PENNSYLVANIA PATIENT SAFETY ADVISORY

Produced by ECRI Institute and ISMP under contract to the Pennsylvania Patient Safety Authority

Vol. 11, No. 1

March 2014

REVIEWS & ANALYSES

1 **Aligning the Lines: An Analysis of IV Line Errors**
Analysis of intravenous (IV) line events reported to the Pennsylvania Patient Safety Authority revealed that three errors were responsible for nearly 50% of the events: rate of infusion mix-up or line mix-up, IV lines not attached to patients, and errors associated with piggyback infusions. Several risk reduction strategies focused on these errors are discussed.

8 **The Use of Patient Sitters to Reduce Falls: Best Practices**
Based on data from 75 hospitals participating in the Pennsylvania Hospital Engagement Network Falls Reduction and Prevention Collaboration, a higher percentage of assisted falls and a lower rate of falls with harm may be associated with the use of sitters. Authority analysts identify specific sitter program design elements that have the potential to reduce rates of falls with harm.

15 **Preoperative Screening and the Influence on Cancellations and Transfers: An Ambulatory Surgical Facility Collaboration**
The Authority conducted a collaborative improvement project with 11 ambulatory surgical facilities in the northeast region of Pennsylvania, and reductions in transfer rates and day-of-service cancellation rates were observed. Interventions included implementation of a standardized checklist and initiation of a second preoperative patient phone call.

23 **Improvement of Pennsylvania Healthcare Consumers' Awareness of Patient Safety**
In 2013, 604 randomly selected participants were surveyed about their respective engagement in 10 consumer patient safety practices. Results indicate that the patient safety movement in Pennsylvania is raising awareness of patient safety among healthcare consumers in the commonwealth.

FOCUS ON INFECTION PREVENTION

30 **Peripheral Vascular Catheter–Related Infection: Dwelling on Dwell Time**
Pennsylvania data indicates that patients are at risk for peripheral vascular catheter (PVC)–related bacteremia after a PVC is in place for more than 72 hours. Waiting for a clinical indication of infection to re-site a PVC may lead to prolonged dwell times, and re-siting at 72 hours may reduce infection risk.

UPDATE

36 **Quarterly Update on Wrong-Site Surgery: Queries and Responses**

OTHER FEATURES

40 **Commitment to Patient Safety Recognized in Pennsylvania**

42 **Enhancing the Authority's Educational Programs to Promote Patient Safety**

OBJECTIVE

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.

PUBLISHING INFORMATION

The *Pennsylvania Patient Safety Advisory* (ISSN 1941-7144) is published quarterly, with periodic supplements, by the Pennsylvania Patient Safety Authority. This publication is produced by ECRI Institute and the Institute for Safe Medication Practices under contract to the Authority.

COPYRIGHT 2014 BY THE PENNSYLVANIA PATIENT SAFETY AUTHORITY

This publication may be reprinted and distributed without restriction, provided it is printed or distributed in its entirety and without alteration. Individual articles may be reprinted in their entirety and without alteration, provided the source is clearly attributed.

Current and previous issues are available online at http://www.patientsafetyauthority.org.

SUBSCRIPTION INFORMATION

This publication is disseminated by e-mail at no cost to the subscriber. To subscribe, go to http://visitor.constantcontact.com/d.jsp?m=1103390819542&p=oi.

INDEX INFORMATION

The *Pennsylvania Patient Safety Advisory* is indexed in NLM Catalog (http://www.ncbi.nlm.nih.gov/nlmcatalog), a service of the US National Library of Medicine and National Institutes of Health.

The *Advisory* is also indexed in the CINAHL® Plus and CINAHL Plus with Full Text databases.

CONTINUING EDUCATION

The Pennsylvania Patient Safety Authority works with the Pennsylvania Medical Society to offer AMA PRA Category 1 Credits™ for selected portions of the *Pennsylvania Patient Safety Advisory* through the online publication *Studies in Patient Safety*. Go to http://www.pamedsoc.org to find out more about patient safety continuing medical education opportunities.

The Authority also works with the Pennsylvania State Nurses Association to offer nursing continuing education credits for selected portions of the *Advisory*. Go to https://psna.hostingharrisburg.com to view the course catalog.

CONSIDERATION OF SUBMITTED MANUSCRIPTS

Manuscripts consistent with the objectives of the *Pennsylvania Patient Safety Advisory* are welcome. For information and guidance about submission and instructions for authors, please contact the editor.

Scan this code with your mobile device's QR reader to subscribe to receive the Advisory for free.

PATIENT SAFETY AUTHORITY

Board of Directors

Carrie DeLone, MD, *Chair*
Radheshyam M. Agrawal, MD
Jan Boswinkel, MD
John Bulger, DO, MBA
Joan M. Garzarelli, MSN, RN
Daniel Glunk, MD
Lorina Marshall-Blake
Gary A. Merica, RPh, MBA/HCM
Cliff Rieders, Esq.
Stanton Smullens, MD
Eric H. Weitz, Esq.

Staff

Michael Doering, MBA, *Executive Director*
Laurene Baker, MA, *Director of Communications*
Franchesca J. Charney, RN, MS, CPSO, CPPS, CPHRM, CPHQ, DFASHRM, *Director of Educational Programs*
Denise Barger, BA, CPHRM, CPHQ, CPPS, HEM, *Patient Safety Liaison*
Michelle Bell, RN, BSN, FISMP, CPPS, *Patient Safety Liaison*
Jeffrey Bomboy, RN, *Patient Safety Liaison*
Regina M. Hoffman, RN, CPHRM, CPPS, *Patient Safety Liaison*
Christina Hunt, MSN, MBA, HCM, RN, CPPS, *Senior Patient Safety Liaison*
Richard Kundravi, BS, *Patient Safety Liaison*
Megan Shetterly, RN, MS, *Senior Patient Safety Liaison*
Robert Yonash, RN, *Patient Safety Liaison*
Howard Newstadt, JD, MBA, *Finance Director/CIO*
Teresa Plesce, *Office Manager*
Denise D. Conder, *Administrative Specialist*
Karen McKinnon-Lipsett, *Administrative Specialist*
Shelly M. Mixell, *Executive Director Assistant*

Contact Information

333 Market Street, Lobby Level
Harrisburg, PA 17120
Telephone: 717-346-0469
Fax: 717-346-1090
Website: http://www.patientsafetyauthority.org
E-mail: patientsafetyauthority@pa.gov

PENNSYLVANIA PATIENT SAFETY ADVISORY

Karen P. Zimmer, MD, MPH, FAAP, *Acting Editor*
John R. Clarke, MD, *Editor Emeritus*
William M. Marella, MBA, *Program Director*

Analysts

Theresa V. Arnold, DPM, *Manager, Clinical Analysis*
Sharon Bradley, RN, CIC
James Davis, MSN, RN, CCRN, CIC
Michelle Feil, MSN, RN
Edward Finley, BS
Lea Anne Gardner, PhD, RN
Michael J. Gaunt, PharmD
Matthew Grissinger, RPh, FISMP, FASCP
Mary C. Magee, MSN, RN, CPHQ
Christina Michalek, BSc Pharm, RPh
Susan C. Wallace, MPH, CPHRM

Advisors

Michael Cohen, RPh, MS, ScD, *President, ISMP*
Ronni Solomon, JD, *Executive Vice President and General Counsel, ECRI Institute*
Allen Vaida, PharmD, *Executive Vice President, ISMP*

Production Staff

Jesse Munn, BA, *Managing Editor*
Michael Baccam, MFA
Susan Lafferty
Miranda R. Minetti, BS
John Hall, *Manager, Printing Services*
Tara Kolb, BFA, *Manager, Media Services*
Kristin Finger, BS
Suzanne R. Gehris
Marlene P. Hartzell
Benjamin Pauldine, MS

Contact Information

Mailing address: PO Box 706
Plymouth Meeting, PA 19462-0706
Telephone: 866-316-1070
Fax: 610-567-1114
E-mail: support_papsrs@pa.gov

Editorial Advisory Board

Mary Blanco, RN, MSN, CPHQ, *Brandywine Hospital*
Lawrence M. Borland, MD, *Children's Hospital of Pittsburgh of UPMC*
Dorothy Borton, RN, BSN, CIC, *Albert Einstein Medical Center*
Albert Bothe Jr., MD, *Geisinger Health System*
Mark E. Bruley, BS, CCE, *ECRI Institute*
Vincent Cowell, MD, *Temple University*
Monica M. Davis, CRNP, MSN, MBA, *The Children's Hospital of Philadelphia*
Frank M. Ferrara, MD, MBA, *Wills Eye Surgery Center-Plymouth*
Caprice C. Greenberg, MD, MPH, *University of Wisconsin*
Daniel Haimowitz, MD, FACP, CMD
Richard J. Hamilton, MD, *Drexel University*
Mary T. Hofmann, MD, *Abington Memorial Hospital*
Janet Johnston, RN, MSN, JD
Harold S. Kaplan, MD, *Mount Sinai School of Medicine*
Michael L. Kay, MD, *Wills Eye Hospital, Thomas Jefferson University Hospital, Pennsylvania Hospital*
John J. Kelly, MD, FACP, *Abington Memorial Hospital*
Curtis P. Langlotz, MD, PhD, *University of Pennsylvania*
Michael Leonard, MD, *Kaiser Permanente, Institute for Healthcare Improvement*
Steven C. Marcus, PhD, *University of Pennsylvania*
James B. McClurken, MD, FACC, FCCP, FACS, *Temple University*
Patrick J. McDonnell, PharmD, *Temple University School of Pharmacy*
Francine Miranda, RN, BSN, FASHRM, *Lehigh Valley Hospital*
Dona Molyneaux, PhD, RN, *Gwynedd-Mercy College*
Steve D. Osborn, Vice President, *Saint Vincent Health Center*
Christopher M. Pezzi, MD, FACS, *Abington Memorial Hospital*
Hyagriv N. Simhan, MD, MSCR, *University of Pittsburgh*
Dean Sittig, PhD, *University of Texas*
Donald C. Tyler, MD, MBA, *The Children's Hospital of Philadelphia*
Donald P. Underwood, DO, *Drexel University*
Nielufar Varjavand, MD, *Drexel University*
Debra J. Verne, MPA, RN, CPHRM, *Penn State Milton S. Hershey Medical Center*
Linda Waddell, MSN, RN, CEN, *Donald D. Wolff, Jr., Center for Quality Improvement and Innovation at UPMC*
Harold C. Wiesenfeld, MD, *University of Pittsburgh*
Zane R. Wolf, PhD, RN, FAAN, *LaSalle University School of Nursing and Health Sciences*

ACKNOWLEDGMENTS

The following individuals reviewed selected articles for Vol. 11, No. 1:
Angela Coladonato, MSN, RN, NEA-BC, *Chester County Hospital*
Jill English, MSN, RN, ANP-BC, WCC, *Hospital of the University of Pennsylvania*
Jean Harpel, MSN, RN, *ECRI Institute*
Leonard Mermel, MD, *Rhode Island Hospital*
Dona Molyneaux, PhD, RN, *Gwynedd-Mercy College*
Barbara L. Olson, MS, RN, FISMP, *LifePoint Hospitals/LifePoint Hospital Engagement Network*
Debora Simmons, PhD, RN, CCNS, *St. Luke's Health System*

©2014 Pennsylvania Patient Safety Authority

Aligning the Lines: An Analysis of IV Line Errors

Amanda Wollitz, PharmD
Patient Safety Analyst
Matthew Grissinger, RPh, FISMP, FASCP
Manager, Medication Safety Analysis
Pennsylvania Patient Safety Authority

ABSTRACT

From July 2004 through August 2013, Pennsylvania healthcare facilities reported to the Pennsylvania Patient Safety Authority 907 events of intravenous (IV) line errors. Reports were analyzed and assigned an error category based on event description. The most common errors occurred during setup and included rate of infusion mix-up or line mix-up (22.6%, n = 205), IV lines not attached to patients (14.6%, n = 132), and errors associated with piggyback infusions (12.8%, n = 116). High-alert medications were involved in 71.0% (n = 644) of all errors, with heparin being the most frequent medication reported (16.6%, n = 151). Nearly half of the reports (48.1%, n = 436) were categorized as harm score D or greater (as defined by the National Coordinating Council for Medication Error Reporting and Prevention), which indicates they reached the patient and required some type of intervention. While it is difficult to determine the exact causes of reported events, more than half of the submitted events involved the setup of IV lines. Risk reduction strategies focused on setting up infusions completely and one at a time, administering high-alert medications as primary infusions, utilizing infusion sets with back-check valves, labeling lines, limiting pump setup to qualified and credentialed personnel, placing IV pumps and epidural pumps on opposite sides of the patient's bed, and raising awareness of the risk of IV errors. (PA Patient Saf Advis 2014 Mar;11[1]:1-7.)

Corresponding Author
Matthew Grissinger

INTRODUCTION

In 2002, the United States Pharmacopeial Convention reported that high-alert medications were associated with harmful errors and identified intravenous (IV) medications as the top offenders.[1] This risk is heightened exponentially with the simultaneous administration of multiple IV infusions. While safeguards such as independent double checks and smart infusion pumps with dose range checking have been used to reduce the risks associated with the IV administration process, extensive research has yet to be completed on the potential errors that could result from the administration of multiple IV infusions. To date, there are no conclusive interventions to prevent these types of errors. Though practitioners rely on smart infusion pumps to alert them to errors, the safety mechanisms of smart pumps are limited.

One study looked at type, frequency, and severity of medication errors associated with IV pumps and revealed that only 1 in 389 documented errors would have been prevented by smart pump technology.[2] The study also points to the limited ability of smart pumps to prevent errors during the medication-use process, asserting that smart pumps are limited to preventing errors as a result of incorrect programming, which can result in a wrong dose (which does not match the order), wrong medication, wrong patient, or wrong indication.[2] Additionally, the complexity of the nursing environment and unnecessary variability in drug concentrations, dosing units, and dosing limits used in different areas of a hospital further complicate infusion pump programming increasing the risk of error.[3]

The Institute for Safe Medication Practices (ISMP) Canada and Health Technology Safety Research Team evaluated two national incident reporting databases (ISMP Canada's Canadian Medication Incident Reporting and Prevention System and the United States Food and Drug Administration's Manufacturer and User Facility Device Experience database) to reveal several safety issues associated with multiple IV infusions with the potential to cause patient harm.[4] The identified safety issues included secondary infusions, line identification, and line setup and removal. This analysis of IV line event reports offers an exclusive interpretation of IV line errors in Pennsylvania healthcare facilities, identifies common steps in the administration process where errors occurred, identifies medications most commonly involved in IV line errors, and categorizes factors associated with such errors.

METHODOLOGY

When reviewing reports submitted to the Pennsylvania Patient Safety Authority, analysts have the opportunity to further classify reports using a "monitor code" for future querying opportunities. Analysts queried reports categorized as "medication errors" in the Authority's Pennsylvania Patient Safety Reporting System database for those assigned the monitor code "DEV3," representing reports identified as events involving IV lines. The monitor code is assigned by an analyst's manual review of report data and is a limitation of this analysis due to the potential coding variability between analysts.

The query yielded 907 medication error reports submitted to the Authority from June 2004 through August 2013. The reports were evaluated to determine what factors are associated with IV line medication errors. Reports were analyzed and assigned a category of error based on the analyst's interpretation of the event. If an event fit into more than one category, the analysts determined, when possible, the primary reason for the event based on information provided within the report. When a report did not provide sufficient detail to determine a cause, the event was categorized as "unknown." Medication

©2014 Pennsylvania Patient Safety Authority

name, route, patient care area, and harm score were provided by the reporting facility. When medication names were left blank but the name was provided in the event description, the medication name field was adjusted. Analysts made note of events involving a high-alert medication, based on *ISMP's List of High-Alert Medications*.[5]

ANALYSIS

Errors involving IV lines reported to the Authority occurred during IV drug setup and administration. The most frequent types were rate of infusion mix-up or line mix-up (22.6%, n = 205), IV lines not attached to patients (14.6%, n = 132), and errors associated with piggyback infusions (12.8%, n = 116). Almost seven percent (6.9%, n = 63) of reports were determined to have insufficient information to assign an error type. These reports were assigned as "unknown" but remained in the analysis to be categorized based on harm score, medication involved, patient care unit, and patient age.

Of the reported events, 11.1% (n = 101) involved patients under the age of 18. High-alert medications were prescribed in 71.0% (n = 644) of all events. Heparin was the high-alert medication most frequently involved in an event error (16.6%, n = 151), followed by insulin (7.6%, n = 69) and parenteral nutrition (5.2%, n = 47) (see the Table). Intensive care units (30.2%, n = 274) ranked highest among all units where IV line errors were reported, followed by medical-surgical units (14.1%, n = 128) and telemetry units (6.6%, n = 60).

Facilities reported events according to harm scores as defined by the National Coordinating Council for Medication Error Reporting and Prevention (NCC MERP) Index for Categorizing Medication Errors.[6] Nearly half (48.1%, n = 436) of the events were reported as harm score D or greater. This indicates that the majority of patients required extra monitoring or intervention to preclude harm.

Table. Top 10 Prescribed Medications Involved in Intravenous Line Events Reported to the Pennsylvania Patient Safety Authority from July 2004 through August 2013 (N = 907)

MEDICATION NAME	NO. OF EVENTS	% OF TOTAL EVENTS
Heparin*	151	16.6
Insulin*	69	7.6
Parenteral nutrition*	47	5.2
Hydration	33	3.6
Morphine*	32	3.5
FentaNYL*	29	3.2
Vancomycin	27	3.0
Diltiazem*	26	2.9
Potassium chloride*	22	2.4
HYDROmorphone*	21	2.3

* A high-alert medication

Based on the Authority's 2012 annual report,[7] 0.5% of medication errors reported to the Authority in 2012 resulted in harm. In comparison, for this analysis, IV line errors caused patient harm (an assigned harm score of E or above) in 6.2% (n = 56) of all event reports. Nearly all reported errors (95.6%, n = 867) reached the patient.

