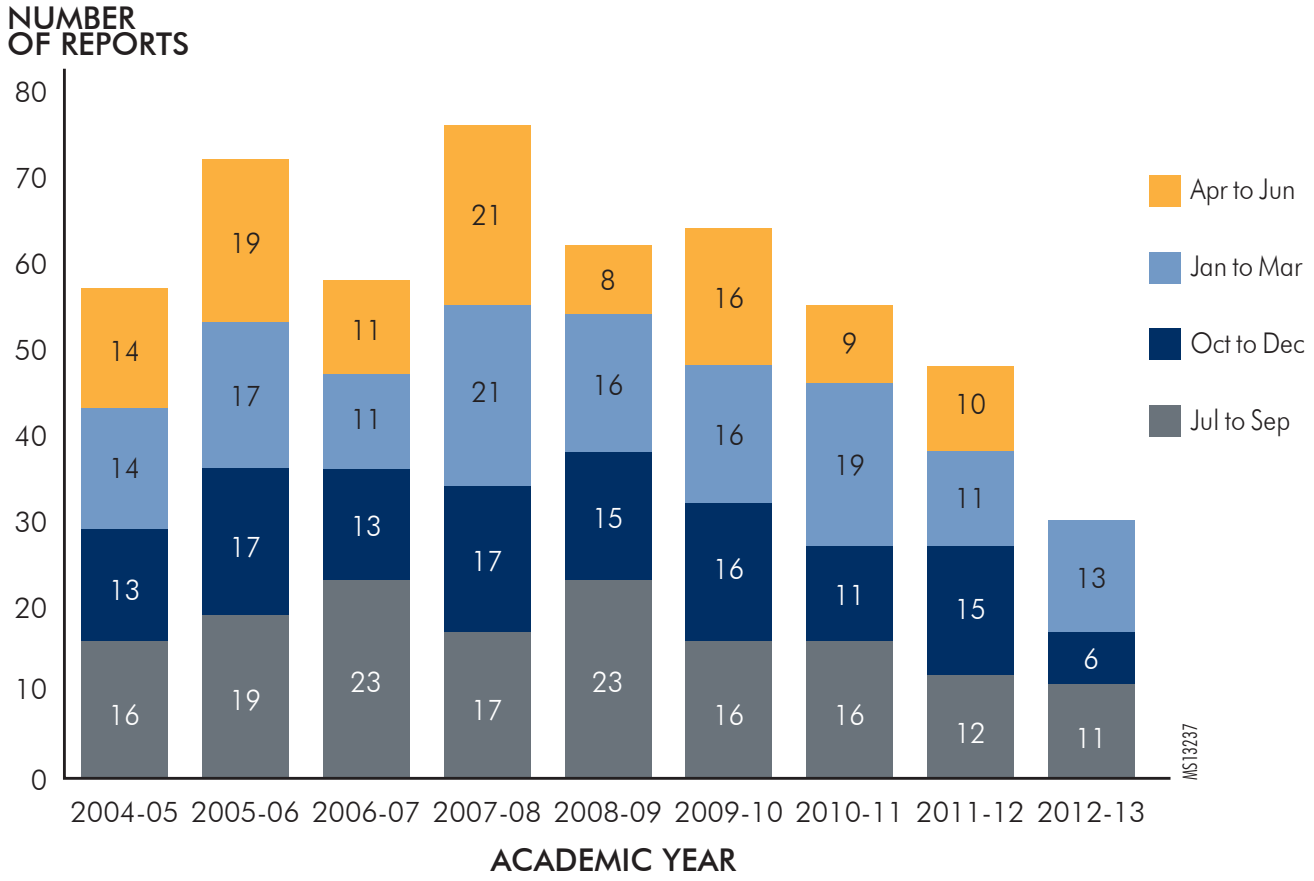
Figure. Pennsylvania Patient Safety Authority Wrong-Site Surgery Reports by Academic Year