Rate or Line Mix-Ups

The most frequent error type involved rates of two or more medications that were switched, most likely due to a programming error or an inaccurate line tracing and reconciliation. Event reports that were described as IV line mix-ups accounted for 9.5% (n = 86) of events, and those described as IV rate mix-ups accounted for 13.1% (n = 119) of all reports. Some event descriptions ambiguously assigned cause of error to either the line or the rate, but the result was ultimately the same in that IV medications were administered at the wrong rate of infusion. Together, rate and line mix-ups accounted for 22.6% (n = 205) of the reported events.

Line tracing is a critical step in the setup process for administration of IV medications. An event report was categorized as an IV line mix-up if the event description specifically stated that during setup or exchange, the IV lines of two medications were inadvertently switched. High-alert medications were involved in 91.9% (n = 79) of IV line mix-ups. The medication most frequently involved in this type of event was heparin (26.7%, n = 23). Examples are as follows:

> *A patient with nitroglycerin and heparin infusions complained of a headache. The nitroglycerin was ordered to infuse at 1.5 mL/hr, and the heparin was ordered to infuse at 30 mL/hr. The pump was set correctly, but the lines were crossed and the nitroglycerin was infusing at 30 mL/hr and heparin was infusing at 1.5 mL/hr. STAT labs were obtained, nitroglycerin rate was decreased, and patient was given Tylenol®.*

> *Patient was ordered to have a NSS [normal saline solution] bolus of fluid. The IV lines of the NSS and fentaNYL were mixed up during a code situation, and the fentaNYL was administered at the NSS bolus rate. The amount of fentaNYL administered is unknown, but the error was corrected when it was discovered.*

©2014 Pennsylvania Patient Safety Authority

IV Neo-Synephrine® was added for hypotension and administered by another RN [registered nurse] while I got report. After the patient passed away, it was discovered that the Neo-Synephrine bag was on the line that was programed for the IV fluid and was run in at 150 mL/hr.

Analysts categorized events as an IV rate mix-up if the event description stated that the rates were switched (e.g., drug A was infusing at the rate ordered for drug B and/or drug B was infusing at the rate ordered for drug A). These events accounted for 13.1% (n = 119) of the reports. The majority of rate mix-ups involved high-alert medications (93.3%, n = 111), including heparin (30.3%, n = 36), parenteral nutrition (18.5%, n = 22) and insulin (8.4%, n = 10). Further, analysts reviewed the medication prescribed compared with the medication administered. Results of this analysis showed that when heparin was the prescribed medication, the rate was most commonly switched with the rate for IV hydration (47.2%, n = 17). When parenteral nutrition was prescribed, its rate was most commonly switched with the rate for the concomitant intralipid (77.3%, n = 17). And when insulin was the prescribed medication, its rate was most commonly switched with the rate for IV hydration (70.0%, n = 7), as in the following report:

A patient was on an insulin drip at 5 mL/hr and a maintenance IV at 100 mL/hr. While changing the patient's gown, the IVs were switched and the patient received the insulin drip at 100 mL/hr, or 20 units/hr for approximately two hours. [By late morning,] the BS [blood sugar] was less than 35 [mg/dL], so the insulin drip was turned off, which was when the error was discovered. Hourly finger sticks [were initiated] and dextrose 50% IV [was administered.]

Another error requiring intervention involved the administration of protamine sulfate after a patient's heparin was programmed at the rate ordered for the patient's hydration:

Patient ordered to start on heparin gtt [drip] at 800 units/hr and NSS at 75 mL/hr. The medications and pumps were prepared. The heparin gtt was inadvertently set up on the NSS pump and the NSS was inadvertently set up on the heparin pump. Therefore, the patient received 7,500 units/hr of heparin instead of the intended 800 units/hr. The error was caught approximately one hour after start and was immediately stopped. The physician was notified, [who] ordered a stat PTT [partial thromboplastin time], which resulted [in a level] greater than 210 [seconds]. Protamine sulfate was given, and PTT was reversed. No permanent patient harm was identified from this event.

Another example of an event report in which rates were interchanged is as follows:

A nurse noted the heparin bag was empty, [and the patient was] in need of a new bag. Message was given to RN of patient for the new heparin bag from her medication cart. I went in and saw that they were set up in reverse for IVF [intravenous fluid] and heparin. The IVF infused at 17 mL/hr, [the rate intended for heparin], and heparin infused at 100 mL/hr, [the rate intended for the intravenous fluid]. It was calculated that the patient received approximately 100 mL of heparin at 100 mL/hr, equaling an approximate 1,000 units/hr heparin overdose. This overdosage occurred for approximately one hour. Further review determined that the patient had lost her INT [intravenous needle therapy] site [at midday], another RN assisted in restarting the patient's INT, and the event occurred after the pumps were restarted. The heparin thus ran out within approximately one hour. [The] heparin [was] stopped, physician [was] notified, [and a] stat PTT [was ordered].

IV Line Not Attached to Patient

The second most common event type, based on analyst evaluation, was IV lines not attached to patients. Unattached lines accounted for 14.6% (n = 132) of the reports. The top three medications involved in these errors were high-alert drugs: heparin (16.7%, n = 22), morphine (8.3%, n = 11), and insulin (6.1%, n = 8). The overall results show that high-alert medications accounted for two-thirds (66.7%, n = 88) of all events in which lines were not attached to the patient. For a critically ill patient in need of immediate treatment, the act of not attaching the required medication could result in patient harm or even death. Multiple reports described that these errors resulted in adverse patient events, including elevated blood glucose, uncontrolled pain, and unmanaged hypotension.

Examples of reports in which IV medications were not attached to patients include the following:

[Patient] was to receive IV CISplatin. Upon verification of the drug, it had been running for approximately 20 minutes when the patient's wife noticed a syringe attached to the patient's port. I went to assess the situation and noticed that the tubing had never been hooked up to the patient's port. The patient was lying on his side in bed and was untouched by the fluid, which had been absorbed by the sheets on the patient's bed. Nursing supervisor, patient, and physician were notified. Patient aware of the situation.

I hung the patient's CARBOplatin, programmed it into the pump, and realized [approximately 10 minutes] later, when patient's companion told me that the tubing was leaking onto floor, that I had never connected it to the primary [IV line]. Amount remaining in bag was 75 mL, according to pump. The tubing was resting on pump support not touching anything, so I connected it. The spill

©2014 Pennsylvania Patient Safety Authority

was contained in a small area on the floor next to chair. Spill kit directions followed and disposed of in chemotherapy waste container. [Physician] notified that patient would receive approximately 75% of dose, and she said that would be satisfactory.

Insulin gtt started as ordered for hyperglycemia. Two hours later, glucose was checked as ordered, and the result was greater than 400 [mg/dL]. Upon assessment, noted tubing disconnected. Physician notified and new orders received. Insulin bolus [was administered] and then gtt [started] at 4.5 units/hr. Additional monitoring and glucose testing required. Glucose steadily decreased and [returned to] normal limits.

According to the RN supervisor, patient ordered norepinephrine (Levophed®) IV drip titrate to keep SBP [systolic blood pressure] >90. The patient had an episode of hypotension, BP [blood pressure] = 68/36. House physician ordered IV NSS wide, Trendelenburg, 100% FIO_2 [fraction of inspired oxygen]. While assessing lines, found Levophed infusion disconnected, and the line was reconnected. Hypotension immediately resolved, BP = 128/60. BP remained stable.

Errors Associated with Piggyback Infusions

The Ontario Health Technology Assessment Series publication *Multiple Intravenous Infusions Phase 1b: Practice and Training Scan* defines a secondary infusion as one that is connected upstream of a single pump/pump channel that infuses each bag sequentially.[4] For the purposes of this analysis, infusions that were administered in this manner or referred to as piggyback or secondary in the event description were categorized as a "piggyback infusion." Errors associated with piggyback infusion administration were the third most frequent (12.8%, n = 116) events reported involving IV line error. Heparin was the most common medication involved in piggyback administration errors (10.3%, n = 12). Event descriptions indicated that piggyback infusion errors could occur at several steps in the setup process, including when a secondary IV is connected below the infusion pump, when a secondary IV is hung lower than the primary IV, when IV clamps are left closed, and when the pump is programmed incorrectly for the secondary infusion.

Secondary IV lines attached below the pump were mentioned in 4.3% (n = 5) of the 116 piggyback IV lines errors, as in the following report:

> *IV insulin 100 units/100 mL was infused over approximately 1 hr. IV was connected at the wrong place, piggybacked below the pump. D50 [dextrose 50%] 25 mL was pushed slowly as per protocol.*

Clamps remaining closed were also indicated in several event reports, including the following:

> *Heparin drip was running at 1,400 units/hr (14 mL/hr). A 4 g magnesium rider IV was piggybacked at 25 mL/hr; therefore, heparin drip ran at 25 mL/hr for over 30 minutes as rider had been clamped. Drip stopped [after] approximately 15 mL [heparin] went in. Physician notified and stated to restart drip and monitor for signs and symptoms of bleeding. PTT drawn and sent; no signs or symptoms of bleeding present.*

Analysts noted that several reports included high-alert medications piggybacked to other high-alert medications. Overall, high-alert medications were indicated as either the prescribed or administered medication in 68.1% (n = 79) of the piggyback IV line medication errors. One such incident including heparin and insulin was reported as follows:

> *Insulin gtt started as secondary to heparin gtt due to limited IV access. Air in line noted and back-primed into empty syringe into line B. At this time, the insulin was hooked into the Y port of the heparin line but [was] not running through pump. Clamp on insulin line was opened and infused completely over approximately 15 minutes. Patient's blood sugar monitored closely every 30 minutes, and [patient] eventually placed back on appropriate insulin gtt. Patient's blood sugar did not bottom out.*

RISK REDUCTION STRATEGIES

Evaluation of IV line event reports reveals that these errors occur at multiple steps in the medication administration process. Due to the limited research on IV line errors, these reports offer a unique window into the factors associated with these events. Currently, strategies for reducing risks associated with multiple IV lines are limited, and there is a lack of standardization and guidelines related to IV setup or administration. Health Quality Ontario (HQO) conducted a 12-hospital field study to collect similar data. Their observations, along with recommendations from ISMP and analysis of the events reported to the Authority, have been considered and have resulted in identification of several risk reduction strategies for the prevention of harm during IV administration. While more than twenty categories of error were identified from the Authority reports, the following strategies focus on reported events that comprised the top 50% of errors.

Set Up Infusions Completely and One at a Time

Several events reported to the Authority detailed that the infusion pump was set correctly but that the lines were crossed. Many of the event reports were a result of medications not being attached to the patient and resulted in the patient not receiving the appropriate care or treatment. These errors may have been prevented if the line for the first medication was

©2014 Pennsylvania Patient Safety Authority

inserted into the pump and unavailable prior to the second medication being prepared.

ISMP suggests that "when using multiple-channel pumps, nurses should handle just one IV solution at a time."[8] Physically tracing the line can help ensure that the correct channel has been used to program the infusions. The Joint Commission recommends tracing all lines back to their origin before connecting any devices or infusions.[9] To diminish risks associated with line mix-ups occurring during gown changes, some hospitals use gowns that have snaps, ties, or Velcro on the shoulders and sleeves; this decreases the need to manipulate IV lines while bathing and changing clothes.[4] Developing a consistent process for IV medication setup and standardizing policies and procedures may prevent such errors as IV line and IV rate mix-ups.

Administer High-Alert Medications as Primary Infusions

Research suggests continuous high-alert medications be administered as primary infusions and that no secondary infusions be attached to the dedicated primary line.[4] Both the HQO research and reports submitted to the Authority revealed the error potential with setting up a secondary infusion. Several high-alert medication events reported to the Authority may have been avoided if the high-alert medication was administered as a primary infusion via a dedicated line. Running high-alert medications by means of a secondary line could potentially result in errors associated with primary and secondary line confusion, secondary infusion delay due to no alarm to signify secondary infusion is empty, delay in medication administration due to volume in IV tubing between the secondary port and the end of the primary tubing, and increased risk of subsequent programming and setup errors.[10] In addition, IV line mix-up errors may be prevented by independent double checks of selected medications. ISMP suggests that nurses hang the solution and ready it for infusion and that another nurse independently validate the original order, the patient's identification, the dose and concentration, the insertion site (route), and the pump or channel setting.[8]

Utilize Infusion Sets with Back-Check Valves

A back-check valve is a pressure-sensitive device that prevents the flow of fluid from a higher-pressure line to a lower-pressure line. The infusion system is particularly vulnerable to this problem if the pump is running at a high flow rate or if the primary infusion bag contains a small volume of fluid. The result of backflow is that the actual rate of administration for each of the fluids is indeterminate.[4] When a piggyback or secondary infusion is necessary, lines should only be attached to primary infusion sets with a back-check valve.[4]

Label Lines

Affixing the name of the drug being infused to each IV line (at the end closest to the patient) and above each channel on the pump may help prevent IV line mix-ups.[8] This practice may also help prevent errors if tubing has to be detached from patients during procedures, imaging, or transfer. While the label alone should not be used to identify the medication, the label can aid practitioners in line tracing and independent double checks.

Restrict Pump Operation to Qualified and Credentialed Personnel

Recognize that transfer of patients may require lines to be removed or replaced and infusion pumps to be turned on or off. This introduces opportunities for error that should be mitigated by ensuring that only qualified, credentialed personnel manipulate IV lines or program IV pumps.[11] Trained, licensed practitioners can inadvertently connect the wrong tubing or forget to restart a pump. However, untrained staff (e.g., ancillary personnel, medical or nursing students) are less likely to know and follow safety measures (e.g., tracing IV lines) or to be knowledgeable about the serious ramifications of misconnections. Include prohibitions for these tasks during orientation, and when possible, offer new ancillary staff practice in turning down requests to connect or disconnect medical tubing.[12] Restrict the practice of connecting, disconnecting, pump operation, and pump programming to qualified and credentialed personnel.[12]

Place IV Pumps and Epidural Pumps on Opposite Sides of Patient's Bed

While wrong-route errors were not limited to the switching of IV and epidural infusions, these reports were of particular concern due to the high possibility of patient harm if these routes are incorrect. ISMP has reported this issue on several occasions. ISMP suggests safety strategies such as placing IV pumps and epidural pumps on opposite sides of the patent's bed to better separate the two infusion systems, clearly labeling the pump as "Epidural Only," and using yellow-lined tubing without injection ports for epidural infusions.[13]

Raise Awareness

The reports submitted to the Authority reveal the incidence of errors, the severity of errors, and the frequency with which high-alert medications are involved. Using this information to raise professional staff awareness of the prevalence of IV administration errors is likely to be helpful, as lack of research and data in the field has contributed to low appreciation of this common threat to safety.[8]

©2014 Pennsylvania Patient Safety Authority

CONCLUSION

Analysis of IV line events reported to the Authority revealed that three steps in the administration process were responsible for nearly 50% of errors involving IV lines; however, the analysis also showed that errors can occur at any point. It is difficult to determine the exact causes of the reported events due to wide practice variations for the setup of simple infusions. Both patients and practitioners would benefit from standard guidelines describing safe practices for concomitant administration of medications from multiple IV infusions. It is important to note that more research must be done to determine the exact causes and best risk reduction strategies for IV line mix-up errors.

NOTES

1. Hicks RW, Cousins DD, Williams RL. *Summary of information submitted to MEDMARX℠ in the year 2002: the quest for quality*. Rockville (MD): US Pharmacopeial Convention, Inc.; 2003.
2. Husch M. Insights from the sharp end of intravenous medication errors: implications for infusion pump technology. *Qual Saf Health Care* 2005;14(2):80-6.
3. Vanderveen T. Averting highest-risk errors is first priority [online]. Patient Saf Qual Healthc 2005 [cited 2013 Nov 8]. http://www.psqh.com/mayjun05/averting.html
4. Cassano-Piché A, Fan M, Sabovitch S, et al. Multiple intravenous infusions phase 1b: practice and training scan [online]. 2012 May [cited 2013 Nov 8]. http://www.hqontario.ca/en/eds/tech/pdfs/2012/multipleinfusions1b_May.pdf
5. Institute for Safe Medication Practices. ISMP's list of high-alert medications [online]. 2012 [cited 2013 Nov 11]. http://www.ismp.org/Tools/institutionalhighAlert.asp
6. National Coordinating Council for Medication Error Reporting and Prevention (NCC MERP). NCC MERP index for categorizing medication errors [online]. 2001 [cited 2013 Nov 16]. http://www.nccmerp.org/medErrorCatIndex.html
7. Pennsylvania Patient Safety Authority. Pennsylvania Patient Safety Authority 2012 annual report [online]. 2013 Apr [cited 2014 Jan 8]. http://www.patientsafetyauthority.org/PatientSafetyAuthority/Documents/Annual%20Report%202012%20.pdf
8. Cohen MR. Preventing medication errors related to drug delivery devices. Chapter 12. In: Cohen MR, ed. *Medication errors*. 2nd ed. Washington (DC): American Pharmacist Association; 2007:278.
9. Joint Commission. Tubing misconnections—a persistent and potentially deadly occurrence [online]. Sentinel Event Alert 2006 Apr 3 [cited 2014 Jan 31]. http://www.jointcommission.org/assets/1/18/SEA_36.PDF
10. Health Technology Safety Research Team, Institute for Safe Medication Practices Canada. Mitigating the risks associated with multiple IV infusions: recommendations based on a field study of twelve Ontario hospitals [online]. 2012 [cited 2014 Jan 7]. http://www.aami.org/htsi/infusion/wg/multiple/MultipleIVInfusions_Phase1bSummary_Recommendations%20and%20Rationale_June%202012.pdf
11. Medication errors occurring in the radiologic services department. Pa Patient Saf Advis [online] 2009 Jun [cited 2013 Nov 27]. http://www.patientsafetyauthority.org/ADVISORIES/AdvisoryLibrary/2009/Jun6(2)/Pages/46.aspx
12. Institute for Safe Medication Practices. Problems persist with life-threatening tubing misconnections. *ISMP Med Saf Alert Acute Care* 2004 Jun 17;9(12):1-2.
13. Institute for Safe Medication Practices IV potassium given epidurally: getting to the "route" of the problem. *ISMP Med Saf Alert Acute Care* 2006 Apr 6;11(7):1-2.

©2014 Pennsylvania Patient Safety Authority

LEARNING OBJECTIVES

- Identify the most common types of errors associated with intravenous (IV) line events submitted to the Pennsylvania Patient Safety Authority.
- Recognize the rate of occurrence in which IV line events reported to the Authority reached the patient.
- Recall the most frequently involved medications in IV line events.
- Select risk reduction strategies that may prevent IV line events.

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 was the most frequent error associated with IV line events reported to the Authority?
   a. Rate or line mix-up
   b. IV line not attached to the patient
   c. Error associated with piggyback infusions
   d. IV medications incompatible
   e. Pump failure
2. According to events reported to the Authority, when heparin was the prescribed medication, with what other IV solution was the heparin rate most commonly switched?
   a. FentaNYL
   b. Insulin
   c. Intralipids
   d. IV hydration
   e. Parenteral nutrition
3. Which of the below statements is true regarding heparin and IV line events reported to the Authority?
   a. Heparin was the second most frequent medication involved in IV rate or line mix-ups.
   b. Heparin was not involved in those events in which IV lines were not attached to patients.
   c. Heparin ranked first among high-alert medications involved in IV line events.
   d. Heparin was the only high-alert medication involved in rate or line mix-up events.
   e. Heparin was the third most frequent medication involved in IV line mix-ups.

Question 4 refers to the following case

A patient who presented with hyperglycemia was ordered to receive an insulin drip. On reassessment, it was noted that the patient's glucose level had increased instead of decreasing, as would be expected with insulin therapy. This unexpected level prompted the nurse to trace the IV line from the pump to the patient's IV access. It was discovered that the IV line had not been attached to the patient. Due to the error, the patient's condition had been left untreated for two hours and additional monitoring was required.

4. Which of the following risk reduction strategies may have prevented this event?
   a. Administering high-alert medications as primary infusions
   b. Setting up infusions completely and one at a time
   c. Restricting pump operations to qualified and credentialed personnel
   d. Utilizing infusion sets with back-check valves
   e. Restricting pump operations for high-alert medications to the ordering physician
5. What percentage of IV line events reported to the Authority reached the patient?
   a. Less than 10%
   b. Less than 50%
   c. Greater than 95%
   d. No IV line events reached the patient
   e. All IV line events reached the patient

©2014 Pennsylvania Patient Safety Authority

The Use of Patient Sitters to Reduce Falls: Best Practices

Michelle Feil, MSN, RN
Senior Patient Safety Analyst
Susan C. Wallace, MPH, CPHRM
Patient Safety Analyst
Pennsylvania Patient Safety Authority

ABSTRACT

Using patient sitters to directly observe patients at high risk for falls is a practice suggested as part of several evidence-based falls prevention guidelines. However, the clinical and cost-effectiveness of sitter programs has been questioned. Analysis of data from 75 hospitals participating in the Hospital and Healthsystem Association of Pennsylvania Hospital Engagement Network Falls Reduction and Prevention Collaboration revealed a statistically significant correlation ($p < 0.05$) between low rates of falls with harm and the use of sitter programs. A statistically significant correlation ($p < 0.05$) was also identified between low rates of falls with harm and three specific sitter program design elements: defining criteria for sitter qualifications, providing a training program for sitters, and establishing a pool of sitters. Analysis of falls reported to the Pennsylvania Patient Safety Authority by hospitals from across the commonwealth in which sitters were identified as being present at the time of the fall suggests that the use of sitters may be associated with a higher percentage of assisted falls and a lower rate of falls with harm. A review of the literature exploring the use of sitters as part of falls prevention programs, along with suggested strategies for sitter program design, is presented. A tool is provided to help hospitals make the business case for implementing and maintaining a sitter program. (Pa Patient Saf Advis 2014 Mar;11[1]:8-14.)

Corresponding Author
Michelle Feil

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

INTRODUCTION*

Patient sitters (also called patient safety assistants, companions, and one-to-one or constant observers) are staff or volunteers assigned to provide direct observation of patients at risk to harm themselves or others. Patient sitters are used in a variety of care settings, including for patients who are assessed to be at high risk for a fall;[1] in psychiatric crisis, including those who have attempted suicide or with suicidal ideation, or at risk for harming others;[2] substance-abusing with behavioral problems;[3] or experiencing delirium, confusion, or agitation.[3]

Patient sitters have been suggested in several evidence-based falls prevention guidelines[4-7] and have become part of an arsenal of interventions used by healthcare institutions to provide close monitoring of patients at high risk to fall. The level of evidence supporting the inclusion of sitters in these evidence-based guidelines is expert opinion, which is generally considered less rigorous than evidence from systematic reviews and randomized controlled trials.[8-10] Research into the clinical effectiveness of sitter programs has produced inconsistent results. In addition, the cost-effectiveness of these programs has been questioned due to the high costs associated with their maintenance.[11]

While the evidence base to support the use of patient sitters may be challenged, analysis of data from 75 Pennsylvania hospitals participating in the Hospital and Healthsystem Association of Pennsylvania Hospital Engagement Network (PA-HEN) Falls Reduction and Prevention Collaboration has found a statistically significant correlation between lower rates of falls with harm and the use of sitter programs, as well as specific sitter program design elements. Hospitals seeking to implement or sustain a patient sitter program that is both clinically effective and cost-effective are encouraged to incorporate specific sitter program design elements and consider existing strategies to structure sitter programs.

PATIENT SITTER USE AND FALLS-WITH-HARM RATES IN PENNSYLVANIA

Information about sitter program implementation and rates of falls with harm is available from 75 hospitals participating in the PA-HEN Falls Reduction and Prevention Collaboration. As part of the collaboration, hospitals completed the Hospital Engagement Network Falls Reduction and Prevention Collaboration Self-Assessment Tool (SAT) survey from July 5, 2012, through August 31, 2012. The falls SAT survey was designed to evaluate the current structure and content of hospital falls prevention programs compared with evidence-based, best-practice guidelines. The intent of the falls SAT survey was to assist hospitals in creating action plans targeted to the best-practice elements that were identified as missing or in need of improvement in their current falls prevention programs.

Hospitals completing the falls SAT survey were asked to report the level of implementation (i.e., no implementation, partial implementation, or full implementation) for individual falls prevention practices and falls prevention program elements across 17 categories of falls prevention practices. The use of patient sitters was the third lowest scoring category of practices. Forty-eight of the 75 hospitals reported having sitter programs, of which 21 reported full implementation of six specific sitter program design elements:

1. A process for requesting and discontinuing sitters

* The analyses upon which this publication is based were in part funded and performed under contract number HHSM-500-2012-00022C, entitled "Hospital Engagement Contractor for Partnership for Patients Initiative."

©2014 Pennsylvania Patient Safety Authority

2. Patient eligibility criteria
3. A pool of sitters
4. Criteria for sitter qualifications
5. A sitter job description with expectations for sitter behavior and responsibilities
6. A training program for sitters

Rates of falls with harm were calculated for hospitals participating in the PA-HEN collaboration using the number of falls with harm (i.e., any fall requiring more than first-aid care[12]) as reported to the Pennsylvania Patient Safety Reporting System (PA-PSRS) and total facility patient-days as reported to the Pennsylvania Health Care Cost Containment Council (PHC4)[13] for the period of January through June 2012. Analysis of falls SAT survey responses alongside rates of falls with harm revealed a statistically significant correlation ($p < 0.05$) between the use of sitter programs and lower rates of falls with harm. In addition, meta-regression analyses revealed statistically significant correlations ($p < 0.05$) between three specific practices and lower rates of falls with harm: the sitter program includes (1) criteria for sitter qualifications, (2) a training program for sitters, and (3) a pool of sitters.

The Pennsylvania Patient Safety Authority has previously published a full analysis of the falls SAT survey results identifying best practices associated with higher or lower rates of falls with harm. Although cause and effect cannot be established based on these analyses, the correlation between sitter programs and specific sitter program practices with lower rates of falls with harm were found to be statistically significant. In light of this correlation, as well as the low levels of full implementation for these practices reported on the falls SAT survey, the Authority has suggested that hospitals carefully consider sitter program implementation and incorporation of best practices in sitter program design.[14]

SITTER USE ASSOCIATED WITH INCREASE IN ASSISTED FALLS AND DECREASED HARM

Falls are one of the events most frequently reported to the Authority.[15] A query of the PA-PSRS database identified 54,289 falls events reported by hospitals across Pennsylvania from January 2012 through June 2013, of which 323 were identified as occurring with a sitter present. Assisted falls is one of the 13 PA-PSRS falls event types that hospitals are instructed to assign to falls that occur when a caregiver sees a patient about to fall and intervenes, lowering him or her to a bed or the floor. The percentage of falls labeled as assisted was much higher for falls occurring with a patient sitter present (54 of 323 falls, 16.72%) than for falls occurring without a sitter present (4,523 of 53,966 falls, 8.38%). Of note, none of the assisted falls with sitters present were reported as falls with harm (see Table 1). This suggests that using patient sitters may increase the chances of a fall being assisted, which in turn may prevent falls with harm from occurring.

The following are examples of PA-PSRS reports of falls assisted by patient sitters:

> *Patient was sitting in a wheelchair with patient sitter in attendance.*

> *Sitter states patient was leaning forward in chair and sitter attempted to guard patient from fall, but patient proceeded to lean forward and was assisted onto floor.*

> *Patient sitter stated the patient was sitting on toilet and started to lean to the left. [The sitter] grabbed the patient and eased him to the floor. The sitter called out for help, and the patient was found lying on the bathroom floor. His head was elevated off the floor.*

> *Sitter reported patient was sitting in chair and lost balance when patient went to get up. Sitter assisted patient to the floor.*

FAILURE MODES EVIDENT IN REPORTS OF FALLS WITH SITTERS PRESENT

While sitter programs may reduce the likelihood of injury from falls, like many safety practices, they are not error-proof. Table 2 shows the percentage of falls occurring with sitters present as reported for each PA-PSRS falls event type. Assisted falls represented the most common falls event type assigned to these falls, but other falls event types (e.g., ambulating, toileting, found on floor) were reported

Table 1. Falls Reported to the Pennsylvania Patient Safety Authority, January 2012 through June 2013

EVENT TYPE	FALLS WITHOUT HARM (% OF EVENT TYPE)	FALLS WITH HARM (% OF EVENT TYPE)	TOTAL BY FALLS EVENT TYPE
Falls without sitter present	52,340 (96.99)	1,626 (3.01)	53,966
Unassisted	47,853 (96.78)	1,590 (3.22)	49,443
Assisted	4,487 (99.20)	36 (0.80)	4,523
Falls with sitter present	312 (96.59)	11 (3.41)	323
Unassisted	258 (95.91)	11 (4.09)	269
Assisted	54 (100.00)	0 (0.00)	54
Total	**52,652 (96.98)**	**1,637 (3.02)**	**54,289**

©2014 Pennsylvania Patient Safety Authority

at frequencies that suggest the need for clarification of sitter behavior responsibilities and expectations, as well as a sitter training program. Failure modes evident in falls reports involving sitters include the following:

- The sitter was not within reach of the patient when the patient fell off a chair, wheelchair, or side of the bed.
- The patient tripped on an item in the path of walking to the bathroom.
- The sitter left the patient's room with no designated backup staff, and the patient was later found on the floor.
- The patient's legs became weak while ambulating, and the sitter was in the patient room or in the hallway.
- The patient was reaching for an item unassisted while sitting in a chair or wheelchair.
- The patient was found on the floor after being left unattended in the bathroom while toileting or showering.
- The patient slid to the floor while sitting on the edge of the bed.

Information derived from the event reports suggests that a successful patient sitter program effective in reducing the number of falls that occur when a patient sitter is present includes specific sitter program design elements.

Table 2. Falls with Sitter Present Reported to the Pennsylvania Patient Safety Authority, January 2012 through June 2013, by Falls Event Type

FALLS EVENT TYPE	NO. OF REPORTS	% OF REPORTS
Assisted fall	54	16.72
Ambulating	51	15.79
Toileting	43	13.31
Found on floor	37	11.46
Lying in bed	36	11.15
Other/unknown	32	9.91
Sitting in chair/wheelchair	26	8.05
Sitting at side of bed	20	6.19
Transferring	11	3.41
Hallways of facility	7	2.17
From stretcher	3	0.93
In exam room/from exam table	3	0.93
Total	**323**	**100.02***

*Total percentage does not equal 100 due to rounding.

SITTER PROGRAM DESIGN

Patient sitter guidelines vary among hospitals, including but not limited to guidelines regarding the duties of the patient sitter, when a patient sitter is requested, the method used to request a sitter, who can request a sitter, and when the sitter is discontinued. Hospitals may also differ in whether they allow the role of a patient sitter to be filled by clinical or nonclinical personnel, including nurses, nursing assistants, hospital staff, volunteers, or family members.[1]

For example, in a multihospital study by Torkelson and Dobal, a lack of collaboration and shared decision making was identified between caregivers and family members on when to begin, continue, and discontinue a patient sitter. The study concluded that sitter programs should be developed that (1) include policies and procedures clearly identifying the responsibilities of the staff nurses and the sitters, (2) provide clear instructions for the sitter, and (3) use psychiatric consults.[2]

Specific Sitter Program Design Elements

Facilities may be able to decrease patient sitter use while helping to reduce rates of falls with harm by incorporating the following specific patient sitter program design elements:

- Designate staff responsible for overseeing the sitter program and/or assessing patients prior to initiating one-to-one observation (e.g., psychiatric liaison nurse, geriatric clinical nurse specialist).[16-19]
- Outline a process for requesting and discontinuing sitters.[2,8,16,20,21]
- Define patient eligibility criteria.[8,16,20,22]
- Designate a pool of sitters.[23]
- Outline criteria for sitter qualifications.[21,24]
- Outline expectations for sitter behavior and responsibilities[2,8,21,24,25] that include the following:
  - Reviewing pertinent clinical information, the reason for observation, and the plan of care with the nurse assigned to the patient and communicating regularly throughout the shift to report observed behaviors indicating either continued need for, or ability to discontinue, use of one-to-one observation[2,23,25]
  - Documenting observed behaviors and interventions provided in the course of performing one-to-one observation[23,25]
  - Maintaining toileting schedules for patients able to use the toilet or bedside commode[5,19,25]

©2014 Pennsylvania Patient Safety Authority

- Remaining with patients while in the bathroom[4,25]
- Staying within arm's reach of patients whenever appropriate (the nurse and the patient sitter will need to assess when remaining within close proximity to the patient may be inappropriate because it may increase agitation in some patients)[25]
- Ensuring a safe environment (e.g., remove clutter, keep items within patient's reach)[4,5,6,7,19,25]
- Providing a proper handoff to another staff member, completed in the presence of the patient, when patient sitters must leave the patient[25]
- Focusing on observation of the patient and avoiding non-work-related activities that may distract from care of the patient (e.g., personal calls, cell phone use, reading)[25]

– Design a training program for sitters[2,19,21,23,24] that provides education on the following:
  - Safe patient handling techniques[4,7,25]
  - Behavior management strategies for de-escalating agitated patients[19]
  - Diversional activities (e.g., activity aprons, crafts, magazine reading) to engage patients, particularly those with cognitive impairment[19,23,25]

Strategies to Structure Patient Sitter Programs and Control Costs

Patient sitters can be one of the costliest falls prevention methods, especially since the associated costs are not reimbursable from third-party payers.[2] According to one national survey of 355 general medical-surgical hospitals conducted in 1996, annual expenses for patient sitters ranged from several thousand to a half-million dollars.[26] In 2007, the Chester County Hospital, a 220-bed facility in West Chester, Pennsylvania, reported an unbudgeted cost of $515,480 in overtime and agency-hired nursing assistants attributable to the sitter program.[23] These cost estimates may prove to be conservative, as more recent costs for sitter programs are not available in the literature.

Several strategies to structure patient sitter programs in order to reduce patient falls and control costs have proven to be effective for some healthcare facilities. Three of these strategies are outlined as follows:

Psychiatric liaison nurses. In an 800-bed Minnesota hospital, a lack of psychiatric resources for medical nurses who were not adequately trained in caring for patients with an underlying mental illness was identified as causing unnecessary use of patient sitters. In response, the hospital employed psychiatric liaison nurses (PLNs) who acted as consultants for medical patient care areas in the use of patient sitters.

PLNs facilitated day-to-day problem solving, provided education and support, and closely collaborated with the nursing staff on a management plan. A 50% reduction in sitter use was noted without increasing restraint prevalence, falls, or other adverse outcomes. The project also strongly suggested that a PLN can benefit medical nurses by "role modeling, teaching, encouraging, and supporting more effective and confident management of patients' psychiatric needs."[27]

A SAFE unit. Scripps Mercy Hospital, a 500-bed level I trauma center in San Diego, California, developed a "Specialized Adult-Focused Environment" (SAFE) unit. With the exception of acutely suicidal patients, patients who require frequent or constant observation are placed in this unit. Patients who do not require one-to-one attention and observation are placed in cohorted rooms next to or across from each other.

Newly hired employees are required to attend an eight-hour SAFE class and are called a "constant observer" or "therapeutic companion," since their roles are viewed as more active than just sitting with a patient. After the first unit was established, other floors in the hospital established their own SAFE units. Falls rates were not reported, but a decline in sitter use and cost was noted.[19]

Patient sitter staff position. The Chester County Hospital created a new position of a patient safety assistant after realizing that their sitter expenses were increasing due to staff overtime and use of agency-hired nursing assistants. The average number of staff used to sit with the patients per month was 15.5 full-time equivalents (FTEs).[23]

At times, nursing assistants needed to be taken away from their assignments on patient care units to sit with a patient, causing the unit to be short-staffed, according to Angela R. Coladonato, MSN, RN, NEA-BC, senior vice president/chief nursing officer, the Chester County Hospital.[23] "It caused huge dissatisfaction with the nursing staff," Coladonato said in a telephone interview. "Their support person was now gone."