> *When reading OR consent upon time-out, the RN noticed no right or left side noted in surgery consent. Time-out was stopped until clarified.*

> *Patient consented for open gastric bypass. Patient scheduled for laparoscopic possible open gastric bypass. Doctor's H&P [history and physical] states laparoscopic bypass. Patient stated laparoscopic gastric bypass when brought into the room. Open [gastric bypass] consent noted during time-out. Doctor [resolved] discrepancy.*

Anyone reviewing the information should check for discrepancies and reconcile any noted with the surgeon:

> *Consent, OR schedule, and H&P state left foot. Patient informed nurse while doing phone assessment it was right foot. OR schedule and documentation from doctor's office all state left foot. Doctor notified.*

All information, including the patient's understanding, should be verified *before* the patient enters the operating room:

> *Patient admitted to pre-op for left foot surgery. Schedule, H&P, consent, and scheduling sheet all have wrong site listed. Patient is scheduled to have left foot surgery, and all documents state right. New documents created with correct site of surgery. OR, surgeon, and scheduler notified of change. Clinical manager contacted [regarding] errors in documentation and potential for wrong-site surgery.*

> *During preparation for eye surgery upon admission, the patient stated she was having surgery on right eye. ID [identification] band placed as such, and drops started. After dose of meds, it was discovered by comparison with her chart that she was to be having surgery on left eye. Patient still stated right eye. Confirmation with surgeon's [office] chart confirmed left eye was indeed to be operated on.*

Patient identification should always be done with two unique patient identifiers:

> *Wrong patient was taken to OR room. Error realized, and patient returned to pre-op. Correct patient then taken for procedure.*

All information, including the patient's understanding, should be verified by each provider caring for the patient. The site should be marked, with the accuracy

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confirmed by both the relevant information and the patient:

> *Patient scheduled for open reduction and internal fixation of left distal femur fracture. Verified with patient, consent, provider, and anesthesia that surgery was planned for the left leg. Anesthesia mark [a band around the ankle] was on the right leg. The operative site [had been] marked by the surgeon, and [the patient had] a traction pin. A regional block was administered to the left femoral area.*

> *Surgical site was marked incorrectly. The incorrect side was on the request for services and the schedule. The consent and H&P were correct. The surgeon was called . . . and the correct site was marked.*

The site should be marked before any procedure:

> *Patient for surgery on his right ankle. Physician did not go in to see patient and mark site [before] anesthesiologist . . . put in popliteal block.*

Information communicated during the time-out should be verified against the relevant documents:

> *[The patient] presented for right knee arthroscopy. Consent states right, as well as H&P. Left knee was painted, cleansed, and draped. Incorrect side was realized during the time-out process, and correct knee operated on.*

The site mark should be visible and referenced in the prepped and draped field during the time-out:

> *The patient was scheduled for right eye procedure. The right eye was marked by the surgeon as the correct site and confirmed by patient; the consent documented the right eye. [The patient] was taken into the OR; the right eye [was] prepped by circulator, and the left eye was draped by surgical tech. [It was] discovered by the OR team prior to initiating the time-out that wrong site was draped.*

> *[This was a] near miss/good catch by the OR team. Patient re-prepped and re-draped to the correct site with the site marking visible within the sterile field.*

Other sources of misinformation:

> *Patient consent was for left hip, but grease board stated right hip. [The information was] reviewed with the surgeon, and left hip is the correct operative site.*

> *Tumor board registrar contacted pathology office to inform them that consent, anesthesia pre-op evaluation, and intra-op documentation all refer to left mastectomy; specimen ID in OR record indicates specimens are from the right breast. Surgeon called to confirm the left side should have been [labeled] on all specimens. Corrections to all path reports were made.*

And if you're not part of the solution, you're part of the problem:

> *Operating surgeon spoke with assistant over the phone and instructed him to proceed with case by marking the patient and performing the time-out. Time-out completed. Recorded in chart that operating surgeon [was] not present for time-out. Upon arrival, operating surgeon asked if time-out was complete. OR staff replied yes; RN stated we should repeat it now that you are present. Operating surgeon refused, stated that the presence and participation of the assistant is sufficient. RN notified OR manager and charge nurse.*

A LOOK AT THE SUSTAINABILITY OF USING EVIDENCE-BASED BEST PRACTICES TO PREVENT WRONG-SITE SURGERY

Thanks to the generous cooperation of participating facilities, the Pennsylvania Patient Safety Authority has been able to follow up from two past collaborations on the use of evidence-based practices to prevent wrong-site surgery.[1]

22-Month Follow-Up

Sixteen facilities volunteered to resurvey their policies with evidence-based practices to prevent wrong-site surgery 22 months after participating in the Authority's second collaboration to prevent wrong-site surgery.[2] Twelve were hospitals and four were ambulatory surgical centers.

Of 97 potential elements in policies that would prevent wrong-site surgery by adhering to evidence-based practices, 9 were found in the same number of policies after 22 months, 57 were found in more policies, and 31 were found in fewer policies. However, the changes for the 16 facilities were statistically significant, by chi-square test, for only three policy elements; all three were improvements (see Table 1).

Five facilities had wrong-site surgery during the 22-month period, and 11 had no wrong-site surgery. One policy element was found significantly more commonly in the 11 facilities that did not experience wrong-site surgery during that period (8 of 11) than in the 5 that did (1 of 5), by chi-square test ($p = 0.05$):

- Does the policy or procedure require that the surgeon obtain consent for surgery from the patient or legal representative prior to or at the time of scheduling the procedure?

Of the nine facilities with that policy element, five had added the element after the collaboration project ended; all five were facilities that experienced no wrong-site surgery in the interim.

Seventeen sites volunteered to resurvey their compliance with evidence-based practices to prevent wrong-site surgery 22 months after participating in the Authority's second collaboration to prevent wrong-site surgery.[2] Twelve were hospitals and five were ambulatory surgical centers; one of the five was part of one of the hospital systems, adhering to the same policies. Ten observations were used for each site, for a total of 170 observations.

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Compliance with evidence-based practices to prevent wrong-site surgery showed a statistically significant decrease, by chi-square test, 22 months after participating in their collaboration to prevent wrong-site surgery for three best practices (see Table 2).

Compliance with evidence-based practices to prevent wrong-site surgery showed a statistically significant increase, by chi-square test, over the 22 months after finishing their collaboration to prevent wrong-site surgery for four best practices (see Table 3).

Five sites had wrong-site surgery during the 22-month period; 12 sites had no wrong-site procedures. Three evidence-based best practices were currently observed significantly more commonly at the 12 sites that did not experience wrong-site surgery than at the 5 that did, by chi-square test (see Table 4).

Compliance with two evidence-based best practices was associated with both a change over time and a difference between sites with and without wrong-site surgery during the 22-month interval:

1. At the end of the collaboration project to prevent wrong-site surgery, the site was marked, with the accuracy confirmed by images when relevant, at 100% of sites that had subsequent wrong-site surgery and 97% of sites that had no subsequent wrong-site surgery, for an overall compliance of 98%. Twenty-two months later, compliance had decreased to 71% among the sites that had wrong-site surgery during the interval and was 100% among the sites that had no wrong-site surgery during the interval, for an overall decrease in compliance to 82%.
2. At the end of the collaboration project to prevent wrong-site surgery, information communicated during the time-out was verified against the relevant documents (e.g., schedule, consent, H&P) at 90% of sites that had subsequent wrong-site surgery and 81% of sites that had no subsequent wrong-site surgery, for an overall compliance of 83%. Twenty-two months later, compliance had decreased to 79% among the sites that had wrong-site surgery during the interval and increased to 98% among the sites that had no wrong-site surgery during the interval, for an overall increase in compliance to 93%.