She decided to "think outside the box" and formed a task force to identify ways to reduce the use of patient sitters. In the first phase, several initiatives were implemented, including the use of activity boxes, enactment of a new alcohol withdrawal order set with assessment guidelines, combining policies for constant observation of suicidal and nonsuicidal patients, instituting volunteer rounding, and establishing a mandatory sitter approval form initiated by nursing.

Coladonato worked closely with human resources and applicable managers, directors and educators to establish the patient safety assistant position. She started with 12 new FTEs and is currently budgeted for 16.23 FTEs. In order to minimize staffing costs, the position is designed to be part-time and does not include benefits.

When the patient safety assistant is not providing continuous observation, their

©2014 Pennsylvania Patient Safety Authority

duties may include restocking supplies for the department, delivering specimens to the lab, transporting patients, and responding to call bells. Table 3 outlines expectations for patient safety assistants compared with nursing assistants at the Chester County Hospital. (For more information, see "The Chester County Hospital Orientation Manual, Patient Safety Assistant, Nursing Staff Development," available on the Authority's website at http://patientsafetyauthority.org/EducationalTools/PatientSafetyTools/falls/Pages/home.aspx.)

FALLS-WITH-HARM SAVINGS CALCULATOR

The Authority has developed a falls-with-harm calculator (available at the web page listed above) for hospitals that may be helpful in justifying the costs associated with implementing a sitter program, as well as other falls reduction initiatives. Hospitals enter their current rate of falls with harm, and the calculator provides the estimated average additional cost and length of stay associated with the current rate, along with estimates of cost savings that could be achieved with 10%, 25%, 50%, 75%, 90%, and 100% reductions in the rate of falls with harm.

The costs used in this calculation are operational costs incurred by hospitals both in treating injuries sustained in a fall and as a result of extended lengths of stay for these patients. These costs do not include additional costs related to malpractice claims or costs associated with subsequent outpatient care or readmissions.[28] Such additional costs are not to be underestimated. A recent case was highlighted in the media[29] that draws attention to the additional costs that

Table 3. Patient Safety Assistant and Nursing Assistant Role Expectations at the Chester County Hospital

ROLE EXPECTATIONS	PATIENT SAFETY ASSISTANTS	NURSING ASSISTANTS
Documents on continuous observation form	X	Only when assigned to 1:1 observation
Handles patient positioning	X	X
Assists patients to bathroom	X	X
Changes bed linen for 1:1 patient (unoccupied bed)	X	X
Assists patient with meals as needed	X	X
Assists with bed-to-chair transfer (if applicable)	X	X
Transports patients	Escorts patient when assigned to 1:1 observation or serves as a transporter when not assigned to 1:1 observation	X
Attends to general patient comfort needs	X	X
Engages patient with activity, if applicable	X	X
Reports patient behavior/movement to registered nurse	X	X
Assists clinical staff as requested for bathing/turning	X	X
Bathes patients		X
Performs patient assessment (skin care/intake/output)		X
Takes vital signs		X
Provides incontinence care		X
Data entry		X
Restocks supplies for department	Only when not assigned to 1:1 observation	X
Delivers specimens to lab	Only when not assigned to 1:1 observation	X
Responds to call bells	Only when not assigned to 1:1 observation	X

Adapted with permission from the Chester County Hospital in West Chester, Pennsylvania.

©2014 Pennsylvania Patient Safety Authority

may be incurred by hospitals that fail to provide sitter programs. The California Department of Public Health fined a hospital $100,000 in a case involving the death of a patient from intracranial hemorrhage following a fall because "there was no nursing supervision provided to the patient to ensure the patient was safe after the nursing staff had identified the patient had increased risk for falls and needed a sitter to prevent falls."[30]

IMPLICATIONS FOR FURTHER STUDY

Hospitals participating in the Hospital and Healthsystem Association Hospital Engagement Network Falls Reduction and Prevention Collaboration completed the falls self-assessment tool survey for a second time in 2013. The results of the follow-up survey are being analyzed to assess whether or not the correlations found in 2012 persist between low rates of falls with harm and falls prevention practices, such as those for sitter programs.

LIMITATIONS

Falls identified as occurring with sitters present was determined through analysis of PA-PSRS report narratives. Of the 54,289 falls events reported by hospitals across Pennsylvania from January 2012 through June 2013, 666 reports included the term "sitter." Of these, 323 report narratives described falls occurring with a sitter present at the time of the fall. It is therefore possible that this is an underestimate of the number of falls occurring with sitters present.

Data used in calculating rates of falls with harm is dependent on accuracy and consistency in reporting falls and identifying injury level within PA-PSRS. The 75 PA-HEN hospitals included in this analysis have agreed to a consensus definition for falls and falls with harm as a condition for participation in the PA-PSRS Falls Reporting Program; therefore, this limitation should be minimized. This data is also dependent on accurate and complete reporting of total facility patient days to PHC4.

Information on the implementation level for best practices in falls prevention was gathered from self-reporting hospitals completing the falls SAT survey. Designation of implementation level (i.e., no implementation, partial implementation, or full implementation) is subjective to the respondent.

Lastly, while meta-regression analyses have identified a statistically significant correlation between the use of sitter programs (and specific sitter program practices) and lower rates of falls with harm in 75 Pennsylvania hospitals, cause and effect cannot be inferred.

CONCLUSION

Patient sitters are one of many interventions that facilities can use to reduce falls. When implementing a patient sitter program, hospitals are encouraged to incorporate specific best practices in sitter program design. To structure patient sitter programs, hospitals can engage in strategies found to be successful in reducing falls and controlling costs in other organizations. The cost savings achieved in decreasing rates of falls with harm, both in terms of money saved and decreased severity of injury, may justify the costs associated with implementing and maintaining a sitter program.

Acknowledgments

Jonathan R. Treadwell, PhD, associate director, Evidence-based Practice Center, ECRI Institute, consulted on and contributed to statistical testing for this article.

NOTES

1. Morse JM. *Preventing patient falls*. Thousand Oaks (CA): Sage Publications; 1996.
2. Torkelson DJ, Dobal MT. Constant observation in medical-surgical settings: a multihospital study. *Nurs Econ* 1999 May-Jun;17(3):149-55.
3. Shever LL, Titler MG, Mackin ML, et al. Fall prevention practices in adult medical-surgical nursing units described by nurse managers. *West J Nurs Res* 2011 Apr;33(3):385-97.
4. Degelau J, Belz M, Bungum L, et al.; Institute for Clinical Systems Improvement. Health care protocol: prevention of falls (acute care) [online]. 2012 Apr [cited 2012 May 15]. https://www.icsi.org/_asset/dcn15z/Falls.pdf
5. Boushon B, Nielsen G, Quigley P, et al. Transforming care at the bedside how-to guide: reducing patient injuries from falls [online]. 2012 [cited 2013 May 8]. http://www.ihi.org/resources/Pages/Tools/TCABHowToGuideReducingPatientInjuriesfromFalls.aspx
6. National Center for Patient Safety. National Center for Patient Safety 2004 falls toolkit [online]. 2004 Jul [cited 2013 May 8]. http://www.innovations.ahrq.gov/content.aspx?id=2648
7. Agency for Healthcare Research and Quality. Preventing falls in hospitals: a toolkit for improving quality of care [online]. 2013 Jan [cited 2013 May 8]. http://www.ahrq.gov/research/ltc/fallpxtoolkit/index.html
8. Capezuti E, Zwicker D, Mezey M, et al., eds. *Evidence-based geriatric nursing protocols for best practice*. 3rd ed. New York: Springer Publishing Company; 2008.
9. Greer N, Mosser G, Logan G, et al. A practical approach to evidence grading. *Jt Com J Qual Improv* 2000 Dec;26(12):700-12.
10. Atkins D, Best D, Briss PA. Grading quality of evidence and strength of recommendations. *BMJ* 2004 Jun 19;328(7454):1490.
11. Harding AD. Observation assistants: sitter effectiveness and industry measures. *Nurs Econ* 2010 Sep-Oct;28(5):330-6.

©2014 Pennsylvania Patient Safety Authority

12. Arnold TV, Barger DM. Falls rates improved in southeastern Pennsylvania: the impact of a regional initiative to standardize falls reporting. Pa Patient Saf Advis [online] 2012 Jun [cited 2013 Sep 30]. http://patientsafetyauthority.org/ADVISORIES/AdvisoryLibrary/2012/Jun;9(2)/Pages/37.aspx
13. Pennsylvania Health Care Cost Containment Council (PHC4) [website]. [cited 2013 Aug 5]. Harrisburg (PA): PHC4. http://www.phc4.org
14. Feil M. Falls prevention: Pennsylvania hospitals implementing best practices. Pa Patient Saf Advis [online] 2013 Dec [cited 2013 Dec 16]. http://patientsafetyauthority.org/ADVISORIES/AdvisoryLibrary/2013/Dec;10(4)/Pages/117.aspx
15. Pennsylvania Patient Safety Authority. 2012 annual report [online]. 2013 Apr 30 [cited 2013 Nov 5]. http://patientsafetyauthority.org/PatientSafetyAuthority/Documents/Annual%20Report%202012%20.pdf
16. Salamon U, Lennon M. Decreasing companion usage without negatively affecting patient outcomes: a performance improvement project. *Medsurg Nurs* 2003 Aug;12(4):230-6.
17. Worley L, Kunkel E, Gitlin D, et al. Constant observation practices in the general hospital setting: a national survey. *Psychosomatics* 2000 Jul-Aug;41(4):301-10.
18. Rausch D, Bjorklund P. Decreasing the costs of constant observation. *J Nurs Adm* 2010 Feb;40(2):75-81.
19. Nadler-Moodie M, Burnell, L, Fries J, et al. A S.A.F.E. alternative to sitters. *Nurs Manage* 2009 Aug;40(8):43-50.
20. Spiva L, Feiner T, Jones D, et al. An evaluation of a sitter reduction program intervention. *J Nurs Care Qual* 2012 Oct-Dec;27(4):341-5.
21. ECRI Institute. Do sitters make a difference? *Risk Manage Rep* 2012 Feb;31(1):1-9.
22. Tzeng HM, Yin CY, Grunawalt J. Effective assessment of use of sitters by nurses in inpatient care settings. *J Adv Nurs* 2008 Oct;64(2):176-83.
23. Coladonato A. Dealing with the patient sitter dilemma. *Bus Caring* 2009 Feb;4(2):1-3.
24. Lipkis-Orlando R, Mian P, Levy G, et al. Challenge for the 90s: a safe and cost-effective sitter program. *Medsurg Nurs* 1993 Dec;2(6):483-5.
25. Chester County Hospital and Health System. *Patient safety assistant orientation manual* [hospital training materials]. West Chester (PA); Chester County Hospital and Health System; 2012 Dec:1-22.
26. Worley LL, Kunkel EJ, Gitlin DF, et al. Constant observation practices in the general hospital setting: a national survey. *Psychosomatics* 2000 Jul-Aug;41(4):301-10.
27. Rausch DL, Bjorklund P. Decreasing the costs of constant observation. *J Nurs Adm* 2010 Feb;40(2):75-81.
28. Wong CA, Recktenwald AJ, Jones ML, et al. The cost of serious fall-related injuries at three Midwestern hospitals. *Jt Comm J Qual Patient Saf* 2011 Feb;37(2):81-7.
29. Clark C. Adverse events draw $775K in fines at 9 CA hospitals [online]. Health Lead Media 2013 Oct 28 [cited 2013 Nov 5]. http://www.healthleadersmedia.com/page-1/QUA-297758/Adverse-Events-Draw-775K-in-Fines-at-9-CA-Hospitals
30. California Health and Human Services Agency Department of Public Health. [Statement of deficiencies and plan of correction for St. Jude Medical Center] [letter online]. 2010 Apr 2 [cited 2013 Nov 5]. http://www.cdph.ca.gov/certlic/facilities/Documents/2567StJudeMedicalCenter-Y2D211-OrangeCounty.pdf

©2014 Pennsylvania Patient Safety Authority

Preoperative Screening and the Influence on Cancellations and Transfers: An Ambulatory Surgical Facility Collaboration

Lea Anne Gardner, PhD, RN
Senior Patient Safety Analyst
Jeff Bomboy, RN, BS
Patient Safety Liaison
Pennsylvania Patient Safety Authority

ABSTRACT

Ambulatory surgical facilities (ASFs) in the northeast region of Pennsylvania and the Pennsylvania Patient Safety Authority worked in collaboration to reduce day-of-surgery (DOS) cancellations and transfers to a hospital through the implementation of a nurse-driven preoperative screening and assessment. Implementation of a standardized checklist, initiation of a second preoperative patient phone call, and evaluation of preoperative patient oral and written instructions were interventions implemented in the 18-month collaboration. No-show cancellation rates were 120% higher in patients lacking a preoperative screening and assessment compared with patients screened preoperatively during the postintervention period. Transportation-related and protocol-related DOS cancellations decreased by 28.5% and 22.4%, respectively, in patients receiving a preoperative screening and assessment using a standardized checklist. ASF transfer rates decreased during the postintervention period by 14.7%. (Pa Patient Saf Advis 2014 Mar;11[1]:15-22.)

Corresponding Author
Lea Anne Gardner

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

INTRODUCTION

A nurse-driven preoperative screening and assessment is a separate clinical evaluation for patients undergoing same-day surgery. This evaluation of the patient's history and physical, diagnostic tests, and psychosocial information is used to identify the patient's medical, physical, and psychosocial needs and risks for developing complications or requiring cancellation of same-day surgery.[1-3] Federal, state, and certification regulations for ambulatory surgical facilities (ASFs)[4,5] do not require nurse-driven preoperative screening and assessment, which can lead to variations in who (i.e., clinical versus nonclinical staff) performs the screening, the scope of information ascertained, and the timing of preoperative screening and assessment.[6] Improving nurse-driven preoperative screening and assessment processes has the potential to increase patient safety and efficiency by identifying appropriate surgical candidates, increasing compliance with preoperative instructions, maximizing revenues, and avoiding surgery delays, cancellations, and transfers.[7-10] Cancellations and transfers represent opportunities to address patient safety concerns (e.g., patients not meeting screening criteria). The ASF transfer rate to an acute care hospital is a patient safety measure that the Centers for Medicare and Medicaid Services will use for public reporting and payment determination for 2014.[11,12]

From January 2012 through June 2013, the Pennsylvania Patient Safety Authority conducted an 18-month collaborative improvement project with 11 ASFs in the northeast region of Pennsylvania. All 11 ASFs were actively engaged throughout the collaboration; there was no facility attrition during this 18-month time period. The collaboration focused on improving the preoperative screening and assessment process to reduce cancellations and avoid medical problems requiring transfer to a hospital. The project focused on day-of-surgery (DOS) cancellations for two reasons: (1) preoperative screening on the DOS is the last opportunity to catch medical conditions that would place patients at risk for a complication, and (2) rearranging schedules due to last-minute cancellations creates opportunities for mix-ups with patient names, procedures, or medications.

The goal of this collaboration was to reduce patient DOS cancellations by 30% and transfers to acute care hospitals by 25% through the implementation of a standardized checklist, evaluation of patient-related preoperative oral and written medical instructions and forms (e.g., preoperative instructions, history forms) using health literacy principles, and institution of a second preoperative phone call to patients. The primary intervention, implementation of a standardized checklist, evaluated clinical and nonclinical aspects of care for every scheduled patient to identify preexisting comorbidities, psychosocial issues (e.g., financial constraints), and screening criteria (e.g., medical clearance not obtained) that place patients at risk for surgical delays due to cancellations or at risk for medical complications leading to transfers.[13]

The ASF collaboration had three phases: (1) planning, (2) preintervention, and (3) postintervention.

METHODS

Planning Phase

The planning phase, January 6, 2012, through June 30, 2012, focused on standardizing definitions for cancellations and transfers, including defining cancellation time periods (e.g., DOS, 24 hours prior to surgery); mapping preoperative screening and assessment processes, including patient scheduling and registration; identifying cancellation and transfer outcome data; and developing event investigation forms to gather detailed information on cancellations and transfers. A focus group of three participating ASFs helped to develop the cancellation and transfer event investigation forms.

©2014 Pennsylvania Patient Safety Authority

Preintervention Phase

Facilities implemented the cancellation and transfer event investigation forms in the preintervention phase, July 1, 2012, through November 30, 2012. Both forms contained questions about the scheduled procedure, the type of and reason for a cancellation or transfer, and contributing factors. The cancellation event form included questions addressing the primary person who cancelled the procedure and time of cancellation (i.e., prior to admission, after admission, or after anesthesia). The transfer event form included questions concerning the time of transfer (i.e., preoperative or postoperative), patient characteristics (i.e., patient's age, physical status according to the American Society of Anesthesiologists' classification system,[14] and body mass index[15]), and the presence of certain preexisting medical conditions (e.g., cardiovascular disease, neurologic disease, peripheral vascular disease).

The event forms were streamlined two months after implementation by standardizing the list of procedural choices, consolidating the contributing factors, and adding two data fields: (1) event date (i.e., date the cancellation or transfer occurred) and (2) time preoperative screening occurred (e.g., 24 hours prior to surgery, 48 hours prior to surgery). The ASFs received quarterly reports containing deidentified cancellation and transfer rates with benchmarking data, an aggregated list of cancellation event types and occurrence percentages, and an aggregated summary of deidentified transfer event information.

Postintervention Phase

In December 2012, the postintervention phase began with implementation of the standardized preoperative screening checklist , which is available on the Authority's website at http://patientsafetyauthority.org/EducationalTools/PatientSafetyTools/asf/Pages/home.aspx. The checklist was developed using evidence-based guidelines,[16-18] medical literature,[19-29] and questions from the Institute for Clinical Systems Improvement preoperative evaluation checklist.[30] In addition, psychosocial questions regarding the patient's ambulatory status, mental status (e.g., depression, dementia), and transportation and financial barriers[1,31] were incorporated into the checklist. Each ASF compared the questions from the standardized preoperative screening checklist with their existing preoperative screening checklist and incorporated any missing items.

During this phase, December 1, 2012, through June 30, 2013, two additional interventions were introduced to the ASFs: initiating a second patient preoperative phone call and incorporating health literacy strategies into patient-staff interactions (e.g., teach-back method, phrasing of questions) and patient-friendly preoperative forms. The second preoperative phone call intervention was based on work done at the University of North Carolina at Chapel Hill.[8] Haufler and Harrington (2011) found additional opportunities to reduce cancellations related to transportation, preoperative instruction issues (e.g., no food or drink after midnight), and patients not showing up on the DOS by making an additional call to each patient three business days before the scheduled surgery. Kimberly Haufler, BS, RN, provided an educational telephone conference during which she gave an overview of the project and discussed improvements in patient, physician, and employee satisfaction.[8] When possible, the ASFs made a second phone call to patients to remind them about their upcoming surgery or procedure, review any preoperative instructions, and ascertain whether the patient had questions or needed clarification.

The third intervention, a health literacy conference call provided by the Authority, addressed health literacy strategies (e.g., use teach-back method, eliminate medical jargon) that the ASFs used to evaluate and implement changes in patient-staff interactions, preoperative instructions, and other patient-related forms (e.g., history). The health literacy materials used in the conference call were adapted from the Hospital and Healthsystem Association of Pennsylvania Hospital Engagement Network health literacy webinar series.[32]

Monthly reports were instituted to provide timely feedback on the implementation of preoperative screening and assessment processes and trends in cancellations or transfers. The monthly reports contained the individual facility's cancellation and transfer rates (with benchmarking data), individual facility cancellation event types, the time when the preoperative screening and assessment was completed for each DOS cancellation, a month-by-month aggregated table of deidentified transfer data, and the time when the preoperative screening and assessment was completed for each transfer.

Monthly coaching calls were held throughout the project to provide support and data updates and to promote collaborative learning among the facilities. One in-person meeting was held during each phase of the collaboration, and a capstone meeting was held at the end of the project, for a total of four in-person meetings.

A *z*-test rate ratio comparison test[33] was used to determine statistical changes in cancellation and transfer rates between the preintervention and postintervention phases.

RESULTS

Cancellations

A DOS cancellation was defined as a cancellation of a scheduled procedure or surgery that occurred after 12:01 a.m. on the DOS for any reason. DOS cancellations occurred prior to admission, after admission, and after anesthesia. Cancellations that occurred after admission and after anesthesia were due to medical conditions and represented opportunities to prevent patient harm.

©2014 Pennsylvania Patient Safety Authority

The ASFs achieved a 9.7%* reduction in their DOS cancellation rate, from 29.6 DOS cancellations per 1,000 completed procedures preintervention to 26.8 DOS cancellations per 1,000 completed procedures postintervention. This difference was statistically significant (p value = 0.023). Certain types of DOS cancellation rates had greater reductions in the postintervention phase compared with the preintervention phase: transportation-related DOS cancellations were reduced 28.5%, protocol-related DOS cancellations (e.g., patient screening criteria not met, history and physical missing or incomplete, equipment unavailable or not working) were reduced 22.4%, and no-show DOS cancellations were reduced 17.9%.

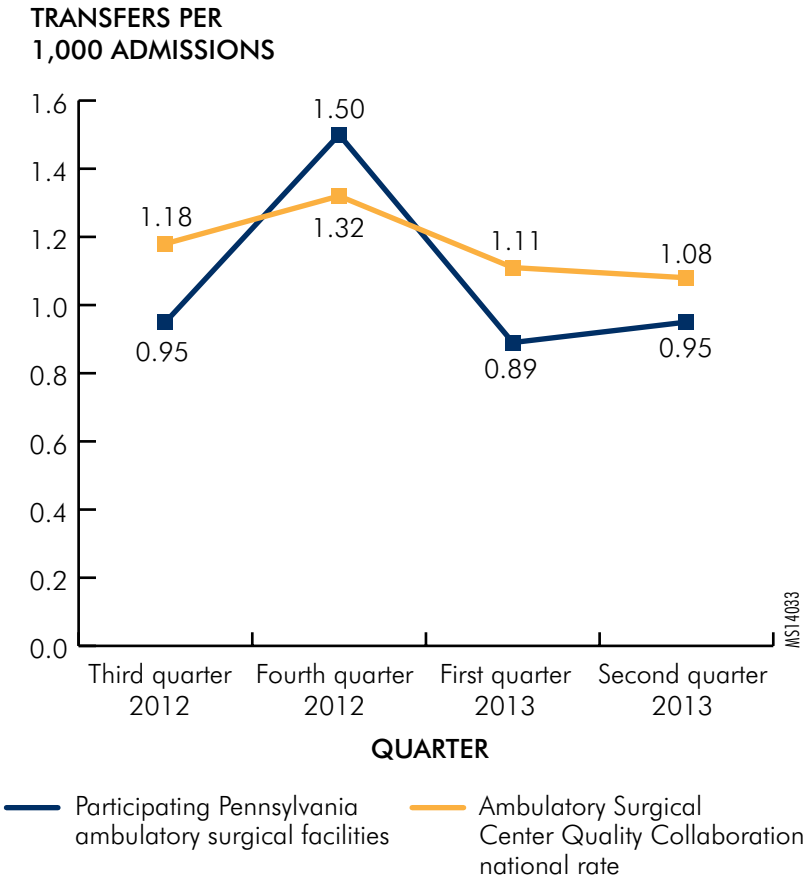
An analysis of preoperative screening implementation for DOS cancellations occurring in the postintervention time period showed that 28.4% (n = 234 of 824) of patients with a DOS cancellation had no preoperative screening and that 43.2% (n = 101 of 234) of these patients without a preoperative screening were patients the ASFs were not able to contact prior to the DOS. A closer examination of patients without a preoperative screening identified a greater percentage of no-show cancellations. In DOS cancellations in which an ASF was unable to contact a patient to perform a preoperative screening assessment, 49.5% (n = 50 of 101) were no-shows. In DOS cancellations in which a preoperative screening assessment was not performed, 30.1% (n = 40 of 133) were no-shows. Yet in DOS cancellations in which a preoperative screening assessment was performed, whether 24 hours prior to surgery, 48 hours prior to surgery, or greater than 48 hours prior to surgery, only 10% to 15% of these cancellations were no-shows. A comparison of no-show DOS cancellation rates for patients with versus without a preoperative screening assessment was statistically significant (p value < 0.001).

Transfers

A transfer was defined as an ASF admission requiring an unexpected hospital transfer or admission directly following discharge from the ASF. Transfer rates decreased 14.7%,* from 1.21 transfers per 1,000 admissions preintervention to 1.03 transfers per 1,000 admissions postintervention. This 14.7%* reduction was not statistically significant. A comparison of the ASF collaboration transfer rates and the Ambulatory Surgical Center Quality Collaboration national transfer rates from third quarter 2012 through second quarter 2013 revealed that the Pennsylvania ASFs in the collaboration had lower transfer rates for three of the four quarters measured (see the Figure).

For the ASFs participating in the collaboration, preoperative transfer rates declined 44.7%, from 0.47 transfers per 1,000 admissions preintervention to 0.26 transfers per 1,000 admissions postintervention. This decrease in preoperative transfer rates was not statistically significant. Preoperative transfers comprised patients with medical conditions not likely to be identified during a preoperative telephone screening and assessment (e.g., cardiac arrhythmias, hypertension). Postoperative transfer rates increased by 3.9%,* from 0.75 transfers

Figure. Transfer Rates: Participating Pennsylvania Ambulatory Surgical Facilities and National Ambulatory Surgical Center Quality Collaboration Facilities



* Due to rounding of rates to one decimal place for reporting purposes, the percentage change in rates appears differently than expected.

©2014 Pennsylvania Patient Safety Authority

Table. Ambulatory Surgical Facility (ASF) Preoperative Screening and Assessment Challenges and Lessons Learned from Participating ASFs

CHALLENGES	LESSONS LEARNED
Staffing and Time Constraints	
Limited time to review and approve alignment of the existing checklist with the standardized set of checklist questions Limited staff and staff time to make second preoperative phone calls to patients Alignment of staff and patient working hours, reducing staff's ability to contact or reach patients	Performing preoperative phone calls one to two days prior to the day of surgery (DOS) (when staff are available) showed dramatic improvements as a result of staff clarifying arrival and procedure times with patients and patients asking questions to clarify preoperative instructions. The number of patients who were unable to be contacted on previous calls was reduced. Identifying cancellations more than two days prior to the DOS allowed some ASFs to fill openings in their surgery schedule. Calling patients preoperatively on off-hours (Saturdays) increased patient contact and reduced cancellations. One ASF found that patients are more likely to be home on weekends.
Communication Issues	
Difficulty keeping open lines of communication with surgeons' offices Limited information about a patient's health status when collected by clerical staff compared with nursing staff Insufficient or inaccurate contact information, resulting in staff's inability to contact patients	Initiating the checklist improved office staff interactions with patients. The checklist was used to educate staff about the importance of getting more information from the patient. For example, if a patient states they had an angioplasty, the checklist prompts office staff to find out the date when the procedure was done. Educating staff to improve screening skills resulted in improvements in communication between clerical staff and clinical staff. Educating schedulers improved information conveyed to patients and improved the scheduler's sense of team participation and team functioning. Completing preoperative phone calls by a nurse resulted in a decrease in no-show cancellations. Opening up lines of communications between the ASF and referring physician offices improved communication between offices and provided opportunities to obtain additional phone numbers when the ASF was unable to contact patients. Calling patients two weeks prior to the day of surgery when the chart was incomplete due to missing allergy information, missing a history, or questionable history resulted in significant increases in completed charts. Obtaining additional phone numbers from the patient and family or friends, including cell phone numbers, can increase the ASF's ability to contact the patient for the preoperative screening and assessment. Sending letters to patients when an ASF is unable to reach the patient by phone has the potential to improve patient communication and reduce DOS no-show cancellations.

per 1,000 admissions preintervention to 0.77 transfers per 1,000 admissions postintervention. This increase in postoperative transfer rates was not statistically significant. Postoperative transfers consisted of medical conditions that arose during or as a result of the procedure and required further intervention beyond the scope of the ASF (e.g., respiratory monitoring, aspirations, perforations).

Evaluation of time of preoperative screening for patient transfers occurring in the postintervention phase revealed that 100% (n = 8 of 8) of patients transferred preoperatively received a preoperative screening and assessment, whereas 70.8% (n = 17 of 24) of patients transferred postoperatively received a preoperative screening and assessment.

An examination of 12 patients transferred postoperatively with potential contributing factors revealed that 75% (n = 9) had a preoperative screening and assessment and that 25% (n = 3) had no preoperative screening and assessment. The potential contributing factors for these 12 patients were reported as follows:

- Patient ill on day of surgery (n = 5)*
- New (i.e., previously undiagnosed) medical issues (n = 2)

* One patient was not screened preoperatively.

©2014 Pennsylvania Patient Safety Authority

Table. Ambulatory Surgical Facility (ASF) Preoperative Screening and Assessment Challenges and Lessons Learned from Participating ASFs (cont'd)

CHALLENGES	LESSONS LEARNED
Educational Issues	
Lacking patient compliance with preoperative instructions (e.g., failing to maintain nothing by mouth [NPO] status, no driver present on the DOS) Changing anesthesiologist group during the collaboration, requiring additional education of physicians	Speaking slowly so patients can comprehend what is said and using plain nonmedical language helped improve patient comprehension. Limiting the amount of information provided to patients aided patient's understanding of the information; too much information at one time can cause information overload, limiting retention. Using the teach-back technique confirms the patient's understanding of preoperative instructions. Lowering the literacy level of the preoperative instructions helped improve patient understanding of the preoperative instructions. For example, telling patients not to drink or eat anything rather than using the word "fast" resulted in improved patient understanding of preoperative instructions. Creating an open environment by phrasing questions in ways that engage patients encouraged patients to ask questions and receive clarifications about their upcoming procedure. For example, asking patients "what questions do you have?" conveys to patients that staff expect and encourage questions. Using simplified explanations to describe to patients the safety reasons for NPO status when receiving anesthesia helped improve understanding. For example, providing a list of clear liquids (e.g., black coffee, water, apple juice) for patients who are allowed to have drinks can reduce ambiguity. Making sure patients understood the importance of having a driver to take them home and that the procedure would be cancelled if they did not have a driver helped improve compliance. Getting feedback from patients about following the preoperative instructions assisted facilities with problem solving when patients were not properly prepped for procedures. Changing the color of the preoperative instructions sheet made the information prominent among the other patient forms. Switching anesthesiologist groups provided an opportunity for the new group of anesthesiologists to incorporate the preoperative checklist into their patient screening and assessments.
Checklist Implementation Issues	
Lacking an existing preoperative screening checklist Adding new questions to an existing preoperative checklist Lacking clinical staff compliance with the checklist Difficulty incorporating the checklist into office staff workflow processes to improve preoperative screening	Adding psychosocial questions to the checklist was beneficial in identifying nonclinical issues, such as no ride home or financial difficulties in paying for the surgery or procedure. Completing the checklist resulted in more completed patient charts on the DOS. Collecting information and forms two weeks prior to surgery aided in tracking missing forms; staff tacked notes on the chart identifying the missing forms. A significant increase in completed charts and completed history and physicals was realized.

- Preexisting medical condition (n = 2)*
- Surgery more difficult than expected (n = 1)*
- Patient required additional time to monitor (n = 1)
- Questionable home care (n = 1)

* One patient was not screened preoperatively.

DISCUSSION

Omitting a nurse-driven preoperative screening and assessment was associated with a high percentage of no-show DOS cancellations. The implementation of a nurse-driven preoperative screening and assessment was associated with reductions in clinical (e.g., protocol-related issues) and nonclinical (e.g., transportation-related issues) DOS cancellations. Several ASFs

©2014 Pennsylvania Patient Safety Authority

implemented health literacy principles (e.g., changes in their patient-staff interactions and written forms) that improved patient understanding of ASF expectations. As changes were put into place, expected reductions in areas such as compliance with preoperative instructions were not realized within the postintervention phase.

Implementation of the second preoperative phone call was achieved intermittently at several ASFs. One ASF reported experiencing a decrease in DOS cancellations when staffing permitted a second preoperative telephone call. The results of this collaboration show that DOS cancellations increased as the time of the preoperative screening was greater from the DOS. Instituting a second preoperative telephone call for patients has the potential to decrease DOS cancellations when the initial preoperative screening and assessment is performed more than 48 hours prior to the DOS.

The monthly conference calls provided opportunities for the ASFs to share their experiences with each other. During the intervention time period, the monthly conference calls provided a setting for the ASFs to discuss and share the challenges they faced completing the preoperative screening and assessment and different successful actions they identified and implemented to address these challenges. Four themes arose with the challenges: staffing and time constraints, communication issues, education issues, and checklist implementation issues. The Table identifies the challenges facing the ASFs and how the ASFs addressed these challenges.

The reduction achieved in patient transfers was less than the goal. Having low numbers of transfers across the ASFs and starting with a transfer rate lower than the national average made it difficult to reach a 25% reduction. Three ASFs had two or fewer transfers throughout the collaboration; specifically, two ASFs had no transfers and one ASF had two transfers. Separating transfers by time of occurrence (i.e., preoperative and postoperative) and identifying the reasons for these transfers added a dimension to ASF transfers. Preoperative transfers identified new unanticipated medical conditions (e.g., cardiac arrhythmias, hypertensive conditions) that prevented patients from undergoing surgery or a procedure. While preoperative screening and assessment processes might not identify these types of problems prior to admission, they represent safe patient care. Postoperative transfers arose from problems encountered during the surgery or procedure and represented additional care needed beyond the scope of the ASF. In some cases (e.g., patient ill on the DOS), staff have an opportunity during the preoperative screening and assessment to educate patients on the importance of notifying staff as soon as possible about new medical information that could place them at risk for a surgical complication and transfer to a hospital.

LIMITATIONS

Missing data from DOS cancellation event forms in the preintervention period prevented testing differences in the specific types of DOS cancellations between the preintervention and postintervention periods. Very small numbers in work-related and language-barrier-related DOS cancellations (i.e., five or fewer events during each time period) limited inferences about reductions in these types of cancellations. In addition, small numbers of transfer events, coupled with an initial low patient transfer rate at the beginning of the collaboration, limited opportunities to achieve higher reductions and statistically significant results at the end of the collaboration.

Time constraints were one of the greatest challenges during this collaboration. Busy operating room schedules, staffing constraints, and administrative duties, combined with the data demands, made it difficult for the ASFs to implement the three interventions. ASFs were asked to implement changes to their checklist (or in one case, establish a checklist); evaluate, modify, and implement changes to existing patient forms and educational approaches; and institute a second preoperative patient phone call. Each intervention had different requirements of the ASF: leadership review and approval, staff education, updating existing patient forms, and in some cases, changes to administrative policies and procedures. Changing written patient forms required review and approval from administrative leaders that often exceeded the collaboration time frame. In situations in which approval processes exceeded the intervention time, temporary forms or pilot forms were developed by the individual ASFs to be used only during the collaboration.

The time dedicated to each phase was determined as the objectives for each phase were reached and was agreed upon by the Authority staff and ASF participants. The seven-month postintervention phase placed constraints on establishing new practice patterns.

CONCLUSION

A nurse-driven preoperative screening and assessment requires a multifaceted approach consisting of a preoperative screening and assessment based on a standardized preoperative checklist; coordination of staff scheduling to provide time to screen patients preoperatively and provide a second preoperative phone call to patients; ongoing communication and education for staff and patients; and patient and staff feedback to improve processes and revise patient forms (e.g., preoperative instructions). This collaboration has shown reductions in DOS cancellations, particularly those related to transportation, protocol, and no-shows, after standardizing the preoperative screening and assessment

©2014 Pennsylvania Patient Safety Authority

process. This collaboration also identified an association between not performing a nurse-driven preoperative screening and assessment and no-show cancellations. In addition, reductions in preoperative transfers were noted during the postimplementation phase.