48-Month Follow-Up

Four hospitals volunteered to resurvey their policies and compliance with evidence-based practices to prevent wrong-site surgery 48 months after participating in the Authority's initial collaboration to prevent wrong-site surgery.[3]

Of 15 policies assessed by the four hospitals at both at baseline (the end of the collaboration project) and 48 months later, 7 remained universally consistent with evidence-based best practices. One became universally consistent: the requirement to include the exact description of the site when scheduling an operation. One became more consistent: the requirement to conduct separate time-outs for separate procedures. One became net more consistent: the requirement to remove patient information from the room with the patient. Two were less consistent with evidence-base best practices than reported at baseline: verification and reconciliation

Table 1. Policy Elements Found in Significantly More of 16 Facilities 22 Months after Finishing a Collaboration Project to Prevent Wrong-Site Surgery

POLICY ELEMENT	NO. OF FACILITIES, MAR 2011	NO. OF FACILITIES, JAN 2013	P =
Does the policy or procedure require that the surgeon state that other members of the operating team speak up if their understanding of the situation is different than the one stated in the time-out?	6	13	0.05
When an operation is done at the level of a particular vertebra or rib, does the policy or procedure require that the identity of the vertebra or rib be verified by fluoroscopy or radiograph (x-ray)?	3	12	0.001
When an operation is done to stent a ureter, does the policy or procedure require that the side of the ureter be verified by fluoroscopy, radiology (x-ray), or ultrasound?	2	10	0.01

Table 2. Decreased Compliance with Evidence-Based Best Practices at 17 Sites 22 Months after Finishing a Collaboration Project to Prevent Wrong-Site Surgery, Based on 170 Observations

PRACTICE	COMPLIANCE, MAR 2011	COMPLIANCE, JAN 2013	P =
The site should be marked by the provider's initials.	82%	50%	0.001
The site should be marked, with the accuracy confirmed by images when relevant.	98%	82%	0.01
The surgical field should be prepped and draped prior to the time-out	99%	92%	0.01

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of all available relevant documents (1) at the time of scheduling and (2) prior to arriving in the preoperative holding area. Three had been reported as universally consistent at baseline but not at 48 months: (1) informing patients that all providers will be asking for identification, (2) marking the site after verification with all relevant documents, and (3) written verification of the correct spinal level by a radiologist as part of the intraoperative verification. Because of the small sample size, no changes were tested for statistical significance.

Three of the four hospitals observed compliance both at baseline and 48 months later. For each practice, they observed a cumulative average of 25 operations at baseline and 23 operations 48 months later. The compliance averaged 90% overall at baseline and 93% 48 months later. Only two practices showed statistically significant differences, by chi-square test, between the two observations:

1. *Including the schedule in the preoperative verification* improved from 45% (9 of 20) during the baseline at the end of the collaboration project to 92% (23 of 25, $p < 0.001$) 48 months later. The improved compliance was in concordance with the improvement to a universally consistent requirement to include the exact description of the site when scheduling an operation.
2. *Radiographic verification of the spinal level intraoperatively* improved from 55% (11 of 20) during the baseline at the end of the collaboration project to 100% (7 of 7, $p < 0.05$) 48 months later. The difference in the percentage of opportunities (20 of 25 = 80% versus 7 of 23 = 30%) is significantly different ($p < 0.001$ by chi-square test), suggesting that the samples for this subset may have been collected differently in the two time periods.

Table 3. Improved Compliance with Evidence-Based Best Practices at 17 Sites 22 Months after Finishing a Collaboration Project to Prevent Wrong-Site Surgery, Based on 170 Observations

PRACTICE	COMPLIANCE, MAR 2011	COMPLIANCE, JAN 2013	P =
The site should be marked, with the accuracy confirmed by all relevant documents.	96%	99%	0.05
Separate formal time-outs should be done for separate procedures, including anesthesia blocks.	85%	99%	0.01
Information communicated during the time-out should be verified against the relevant documents (e.g., schedule, consent, history and physical).	83%	93%	0.01
The surgeon actively participates in the time-out.	94%	99%	0.05