Selecting appropriate patients for same-day surgery through the implementation of a nurse-driven preoperative screening and assessment can improve patient safety by identifying patients suited for outpatient surgery or procedures; reducing disruptions or delays in the surgery schedule, including disruptions in surgical staffing; and increasing patient accountability (e.g., in arranging for reliable transportation home).

Acknowledgments

Megan Shetterly, RN, MS, senior patient safety liaison, and Denise Martindell, RN, JD, former senior patient safety analyst, worked on this collaboration as team member and team lead, respectively. Jonathan R. Treadwell, PhD, associate director, Evidence-based Practice Center, ECRI Institute, consulted on and contributed to statistical testing for this article.

NOTES

1. Association of periOperative Registered Nurses (AORN). AORN guidance statement: preoperative patient care in the ambulatory surgery setting. *AORN J* 2005 Apr;81(4):871-8.
2. Bramhall J. The role of nurses in preoperative assessment [online]. Nurs Times 2002 Oct 1 [cited 2013 Nov 6]. http://www.nursingtimes.net/the-role-of-nurses-in-preoperative-assessment/205900.article
3. Dean A. The preoperative patient assessment in an ambulatory surgery center [online]. 2012 Aug 15 [cited 2013 Oct 30]. http://www.beckersasc.com/asc-turnarounds-ideas-to-improve-performance/the-preoperative-patient-assessment-in-an-ambulatory-surgery-center.html
4. Centers for Medicare and Medicaid Services. US Department of Health and Human Services. Clarification to appendix L, ambulatory surgical center interpretive guidelines—comprehensive medical history and physical assessment and anesthetic risk and evaluation [online]. 2011 May 13 [cited 2013 Nov 8]. http://www.cms.gov/Regulations-and-Guidance/Guidance/Transmittals/downloads/R71SOMA.pdf
5. 28 Pa. Code § 555 (2000). [Ambulatory surgical center medical staff regulations, Pennsylvania]. Also available at http://www.pacode.com/secure/data/028/chapter555/028_0555.pdf
6. Gardner LA. Survey of ambulatory surgical facility preoperative screening processes in Pennsylvania. Pa Patient Saf Advis [online] 2012 Mar [cited 2013 Nov 1]. http://patientsafetyauthority.org/ADVISORIES/AdvisoryLibrary/2012/Mar;9(1)/Pages/18.aspx
7. Patient screening and assessment in ambulatory surgical facilities. Pa Patient Saf Advis [online] 2009 Mar [cited 2013 Oct 30]. http://patientsafetyauthority.org/ADVISORIES/AdvisoryLibrary/2009/Mar6(1)/Pages/03.aspx
8. Haufler K, Harrington M. Using nurse-to-patient telephone calls to reduce day-of-surgery cancellations. *AORN J* 2011 Jul;94(1):19-26.
9. Garg R, Bhalotra AR, Bhadoria P, et al. Reasons for cancellation of cases on the day of surgery–a prospective study. *Indian J Anaesth* 2009 Feb;53(1):35-9.
10. Digner M. At your convenience: preoperative assessment by telephone. *J Perioper Pract* 2007 Jul;17(7):294-301.
11. Centers for Medicare and Medicaid Services. Ambulatory Surgical Center Quality Reporting Program: quality measures specification manual [online]. 2012 Jul [cited 2013 Oct 8]. http://www.asge.org/assets/0/47668/71298/ccb3adeb-9fc4-4a3a-a522-1db072f65ef4.pdf
12. Centers for Medicare and Medicaid Services. ASC quality reporting [online]. [cited 2013 Oct 8]. http://www.cms.gov/Medicare/Quality-Initiatives-Patient-Assessment-Instruments/ASC-Quality-Reporting/index.html
13. Chung F, Mezei G, Tong D. Pre-existing medical conditions as predictors of adverse events in day-case surgery. *Brit J Anes* 1999 Aug;83(2):262-70.
14. American Society of Anesthesiologists (ASA). ASA physical status classification system [online]. 2013 [cited 2013 Oct 1]. http://www.asahq.org/Home/For-Members/Clinical-Information/ASA-Physical-Status-Classification-System
15. National Institutes of Health National Heart, Lung, and Blood Institute. Clinical guidelines on the identification, evaluation, and treatment of overweight and obesity in adults: the evidence report [online]. NIH pub. no. 98-4083. 1998 Sep [cited 2013 Apr 5]. http://www.nhlbi.nih.gov/guidelines/obesity/ob_gdlns.pdf
16. American Society of Anesthesiologists. Practice advisory for the perioperative management of patients with cardiac implantable electronic devices: pacemakers and implantable cardioverter-defibrillators. *Anesthesiology* 2011 Feb;114(2):247-61.
17. Fleisher LA, Beckman JA, Brown KA, et al. ACC/AHA 2007 guidelines on perioperative cardiovascular evaluation and care for noncardiac surgery: executive summary: a report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines. *Anesth Analg* 2008 Mar;106(3):685-712.
18. Haeck PC, Swanson JA, Iverson RE, et al. Evidence-based patient safety advisory: patient selection and procedures in ambulatory surgery. *Plast Reconstr Surg* 2009 Oct;124(4 Suppl):6S-27S.
19. Adams JP, Murphy PG. Obesity in anaesthesia and intensive care. *Br J Anaesth* 2000 Jul;85(1):91-108.
20. Bryson GL, Chung F, Finegan BA, et al. Patient selection in ambulatory anesthesia—an evidence-based review: part I. *Can J Anaesth* 2004 Oct;51(8):768-81.
21. Cartwright, SM. Multidrug-resistant organisms: practice considerations in the ambulatory surgery setting—part one. *J Perianestha Nurs* 2011 Aug;26(4): 277-80.
22. Chung F, Mezei G, Tong D. Pre-existing medical conditions as prediction of adverse events in day-case surgery. *Br J Anaesth* 1999 Aug;83(2):262-70.
23. Duncan PG, Cohen MM, Tweed WA, et al. The Canadian four-centre study of anaesthetic outcomes: III. Are anaesthetic complications predictable in day surgical practice? *Can J Anaesth* 1992 May;39(5 Pt 1):440-8.

©2014 Pennsylvania Patient Safety Authority

24. Helsley SE. Ambulatory anesthetic management of common diseases. Chapter 40. In: Steele SM, Nielsen KC, Klein SM, eds. *Ambulatory anesthesia and perioperative analgesia*. New York: McGraw-Hill Companies, Inc.; 2005:441-2.
25. Hofer RE, Kai T, Decker PA, et al. Obesity as a risk factor for unanticipated admissions after ambulatory surgery. *Mayo Clin Proc* 2008 Aug;83(8):908-16.
26. Mathews DM, Twersky RS. Adult clinical challenges. In: Twersky RS, Philip BK, eds. *Handbook of ambulatory anesthesia*. 2nd ed. New York: Springer Science + Business Media, LLC; 2008:78-9.
27. Melloni C. Morbidity and mortality related to anesthesia outside the operating room. *Minerva Anesthesiol* 2005 Jun;71(6):325-34.
28. Pasternak LR. Preoperative screening for ambulatory patients. *Anesthesiol Clin North America* 2003 Jun;21(2):229-42, vii.
29. Management of MRSA in ambulatory surgical facilities [online]. Pa Patient Saf Advis [online] 2010 Jun [cited 2013 Dec 13]. http://patientsafetyauthority.org/ADVISORIES/AdvisoryLibrary/2010/Jun7(2)/Pages/61.aspx
30. Danielson D, Bjork K, Card R, et al. Institute for Clinical Systems Improvement. Preoperative evaluation [online]. Updated 2012 Jul [cited 2013 Oct 1]. https://www.icsi.org/guidelines__more/catalog_guidelines_and_more/catalog_guidelines/catalog_surgical_guidelines/preop
31. Should patients be accompanied when discharged from ambulatory surgery? PA PSRS Patient Saf Advis [online] 2007 Sep [cited 2013 Dec 13]. http://patientsafetyauthority.org/ADVISORIES/AdvisoryLibrary/2007/sep4(3)/Pages/100.aspx
32. Hospital and Healthsystem Association of Pennsylvania. Webinar presentations: PA-HEN Readmission Regional Events; 2013 Jan 10, 2013 Feb 14.
33. Kirkwood BR, Sterne JAC. *Essential Medical Statistics*. 2nd ed. Malden (MA): Blackwell Science Ltd.; 2001.

©2014 Pennsylvania Patient Safety Authority

Improvement of Pennsylvania Healthcare Consumers' Awareness of Patient Safety

Jesse Munn
Managing Editor, Pennsylvania Patient Safety Advisory
Operations Manager, Pennsylvania Patient Safety Authority

ABSTRACT

In the past, the Pennsylvania Patient Safety Authority has sponsored questions in annual, statewide polls of Pennsylvania consumers; specifically, questions to measure consumers' engagement in patient safety practices (e.g., confirmation of patient identity). In 2013, 604 randomly selected participants were surveyed about their respective engagement in 10 consumer patient safety practices. The Authority first contributed questions about these select practices for the 2006 poll. Authority analysts compared participant responses to the respective polls and observed statistically significant increases in likelihood of engagement in 8 of the 10 practices. Analysts also reviewed consumers' inclinations to engage in these practices. The 2013 participants were most inclined toward asking for an explanation for understanding, questioning unfamiliar drugs or reasons for procedures, and seeking second opinions about healthcare, and participants were least inclined toward asking about handwashing. Overall, results indicate that the patient safety movement in Pennsylvania is raising awareness of patient safety among Pennsylvania healthcare consumers. (Pa Patient Saf Advis 2014 Mar;11[1]:23-9.)

In its inaugural "I Am Patient Safety" poster contest, the Authority recognized individuals and groups within Pennsylvania's healthcare facilities who have made a personal commitment to patient safety. For more information, see the article "Commitment to Patient Safety Recognized in Pennsylvania."

INTRODUCTION

The Pennsylvania Patient Safety Authority has been involved with multiple collaborative efforts that included means to increase healthcare consumers' (i.e., patients) awareness of patient safety issues such as patient identification. In one such collaboration between the Authority and Pennsylvania healthcare facilities that resulted in a 37% aggregate, statistically significant decrease in specimen labeling errors, participating facilities made use of Authority-sponsored "Did You ID Me?" shirt buttons and posters to promote consumer awareness about patient identification.[1,2] Accompanying the materials released as part of the Authority's wrong-site surgery prevention collaborative improvement projects[3] is a brochure for surgeons or facilities to provide to preoperative patients so that they understand why their different providers repeat similar questions (e.g., "What is your name?"). An additional, well-known example was the collaborative effort in Pennsylvania to standardize meanings of color-coded wristbands on patients and reduce patient and staff confusion.[4] This effort followed an Authority-sponsored survey seeking additional information about facilities' interpretations of wristbands, initiated after a Pennsylvania healthcare facility reported to the Authority a near-miss involving confusion associated with a colored wristband.[5]

In other efforts targeted directly at consumers, the Authority hosts on its website more than 30 Consumer Tips that inform patients and caregivers about how to engage in patient safety during the receipt of healthcare (e.g., prevention of medication errors, healthcare-associated infections, misdiagnosis), and the Authority distributes these tips during legislature-sponsored expositions. Most recently, the Authority Board of Directors made "Increase Integration of Patient Voice into Authority Activities" a project as part of its strategic plan, which includes among its objectives to identify and test targeted strategies to engage providers and patients to implement Authority (patient safety) recommendations.[6]

The Authority is invested in these consumer engagement efforts, and it is in good company. Sister agencies in the commonwealth strive toward similar goals, and at a national level, well-known initiatives include among them the Joint Commission's Speak Up campaign,[7] the National Patient Safety Foundation's Ask Me 3 program,[8] and the Agency for Healthcare Research and Quality's (AHRQ) "Questions to Ask Your Doctor."[9] Because such efforts, mature or otherwise, target patient awareness and involvement in healthcare, it is important to measure whether awareness is improving or requires more attention. The Authority has previously participated in statewide polls of Pennsylvania residents. In 2006, the Authority sponsored survey questions[10] to assess Pennsylvania healthcare consumer engagement in patient safety practices. In 2013, the Authority again sponsored survey questions about Pennsylvania healthcare consumers' engagement. Comparative analysis of the responses indicates an increase in the likelihood of Pennsylvania consumer engagement in consumer patient safety practices.

METHODS

From March 4, 2013, through March 26, 2013, the Penn State Harrisburg Center for Survey Research conducted a random telephone poll of 604* adults in Pennsylvania. The overall survey included base demographic questions followed by specific questions provided by poll sponsors, including the Authority. Associated with the Authority's poll sponsorship, participants were surveyed about their respective engagement in

* Respondent numbers represented in this article may not add up to 604 due to exclusion of "don't know" and "declined to answer" responses.

©2014 Pennsylvania Patient Safety Authority

10 consumer patient safety practices. These practices were chosen during conduct of the annual poll in 2006 and were included because of their promotion in educational materials targeting consumer involvement in patient safety improvement efforts, as well as their inclusion in past surveys of a similar nature by various other organizations.[10]

Consumer engagement was measured by asking the following questions about these 10 safety practices:

In regard to your healthcare, how likely are you to

1. ask a healthcare worker if they have washed their hands?
2. ask a healthcare worker to confirm your identity before performing a procedure?
3. seek a second opinion regarding an important healthcare decision?
4. ask a healthcare worker to explain more fully something they just said that you don't understand?

How frequently do you engage in the following practices related to your healthcare?

5. Check that you received the right drug and strength before leaving the pharmacy.
6. Call your doctor when you have a medical test ordered and no one calls you with the results.
7. Take a written list of all the medications you are currently taking when going to the doctor.

If you were a patient in a hospital, how likely are you to

8. question the reason for a procedure before it is performed?
9. question medications or pills if you do not recognize them and never took this medication in the past?
10. refuse care, such as an x-ray or drawing blood, that you were not told about by your doctor or nurse?

The sample included landline and cell phone numbers selected at random from Pennsylvania databases, including working, nonworking, and unassigned numbers, to ensure equal chance of selection during the poll process.[11] A randomized selection technique ensured every adult age 18 or older within the samples had equal probability of selection. The completed interviews comprised approximately 83% landline and 17% cell phone participants. The completed interviews required placing 12,749 calls of 5,035 landline numbers and 4,521 calls of 2,551 cell phone numbers. For the overall sample size, the sampling error is 4.0% for a 50/50 distribution of responses. The survey cooperation rate for landline responses was 76.8%, and the cooperation rate for cell phone responses was 57.2%. Accounting for frame overlap through weighted rates, the overall cooperation rate was 65.7%.

General demographics of respondents are included in the Table.

To observe differences in participant responses to the questions about the 10 safety practices, Authority analysts compared the participant responses in the 2013 poll[11] with the responses of the 2006 poll (856 interviews).[10,12]

Following analysis, Authority analysts conducted a search for medical literature in the last five years addressing patient engagement in patient safety. Databases and resources searched included PubMed, Scopus, Google Scholar, Embase, ECRI Institute, and AHRQ. Statistical methods included the chi-square test for linear trend and the Wilson score method[13] for proportions.

RESULTS

Consumer Patient Safety Practices

Comparing 2013 poll results with 2006 poll results, there were statistically significant increases in likelihood of consumer engagement in 8 of 10 consumer patient safety practices (see Figure 1). The two practices that did not demonstrate a statistically significant increase were of the question set about "How frequently do you engage in the following practices related to your healthcare?"

- Check that you received the right drug and strength before leaving the pharmacy.
- Call your doctor when you have a medical test ordered and no one calls you with the results.

Statistical significance was determined by chi-square test for linear trend.

Similar to the 2006 poll results,[10] 2013 poll participants responded with varied inclination to engage in the 10 patient safety practices. In Figure 2, participants who indicated they were "likely" or "very likely" to engage in a select practice or would "always" or "often" engage in a behavior were combined according to practice and ranked according to 2013 results. In 2013, positive inclination improved by percentage in 9 of 10 practices compared with 2006 (see Figure 1), although, as noted above, overall responses were not statistically significant in 2 practices.
Confidence intervals for the proportions were calculated by the Wilson score method without continuity correction.

DISCUSSION

Results of the 2013 poll, particularly the statistically significant increases in likelihood of engagement in 8 of the 10 practices, indicate that the patient safety movement in Pennsylvania is raising awareness of patient safety among Pennsylvania healthcare consumers.

The 2013 participants were most inclined (i.e., from 81% to nearly 96%) toward asking for an explanation for understanding, questioning unfamiliar drugs or reasons for procedures, and seeking second opinions about healthcare. These inclinations

©2014 Pennsylvania Patient Safety Authority

Table. Demographic Distribution of 604 Survey Participants in the 2013 Penn State Poll*

VARIABLE	NUMBER	PERCENTAGE
Gender		
Male	290	48.0
Female	314	52.0
Age Category		
18 through 24 years	76	12.6
25 through 34 years	92	15.2
35 through 44 years	101	16.7
45 through 54 years	118	19.5
55 through 64 years	97	16.1
65 through 74 years	59	9.8
75 years of age or older	60	9.9
Race		
White alone	515	85.3
Black, African American alone	43	7.1
Asian alone	11	1.8
American Indian or Native Alaskan alone	3	0.5
Some other race alone	21	3.5
Two or more races	11	1.8
Region (Counties)		
1. (Allegheny, Armstrong, Beaver, Butler, Fayette, Greene, Indiana, Lawrence, Mercer, Somerset, Washington, and Westmoreland)	148	24.5
2. (Crawford, Erie, Venango, and Warren)	26	4.3
3. (Cameron, Clarion, Clearfield, Elk, Forest, Jefferson, McKean, and Potter)	28	4.6
4. (Bedford, Blair, Cambria, and Huntingdon)	24	4.0
5. (Centre, Clinton, Juniata, Mifflin, Snyder, and Union)	21	3.5
6. (Bradford, Carbon, Columbia, Lackawanna, Luzerne, Lycoming, Monroe, Montour, Northumberland, Pike, Sullivan, Susquehanna, Tioga, Wayne, and Wyoming)	76	12.6
7. (Adams, Cumberland, Dauphin, Franklin, Fulton, Lancaster, Perry, and York)	72	11.9
8. (Berks, Lebanon, Lehigh, Northampton, and Schuylkill)	68	11.3
9. (Bucks, Chester, Delaware, Montgomery, and Philadelphia)	140	23.2

Source: Center for Survey Research Penn State Harrisburg. *Spring 2013 Penn State poll: report of methods and findings*. Harrisburg (PA): Penn State Harrisburg; 2013 May.
* Respondent numbers represented in this table may not add up to 604 due to exclusion of "don't know" and "declined to answer" responses.

were consistent with results of the 2006 poll[10] in that these four practices were those for which 2006 participants were most inclined (i.e., from 73% to 91%). In 2013, fewer participants, but nevertheless the majority by percentage (i.e., from 50% to nearly 64%), were inclined to call for test results, check drugs before leaving the pharmacy, ask for confirmation of identity, refuse care, and take a list of medications to a doctor's visit.

Noting that differences in overall 2013 responses were not statistically significant from 2006 responses for (1) checking drugs before leaving the pharmacy or (2) calling for medical test results, analysts reviewed the Authority authors' discussion of the ranked inclination of 2006 results. For example, there remains a marked difference in proportion of responses of a patient in a hospital questioning medications he or she did not recognize (2013: 90.1%; 2006: 84.3%) and whether a patient would check drugs before leaving the pharmacy (2013: 61.1%; 2006: 63.0%). Authority authors previously noted that patients' familiarity with their community pharmacy and/or with the routine medications they purchase may breed confidence in these interactions or that there is a consumer belief that medications used in the hospital are associated with more risk than those in the community.[10] These beliefs may well persist.

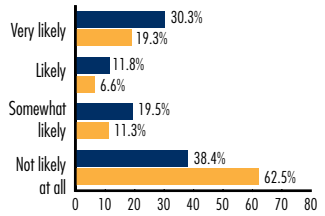
Similarly, regarding no significant change in participant responses to calling for medical test results, Authority authors previously noted the 2006 finding was generally consistent with other study findings at the time, although differences in the survey questions made comparisons difficult.[10] In a more recent, cross-sectional, exploratory study of medical and surgical students in a London hospital, Davis et al. found an average response of 6.8 (1: strongly disagree; 7: strongly agree) among patients asked whether they would notify a doctor if they had not received

(continued on page 27)

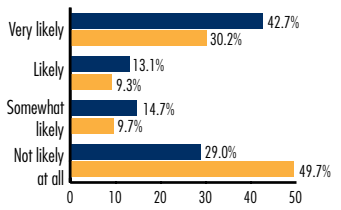
©2014 Pennsylvania Patient Safety Authority

Figure 1. Likelihood of Consumer Engagement in Consumer Patient Safety Practices, 2013 and 2006 (Statistical Significance Determined by Chi-Square Test for Linear Trend)

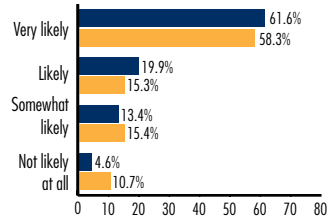
IN REGARD TO YOUR HEALTHCARE, HOW LIKELY ARE YOU TO



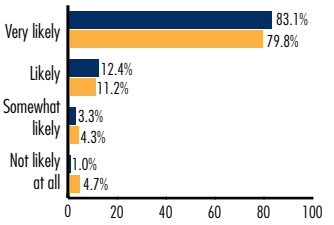
ask a healthcare worker if they have washed their hands? **(statistically significant increase in likelihood, p < 0.0010)**



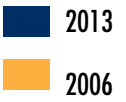
ask a healthcare worker to confirm your identity before performing a procedure? **(statistically significant increase in likelihood, p < 0.0010)**



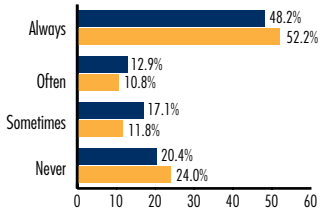
seek a second opinion regarding an important healthcare decision? **(statistically significant increase in likelihood, p = 0.0009)**



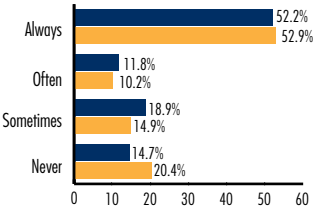
ask a healthcare worker to explain more fully something they just said that you don't understand? **(statistically significant increase in likelihood, p = 0.0012)**



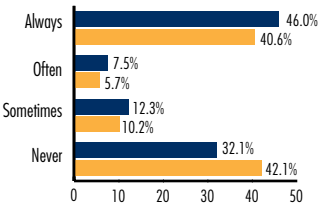
HOW FREQUENTLY DO YOU ENGAGE IN THE FOLLOWING PRACTICES RELATED TO YOUR HEALTHCARE?



Check that you received the right drug and strength before leaving the pharmacy. **(not a statistically significant increase in likelihood, p = 0.7583)**

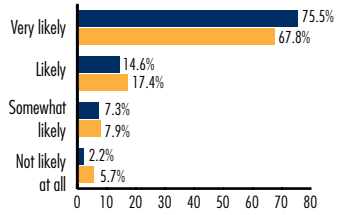


Call your doctor when you have a medical test ordered and no one calls you with the results. **(not a statistically significant increase in likelihood, p = 0.2953)**

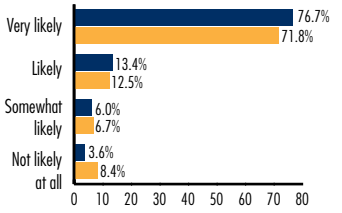


Take a written list of all the medications you are currently taking when going to the doctor. **(statistically significant increase in likelihood, p = 0.0015)**

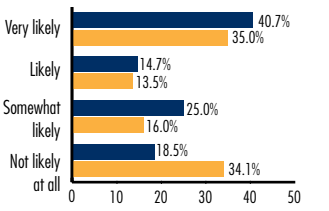
IF YOU WERE A PATIENT IN A HOSPITAL, HOW LIKELY ARE YOU TO



question the reason for a procedure before it is performed? **(statistically significant increase in likelihood, p = 0.0005)**



question medications or pills if you do not recognize them and never took this medication in the past? **(statistically significant increase in likelihood, p = 0.0100)**

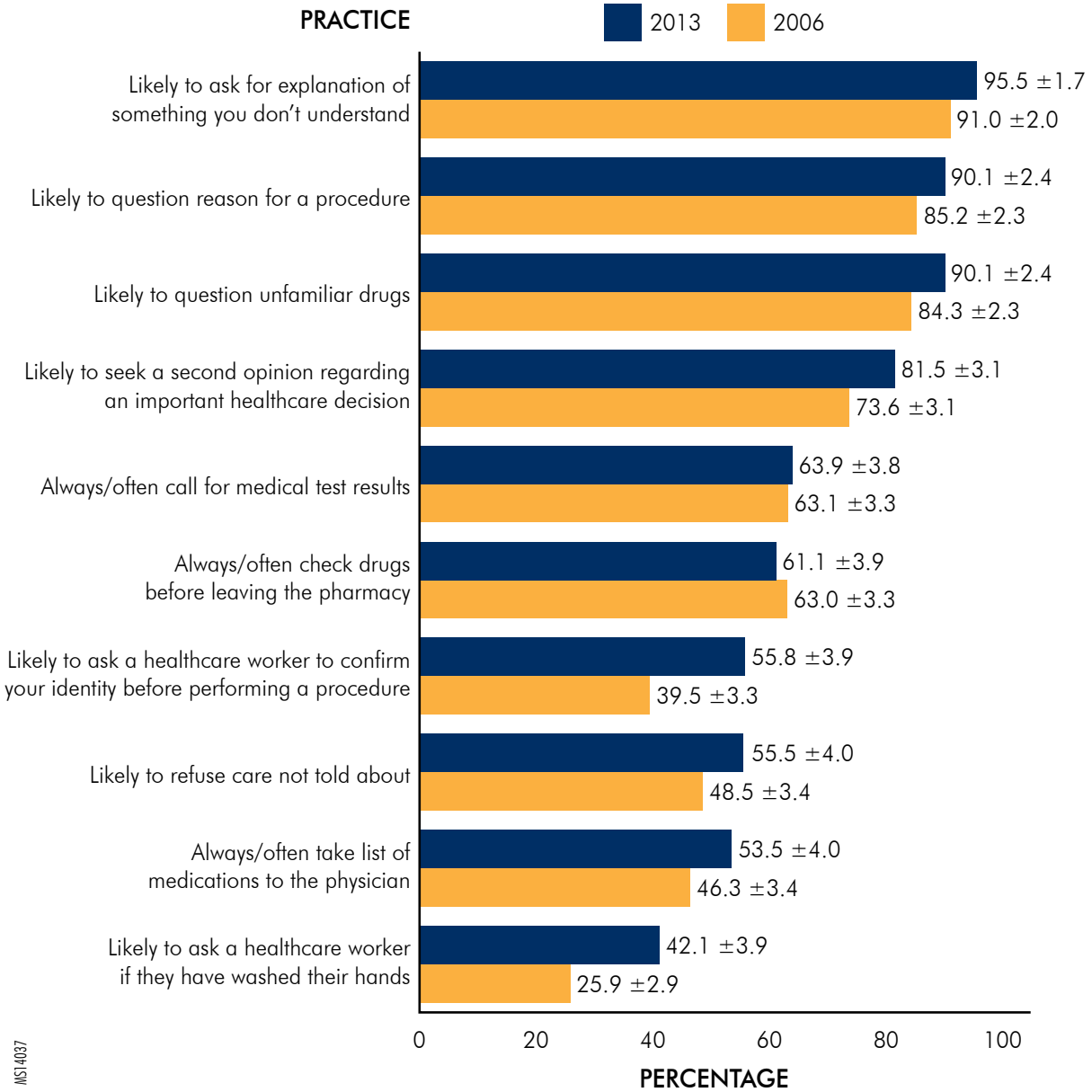


refuse care, such as an x-ray or drawing blood, that you were not told about by your doctor or nurse? **(statistically significant increase in likelihood, p < 0.0010)**

MSI 4036

©2014 Pennsylvania Patient Safety Authority

Figure 2. Consumer Safety Practices, 2013 and 2006, Ranked by 2013 Percentage of Participants Who Were Positively Inclined



Confidence intervals for the proportions were calculated by the Wilson score method without continuity correction.

(continued from page 25)

the results of a medical test.[14] Notably, there exist differences in population samples, population locations, and scale of responses between this study and the Penn State polls.

Included among the ranked inclination observations, positive inclination of "In regard to your healthcare, how likely are you to ask a healthcare worker to confirm your identity before performing a procedure?" improved by 3 positions among the 10 ranked practices, or a difference of 16.3%. In a previous article about the

©2014 Pennsylvania Patient Safety Authority

2006 poll,[10] Authority authors noted low inclination (39.5%) for this practice, potentially warranting patient and family education. National and Authority focus on confirmation of patient identity has continued since the 2006 poll. For example, improving patient identification has been one of the Joint Commission's National Patient Safety Goals (NPSGs) since NPSGs were enacted in 2003 and is required by all Joint Commission–accredited healthcare organizations.[15,16] Further, patient identification forms a core issue of several Authority collaborative improvement projects past and present (e.g., color-coded wristbands, wrong-site surgery, blood specimen mislabeling), as well as featuring among risk reduction strategies for healthcare providers in the Authority's *Pennsylvania Patient Safety Advisory*.[3-5]

The 2013 poll participants, similar to 2006 participants, remained least inclined toward asking about handwashing; however, this consumer practice demonstrated the second greatest percentage improvement in 2013 since the 2006 poll. The medical literature abounds with information about patients questioning healthcare providers about their hand hygiene before patient treatment. In a systematic review of patient safety practices, Berger et al. addressed interventions encouraging patient engagement in patient safety practices, including hand hygiene.[17] In one included study addressing hand hygiene, 80% to 90% of patients reported willingness to ask providers to wash their hands, but only 60% to 70% actually questioned providers, suggesting barriers (e.g., fear of negative reaction by providers). Another included study noted that patient factors (e.g., extrovert patient personality, awareness of risk of healthcare-association infections) were associated with patients encouraging providers to wash their hands. Because willingness to engage in the practice remains the lowest of surveyed practices in the 2013 poll, focused attention to patient engagement in provider hand hygiene may still be warranted.

In a systematic review published in 2010 about evidence of patients' attitudes toward engagement in error prevention, as well as the effectiveness of efforts to increase patient participation, Schwappach notes considerable variation in patients' attitudes about engaging in "specific, commonly recommended error prevention strategies."[18] Behaviors that require questioning medical authority are less likely than behaviors involving "traditional roles," such as patients communicating information to their healthcare providers. Such division of the participants' responses to the consumer engagement practices was noted in the 2006 poll results.[10] In the 2013 results, behaviors that *directly* challenge actions of healthcare providers do not number among the practices with most inclination, but improvement since the 2006 poll is visible nonetheless.

CONCLUSION

Pennsylvania healthcare consumers were previously reported as being inclined to engage in practices to promote their own safety,[10] which continued in results of a 2013 poll. Their inclination varied among the 10 safety practices but was somewhat consistently divided between communicating or seeking information from providers and questioning or challenging providers. There was a noted increase in the likelihood of Pennsylvania consumer engagement in consumer patient safety practices, and overall, it appears the patient safety movement in Pennsylvania is raising awareness of patient safety among Pennsylvania healthcare consumers.

As to whether overall attention needs to continue for consumer engagement in patient safety practices, patient participation in safety practices may be influenced by self-perception and patient-physician relationships, among other factors, and examination of the reaction of physicians and healthcare providers to patient and family engagement may prove beneficial.[17] Specifics about patient engagement beyond that of questioning provider behavior may require further study, such as on the optimum strategy for implementation.[17] Similarly, a 2013 viewpoint article in the *Journal of the American Medical Association* noted that while such engagement is unproven, it nevertheless may be valuable to facilitate communication between patients and providers, particularly physicians.[19] Overall, the viewpoint states, question-like engagement is a start, and the goal is a more patient-centered experience in which providers engage in open dialogue with patients and minimize "apprehensive silence."

Acknowledgments

Jonathan R. Treadwell, PhD, associate director, Evidence-based Practice Center, ECRI Institute, and William Marella, MBA, program director, Pennsylvania Patient Safety Authority, consulted on and contributed to statistical testing for this article.

NOTES

1. Reducing errors in blood specimen labeling: a multihospital initiative. Pa Patient Saf Advis [online] 2011 Jun [cited 2014 Jan 15]. http://patientsafetyauthority.org/ADVISORIES/AdvisoryLibrary/2011/jun8(2)/Pages/47.aspx
2. Shetterly M. Blood specimen labeling collaborative: path to results. Pa Patient Saf Advis [online] 2011 Jun [cited 2014 Jan 15]. http://patientsafetyauthority.org/ADVISORIES/AdvisoryLibrary/2011/jun8(2)/Pages/53.aspx
3. Pennsylvania Patient Safety Authority. Preventing wrong-site surgery [online]. [cited 2014 Jan 15]. http://patientsafetyauthority.org/EducationalTools/PatientSafetyTools/PWSS/Pages/home.aspx

©2014 Pennsylvania Patient Safety Authority

4. Pennsylvania Patient Safety Authority. The color of safety [online]. [cited 2014 Jan 15]. http://patientsafetyauthority.org/EducationalTools/PatientSafetyTools/wristbands/Pages/wristband_manual.aspx
5. Use of color-coded patient wristbands creates unnecessary risk. PA PSRS Patient Saf Advis [online] 2005 Dec [cited 2014 Jan 15]. http://patientsafetyauthority.org/ADVISORIES/AdvisoryLibrary/2005/dec14_2(suppl2)/Pages/dec14;2(suppl2).aspx
6. Pennsylvania Patient Safety Authority. 2012 annual report [online]. 2013 Apr 31 [cited 2014 Jan 15]. http://patientsafetyauthority.org/PatientSafetyAuthority/Documents/Annual%20Report%202012%20.pdf
7. Joint Commission. Speak Up initiatives [online]. [cited 2014 Jan 15]. http://www.jointcommission.org/speakup.aspx
8. National Patient Safety Foundation. Ask Me 3 [online]. 2014 [cited 2014 Jan 28]. http://www.npsf.org/for-healthcare-professionals/programs/ask-me-3
9. Agency for Healthcare Research and Quality. Questions to ask your doctor: questions are the answer [online]. 2012 Sep [cited 2014 Jan 15]. http://www.ahrq.gov/patients-consumers/patient-involvement/ask-your-doctor/index.html
10. Marella W, Finley E, Thomas AD, et al. Health care consumers' inclination to engage in selected patient safety practices: a survey of adults in Pennsylvania. *J Patient Saf* 2007 Dec;3(4):184-9.
11. Center for Survey Research Penn State Harrisburg. *Spring 2013 Penn State poll: report of methods and findings*. Harrisburg (PA): Penn State Harrisburg; 2013 May.
12. Center for Survey Research Penn State Harrisburg. *2006 Penn State poll: technical report*. Harrisburg (PA): Penn State Harrisburg; 2006 Dec.
13. Newcombe RG. Two-sided confidence intervals for the single proportion: comparison of seven methods. *Stat Med* 1998 Apr 30;17(8):857-72.
14. Davis RE, Sevdalis N, Vincent CA. Patient involvement in patient safety: how willing are patients to participate? *BMJ Qual Saf* 2011 Jan;20(1):108-14.
15. ECRI Institute. Patient identification. *Healthc Risk Control* 2007 Nov;Suppl A: Risk and quality management strategies 16.
16. Joint Commission. 2014 National Patient Safety Goals slide presentation [online]. 2014 Jan 3 [cited 2014 Jan 15]. http://www.jointcommission.org/2014_national_patient_safety_goals_slide_presentation
17. Berger Z, Flickinger TE, Pfoh E, et al. Promoting engagement by patients and families to reduce adverse events in acute care settings: a systematic review [online]. BMJ Qual Saf 2013 Dec 13 [cited 2013 Dec 16; epub ahead of print]. http://qualitysafety.bmj.com/content/early/2014/01/16/bmjqs-2012-001769.long
18. Schwappach DL. Review: engaging patients as vigilant partners in safety: a systematic review. *Med Care Res Rev* 2010 Apr;67(2):119-48.
19. Judson TJ, Detsky AS, Press MJ. Encouraging patients to ask questions: how to overcome "white-coat silence." *JAMA* 2013 Jun 12;309(22):2325-6.