Table 4. Current Compliance with Evidence-Based Best Practices at 5 Sites with Wrong-Site Surgery versus 12 Sites without Wrong-Site Surgery during the 22 Months since Finishing a Collaboration Project to Prevent Wrong-Site Surgery, Based on 170 Observations

PRACTICE	COMPLIANCE, SITES WITH WRONG-SITE SURGERY	COMPLIANCE, SITES WITHOUT WRONG-SITE SURGERY	P =
The site should be marked, with the accuracy confirmed by images when relevant.	71%	100%	0.01
Information communicated during the time-out should be verified against the relevant documents (e.g., schedule, consent, history and physical).	80%	98%	0.001
Information communicated during the time-out should be verified against diagnostic test results, images, and/or pathology reports, if relevant.	79%	98%	0.001

Interpretation of the Results of the Follow-Up Surveys

The results of follow-up surveys of policies and compliance with evidence-based practices to prevent wrong-site surgery in facilities that participated in collaborations to prevent wrong-site surgery showed interesting patterns, as described in this section.

The institution of policies and improved compliance continued in some facilities *after* completion of their participation in a collaboration to prevent wrong-site surgery. Three policy elements were found in significantly more facilities after 22 months (see Table 1). One policy element, requiring the surgeon to get the consent prior to or at the time of scheduling the procedure, was added only in facilities that had no wrong-site surgery during the 22-month period. Four evidence-based best practices were observed more frequently 22 months later (see Table 3). One of those practices, verifying information against relevant documents, improved only in facilities that had no wrong-site surgery during the 22-month period. At least one additional best practice was observed more frequently 48 months later.

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Some policies and practices to prevent wrong-site surgery were no longer as prevalent at follow-up as they were at the end of the collaboration (see Table 2). Decreased compliance with one of these practices, confirming the accuracy of the site marking with images when relevant, was associated with wrong-site surgery during the 22 months before follow-up.

The policies to prevent wrong-site surgery that were significantly more prevalent after completion of the collaboration were as follows:

- The surgeon states that other members of the operating team should speak up if their understanding of the situation is different than the one stated in the time-out.
- When an operation is done at the level of a particular vertebra or rib, the identity of the vertebra or rib should be verified by fluoroscopy or radiograph (x-ray).
- When an operation is done to stent a ureter, the side of the ureter should be verified by fluoroscopy, radiology (x-ray), or ultrasound.
- The surgeon should obtain consent for surgery from the patient or legal representative prior to or at the time of scheduling the procedure.

These results suggest prolonged negotiations with surgeons on the medical staff to accept some policies affecting them.

Compliance with evidence-based practices to prevent wrong-site surgery increased over time after the collaboration for some practices and decreased for others. The best practices that were observed significantly more frequently over time were as follows:

- The site should be marked, with the accuracy confirmed by all relevant documents.
- Separate formal time-outs should be done for separate procedures, including anesthesia blocks.
- Information communicated during the time-out should be verified against the relevant documents (e.g., schedule, consent, H&P).
- The surgeon actively participates in the time-out.

And, at 48-months, as follows:

- The schedule should be included in the preoperative verification.

The best practices that were observed significantly less frequently over time were as follows:

- The site should be marked by the provider's initials.
- The site should be marked, with the accuracy confirmed by images when relevant.
- The surgical field should be prepped and draped prior to the time-out.

All other best practices were maintained over 22 to 48 months—or at least compliance varied in ways that were not statistically significant.

Continued improvement in the presence of policies and compliance with evidence-based best practices to prevent wrong-site surgery was more common than decreased adherence to best-practice policies.

The underlying patterns for the observed changes over time can only be conjectured. Presumably, the best practices that were maintained were supported by policies and by systems that facilitated compliance. They may have become good habits.

Presumably, continued improvements in compliance resulted from strengthening policies, reducing barriers to compliance, and/or providing effective incentives for compliance.

Presumably, decreased compliance over time resulted from persistence of behavior that did not match best practice. The failure to maintain compliance may be associated with resistance to the practice, continued barriers, ineffective incentives, lack of enforcement, and/or absence of monitoring and feedback.

The results of the follow-up surveys of facilities that had participated in collaborations to prevent wrong-site surgery demonstrate continued improvement in the presence of policies and compliance with evidence-based best practices. Most policies and best practices were maintained. Compliance with some best practices decreased, suggesting the need for periodic monitoring and feedback. Facilities committed to preventing wrong-site surgery should persist in efforts to adopt and comply with best practices.

The facilities that volunteered to participate in the repeat surveys are commended for their dedication to the project to prevent wrong-site surgery in Pennsylvania.

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Contracting for Safety: A Misused Tool

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INTRODUCTION

As a Patient Safety Liaison, I have used my own lessons learned as talking points during some of my initial consultations with healthcare facilities. One of those lessons learned was my knowledge of the limited value of "contracting for safety" or "no-suicide contracts" (NSCs) to prevent suicide. I found through discussions that many healthcare providers use contracts for safety in their assessment of patients at risk for suicide. I also found that many were not aware of the associated limitations and possible risks.

According to the Pennsylvania Department of Health report *Injury Deaths and Hospitalizations in Pennsylvania 2005–2009*, between 2005 and 2009, the age-adjusted suicide rate increased in Pennsylvania by 10%, from 11.1 deaths per 100,000 population to 12.1 deaths per 100,000 population.[1] Between June 2004 and October 2012, healthcare facilities reported 32 deaths by suicide to the Pennsylvania Patient Safety Authority through its Pennsylvania Patient Safety Reporting System (PA-PSRS). These deaths included suicide in the inpatient setting, outpatient setting, and after release from treatment. Additionally, facilities reported 44 events that included the terminology "contract for safety" in the narrative description. Of those 44 events, 8 were reported in which the patient "contracted for safety" but then went on to harm him or herself. Examples include the following:

> *Patient contracted for safety and then ingested hand sanitizer.*
>
> *Patient contracted for safety prior to discharge then committed suicide.*
>
> *Teenage patient contracted for safety and then hung himself.*
>
> *Contracted for safety and immediately removed sutures with a comb.*

The data is limited because reports submitted to PA-PSRS as Infrastructure Failures are not available for review and because the report narratives needed to indicate that the patient had a contract for safety in place in order for the report to be identified by the search of PA-PSRS.

CONTRACTING FOR SAFETY

So what does "contracting for safety" mean, and is it an effective means of assessing a patient's suicide risk? "Contracts for safety," "NSCs," and "no-suicide decisions" are common terms used to describe an agreement between the patient and clinician whereby the patient agrees not to harm him or herself. The agreements are usually written but are sometimes verbal.[2] These terms are often used interchangeably by providers. No-suicide decisions were first described in psychiatric literature by Drye et al. in 1973.[3] The authors described the patient making a decision to not commit suicide for a specified period of time. One of the key aspects of this suicide management strategy was the long-term relationship that the patient had with the clinician. This process has evolved into something very different than what Drye et al. described 40 years ago. NSCs can assist in the patient assessment process but, used alone, can lead to poor or even dangerous treatment plans for the patient.[4,5] It is evident from events reported to the Authority that contracts for safety or NSCs are used in inpatient settings, drug and alcohol units, and emergency departments. The use of such contracts are contraindicated in the emergency setting[6,7] and for use with newly admitted or unknown patients, agitated patients, psychotic or impulsive patients, or those under the influence of drugs or alcohol.[7] Use of NSCs in such settings may ignore the long-term relationship aspect of the contract between the patient and clinician.

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Concerns regarding the use of NSCs include the lack of empirically based evidence to support ongoing use,[2,5,8-14] decreased vigilance by healthcare workers when NSCs are present,[7,9,13,15] inaccurate assumptions of legal protections afforded by NSCs,[5,8,11,13,14] and questions surrounding informed consent and competence.[8,13] A retrospective chart review conducted by Barbara L. Drew in 2001 concluded that contracting for safety did not contribute to suicide; however, prevention of self-harm through the use of NSCs was not demonstrated.[10] The review also concluded that consistent, appropriate nurse staffing levels resulted in a decreased risk of suicide. Some literature suggests that in certain situations (e.g., patient with borderline personality disorder), an NSC may actually increase the patient's risk by putting the patient in a situation that is likely to cause him or her to "act out."[2] Key findings in a qualitative study of crisis team nurses and patients included that clinicians were using NSCs to protect themselves from liability, that clinicians were using NSCs to compensate for limited mental healthcare resources, and that there was a lack of formal training.[14] Other literature suggests that some patients may feel disempowered by an NSC,[15] may see it as a barrier to communicating with clinicians,[13,15] or may be unable to accept additional accountability during such a critical time.[15]

RISK REDUCTION STRATEGIES

Assessing a patient for suicide risk and then managing that risk is one of the more difficult challenges that healthcare workers face. It is difficult to correlate risk reduction strategies and outcomes. Following are some published best practices.

Assessing risk. Conduct a comprehensive psychiatric assessment that includes assessing the five components of suicide (ideation, intent, plan, access to lethal means, and history of past attempts);[7,9,16] evaluate risk factors, noting those that can be modified to reduce risk;[7,9,16,17] examine the patient's current situation (what is happening now);[16] identify protective factors, noting those that can be enhanced;[17] develop a safety/crisis plan with the patient;[5,7,18] and identify appropriate interventions. Risk factors include the following:

- Presence of a mental health disorder (high-risk diagnoses include major depression, bipolar disorders, alcohol or substance abuse, schizophrenia, and borderline personality disorder)[7,9,16,17]
- Delirium[9]
- Dementia[9]
- Other cognitive impairment[7,16,17]
- Social stressors (e.g., financial)[7,9,17]
- Recent or impending loss[17]
- Access to firearms[7,9,17]
- Previous suicidal behavior or attempts[7,9,16,17]
- History of physical or sexual abuse[16,17]
- Family history of suicide[7,9,16,17]
- Social isolation[7,16]
- Hopelessness or despair[7,9,16,17]
- Anhedonia[16,17]
- Impulsivity[7,16,17]
- Global insomnia[17]
- Command hallucinations[16,17]
- Medical disorders with poor prognosis, poor physical functioning, or chronic pain[7,9,16,17]
- Childhood trauma[7,16,17]

Consideration should also be given to special populations such as adolescents and the elderly, certain occupations, and demographics.[7,16,17]

Assessing at appropriate times. Suicide risk assessment and reassessment is a dynamic process. Opportunities to assess risk include upon crisis presentation to a mental health or emergency setting, during initial psychiatric inpatient or outpatient evaluation, when a change in observation status or treatment setting is being considered, when the patient's clinical presentation changes, when there is a lack of improvement or worsening of symptoms while receiving treatment, when medications are changed, when a significant other becomes involved, prior to discharge, and when a patient with a chronic mental health disorder stops treatment.[16,17]

Managing risk. Establish and maintain a therapeutic relationship; provide a safe environment; determine the appropriate treatment setting; develop a treatment plan with the patient;[7,17] develop a safety/crisis plan with the patient;[5,8,18] coordinate, consult, and collaborate with other clinicians; promote adherence to the plan; educate the patient and family;[7] provide emergency contact numbers (both local and national) and instructions on when to call;[17,18] and monitor patient status and response to treatment.[7]

CONCLUSION

Little evidence exists to support the use of NSCs. However, if they are used, it is important to ensure that they are used appropriately in the management of suicide risk. NSCs are intended for use in settings where there are longstanding therapeutic relationships with the clinicians, and they are not intended to replace comprehensive suicide risk assessments.

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