©2014 Pennsylvania Patient Safety Authority

Peripheral Vascular Catheter–Related Infection: Dwelling on Dwell Time

James Davis, MSN, RN, CCRN, CIC
Senior Infection Prevention Analyst
Pennsylvania Patient Safety Authority

ABSTRACT

In the United States, almost 200 million peripheral intravenous catheters are used each year. Recommendations for the prevention of vascular catheter–related infection in adults seem to allow the clinician to leave a peripheral catheter in place for more than 72 hours and allow clinicians to use clinical judgment for leaving peripheral intravenous catheters in place until clinical indications for removal are manifested. From an infection prevention standpoint, once the patient shows clinical indications of infection, bacteremia may not be far off. Authority analysts searched the Pennsylvania Patient Safety Reporting System and the National Healthcare Safety Network for evidence related to the prevalence of peripheral intravenous catheter infection–related bacteremia and the related time frame of infection development. Focusing on Staphylococcus aureus *primary bloodstream infection (BSI) as a surrogate for the detection of peripheral intravenous catheter–related infection, there was an impressive increase in primary BSIs 72 hours post-admission. Due to the high incidence in which peripheral catheters are used when caring for inpatients, complications like bacteremia may contribute substantially to yearly hospital-acquired infections. (Pa Patient Saf Advis 2014 Mar;11[1]:30-5.)*

INTRODUCTION

The Centers for Disease Control and Prevention (CDC) guidelines for prevention of peripheral vascular catheter–related infection (PVCRI) state the following:[1]

1. *There is no need to replace peripheral catheters more frequently than every 72–96 hours. . . . Category IB**
2. *No recommendation is made regarding replacement of peripheral catheters in adults only when clinically indicated. Unresolved issue†*
3. *Replace peripheral catheters in children only when clinically indicated. Category IB**

The above recommendations for the prevention of PVCRI could be interpreted to allow the clinician to leave a peripheral catheter in adults in place for more than 72 hours. In certain populations, the peripheral vascular catheter (PVC) can be changed when clinically indicated. Furthermore, the CDC guidelines state that "some studies have suggested that planned removal at 72 hours vs. removing as needed resulted in similar rates of phlebitis and catheter failure. However, these studies did not address the issue of [PVCRI], and the risk of [PVCRI] with this strategy is not well studied."[1]

The Infusion Nurses Society's (INS) 2011 standards of practice recommend that site rotation of the short peripheral catheter be based on clinical indication, which is a change from the 2006 recommendation of rotation at least every 72 hours.[2,3] INS underlines the importance of site inspection for the identification of complications of catheter use, including signs and symptoms of phlebitis, infiltration, extravasation, nerve damage, and infection (mainly by way of fever development).[4] However, from an infection prevention standpoint, once the patient develops a fever or other indicators of infection, bacteremia may not be far off.

INS has identified the primary reference for the change in recommendations to be a meta-analysis of five trials that showed changing the catheter every three days did not reduce the risk of infection.[5] Another review of seven trials showed no evidence to support changing catheters every 72 to 96 hours.[6] In contrast, a survey conducted by Collignon found that in 90% of all PVC sepsis cases, the catheter was in place for three days or more.[7] Furthermore, it has been observed that there is a linear relationship between *in situ* time and PVCRI complications.[8] Trinh et al., studying PVC-related *Staphylococcus aureus* bacteremia, noted the impact of prolonged dwell time on infection development and stressed that PVC-related bacteremia due to *S. aureus* is an unrecognized complication of PVC use.[9] Maki points out that "although abandoning scheduled replacements may not greatly increase the incidence of infusion phlebitis and infiltration in the average hospital that currently replaces peripheral catheters at 72 hour intervals, it would probably increase the risk of catheter related bacteremia with *Staphylococcus aureus*."[10]

The evidence is conflicted related to how to best manage PVC dwell time, and recommendations are being based on that evidence. Two essential questions remain regarding management of PVCs in the acute care adult population:

1. From an infection prevention standpoint, is it safe to leave a PVC in place until there is a clinical indication for removal?

---

* "Category IB. Strongly recommended for implementation and supported by some experimental, clinical, or epidemiologic studies and a strong theoretical rationale; or an accepted practice (e.g., aseptic technique) supported by limited evidence."[1]

† "Unresolved issue. Represents an unresolved issue for which evidence is insufficient or no consensus regarding efficacy exists."[1]

©2014 Pennsylvania Patient Safety Authority

2. Is there a time in hours that a PVC could be re-sited that would likely reduce the risk of PVCRI?

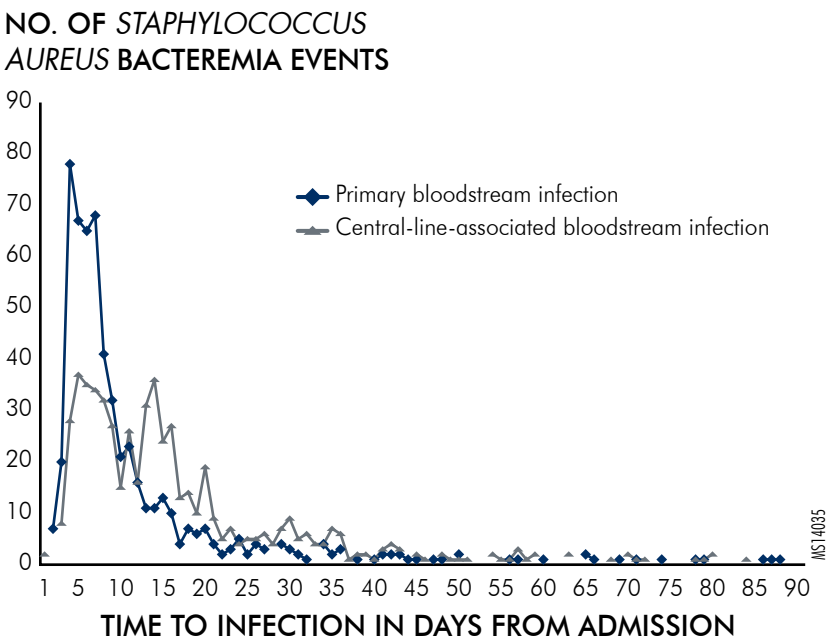
METHODS

Health Protection Scotland places PVCRI as the third leading cause of device-related bacteremia.[11] In the United States, almost 200 million PVCs are used each year.[12] Due to the high utilization of peripheral catheters in the inpatient setting, complications like bacteremia may contribute substantially to hospital-acquired infections. Furthermore, it has been demonstrated that PVCRI related to *S. aureus* may be as high as 23.5% and that 45.2% of PVCRIs related to *S. aureus* were found in patients for which the PVC had a dwell time of ≥4 days.[13]

Because of the probable impact of PVCRI and PVC use as highlighted in previous sections, Pennsylvania Patient Safety Authority analysts searched the National Healthcare Safety Network (NHSN) for primary bloodstream infection (BSI) data for the years of 2011 and 2012. Primary BSI is an infection of the bloodstream not related to an infection at another site. One of the challenges with identifying evidence for a PVCRI aggregate is that there is currently no way to isolate an event related to a peripheral catheter within the NHSN database. Therefore, unlike central venous catheters, there needs to be other levels of epidemiological evidence applied in order to identify the perceived occurrence of PVCRI. When looking specifically at *S. aureus,* there seems to be external validity in assuming a relationship between *S. aureus* and PVC infection prevalence evidenced by similar findings in the literature related to *S. aureus* and PVC infection development.[7-9] *S. aureus* is the second most common cause of hospital-acquired BSI, and it has been estimated that as many as 76% of hospitalized adult inpatients have a PVC.[9,14]

In order to understand the impact of PVCRI on Pennsylvania patients, Authority analysts queried the Pennsylvania Patient Safety Reporting System (PA-PSRS) database for events associated with PVC use. The search was conducted for calendar year 2012. Examples from the PA-PSRS database related to that search are presented in the following section.

Figure. Time to Infection: *Staphylococcus aureus* Primary Bloodstream Infections and Central-Line-Associated Bloodstream Infections in Pennsylvania Acute Care Facilities, 2011 to 2012



Data as identified from the Centers for Disease Control and Prevention's National Healthcare Safety Network.

RESULTS

Events of primary BSI (those not related to a central line) from NHSN for 2011 and 2012 in Pennsylvania (N = 1,890) were analyzed and categorized by time from presumed catheter insertion (typically on admission) to infection and type of pathogen. The Figure focuses on *S. aureus* bacteremia and shows an impressive increase in primary *S. aureus* BSI after the 72-hour mark. The data aligns with published studies on PVCRI prevalence at and beyond the 72-hour mark.[7-9]

The Table lists the top 10 pathogens causing bacteremia for primary BSI and central-line-associated infection (CLABSI). Of particular interest are the percentages of reported *S. aureus* bacteremia in both populations of patients, likely due to the similarities of how both device types enter the skin and bloodstream, insertion and maintenance procedures, and the potential for endogenous colonization of patients. Furthermore, in the primary BSI population, the percentage of *Escherichia coli* may implicate poor hand hygiene and/or general hygiene of the patient, translocation of bacteria, catheter contamination, and unidentified source infections being confirmed early and reported as primary BSIs.

©2014 Pennsylvania Patient Safety Authority

Table. Top 10 Pathogens Causing Primary BSI and CLABSI in Pennsylvania, 2011 to 2012

PRIMARY BLOODSTREAM INFECTION (BSI)		
PATHOGEN	**NO. OF INFECTIONS**	**PERCENTAGE**
Staphylococcus aureus	584	30.9
Escherichia coli	197	10.4
Klebsiella pneumoniae	140	7.4
Enterococcus faecalis	130	6.9
Enterococcus faecium	81	4.3
Pseudomonas aeruginosa	72	3.8
Candida albicans	63	3.3
Coagulase-negative staphylococci	46	2.4
Enterobacter cloacae	45	2.4
Serratia marcescens	43	2.3
CENTRAL-LINE-ASSOCIATED BLOODSTREAM INFECTION (CLABSI)		
PATHOGEN	**NO. OF INFECTIONS**	**PERCENTAGE**
Staphylococcus aureus	598	19.9
Klebsiella pneumoniae	250	8.3
Enterococcus faecalis	247	8.2
Coagulase-negative staphylococci	197	6.5
Candida albicans	193	6.4
Staphylococcus epidermidis	159	5.3
Enterococcus faecium	152	5.1
Pseudomonas aeruginosa	147	4.9
Escherichia coli	125	4.2
Enterobacter cloacae	86	2.9

Note: Data as identified from the Centers for Disease Control and Prevention's National Healthcare Safety Network.

The PA-PSRS database houses Serious Event and Incident reports; however, within those event reports are narratives authored by the individual reporter, usually a bedside clinician. The narratives are plainly worded accounts of what the clinician or the patient had experienced. Following are excerpts from actual PA-PSRS event report narratives related to complications of PVCRI:

> *A patient was admitted with a diagnosis of inflammatory bowel disease and an IV [intravenous] catheter inserted into the left antecubital. Routine restart of the IV line was waived per physician order. The patient developed a fever. The IV line was discontinued, and the catheter tip was cultured and was positive.*
>
> *Blood cultures were identified with* Staphylococcus epidermidis *and* Staphylococcus aureus. *Phlebitis was noted on left forearm from old IV catheters. Forearm IV line was in for five days; [when it was] removed, [there were] no signs of infection at that time. The next day, the site was red and had a small pocket of pus. Site and blood cultures were positive for staph.*
>
> *A patient was admitted with acute MI [myocardial infarction]. Cardiac catheterization was performed. The patient with chronic ESRD [end-stage renal disease] was on hemodialysis. The patient developed respiratory failure prior to cardiac catheterization and was febrile with positive blood cultures. [The patient was] diagnosed with peripheral IV catheter bacteremia.*
>
> *A patient was admitted with an A-Fib [atrial fibrillation]. IV catheter #18 inserted at left antecubital space. Four days later, the site was found to be red and tender. The IV line was removed. The patient was started on antibiotics. The IV catheter tip was sent for culture. The culture tip and blood were positive for* Staphylococcus sp. *Patient was for pacemaker inwsertion. The infectious-disease physician was consulted. Antibiotics were started, and pacemaker insertion was put on hold for three days.*

DISCUSSION

The primary BSI criteria within NHSN does not specifically ask if the infection is a result of a PVC (unlike CLABSI); therefore, this is a limitation in the data set that was used, meaning that it is unclear exactly how many PVCRIs are represented by the primary BSI events. As described herein, when the epidemiologic links of time to infection and the pathogen profile are combined with the definition of primary BSI, and when the sheer prevalence of the PVC is considered, it is likely that the majority of acute care adult primary BSIs in Pennsylvania are due to PVCRI.

(continued on page 34)

©2014 Pennsylvania Patient Safety Authority

INFECTION REDUCTION STRATEGIES FOR THE ADULT PATIENT WITH A PERIPHERAL INTRAVENOUS CATHETER

Selected Strategies for Insertion

Evaluate the patient's care plan and condition in order to select the appropriate intravenous access device.

Avoid placing catheters in the antecubital space.

Use sterile tape or sterile securement devices for catheter securement.

Place a sterile occlusive dressing as soon as possible after establishing intravenous access.

Train and credential those staff who are responsible for establishing intravenous access.

Consider the use of an insertion checklist.

Use an intravenous start kit that contains at least all supplies necessary for proper skin preparation, catheter securement, and insertion site dressing, as well as personal protective equipment for staff.

Consider a product containing chlorhexidine-alcohol for skin preparation prior to insertion.

Flush catheters postinsertion until clear.

Infection Risk Reduction

Selected Strategies for Maintenance

Remove catheters that were placed in suboptimal conditions.

Limit dwell time to 72 hours in adults.

Label dressing with insertion date to establish dwell time start.

Avoid traction on intravenous tubing.

Review catheter necessity daily.

Remove unneeded or unused catheters.

Consider a product containing chlorhexidine-alcohol for scrubbing the hubs of intravenous tubing and catheter ports prior to access.

Scrub hubs and ports for at least 10 to 15 seconds prior to access.

Access the catheter function and the insertion site/vein per Infusion Nurses Society guidelines.

Train and credential those staff who are responsible for intravenous catheter care and maintenance.

Ensure intravenous tubing and fluid or medication bags or bottles are changed per Centers for Disease Control and Prevention or manufacturer's guidelines.

Label tubing, bags, or bottles to ensure proper changing intervals.

Create workflows or practices of care that limit translocation of pathogens to the intravenous catheter or tubing.

Notes

Health Protection Scotland. National Services Scotland. Preventing infections when inserting and maintaining a PVC [online]. 2013 Oct [cited 2013 Nov 20]. http://www.documents.hps.scot.nhs.uk/hai/infection-control/bundles/pvc/pvc-bundle-v1.pdf

Hirshmann H, Fux L, Podusel J, et al. The influence of hand hygiene prior to insertion of peripheral venous catheters on the frequency of complications. *J Hosp Infect* 2001 Nov;49(3):199-23.

Infusion Nurses Society. Infusion nursing standards of practice. *J Infus Nurs* 2011;34(1 Suppl):S1-S110.

Infusion Nurses Society. INS position paper: recommendations for frequency of assessment of the short peripheral catheter site [online]. 2012 [cited 2013 Oct 29]. http://www.ins1.org/files/public/07_05_12_Assessment_Position_Paper_BOD_FINAL.pdf

Maki DG, Kluger DM, Crnich CJ. The risk of bloodstream infection in adults with different intravascular devices: a systematic review of 200 published prospective studies. *Mayo Clin Proc* 2006;81:1159-71.

National Services Scotland. Protection Scotland Infection Control Team. Care bundles for preventing infections when inserting and maintaining a peripheral vascular catheter (PVC) [online]. [cited 2013 Nov 20]. http://www.hps.scot.nhs.uk/haiic/ic/PVCCareBundle.aspx

O'Grady NP, Alexander M, Burns LA, et al. Guidelines for the prevention of intravascular-related Infections, 2011 [online]. 2011 [cited 2013 Nov 1]. http://www.cdc.gov/hicpac/pdf/guidelines/bsi-guidelines-2011.pdf

Ryder M, James G, Pulchini E, et al. Differences in bacterial transfer and fluid path colonization through needlefree connector-catheter systems in vitro [online]. 2011 Apr 29 [cited 2013 Nov 20]. http://www.icumed.com/media/27848/m1-1303_m.ryder_ins_2011_poster_symmary_rev.02.pdf

Trinth TT, Chan P A, Edwards O, et al. Peripheral venous catheter-related *Staphylococcus aureus* bacteremia. *Infect Control Hosp Epidemol* 2011 Jun;32(6):579-83.

MS14040

©2014 Pennsylvania Patient Safety Authority

(continued from page 32)

From an infection control standpoint, waiting for a clinical indication of infection to re-site may place the patient in a position for the development of bacteremia due to prolonged dwell times. Re-siting at 72 hours may reduce PVCRI risk, and a comprehensive approach to PVC care (including use of best practices for insertion, maintenance, and monitoring) is fundamental for the development of a PVC care program.[1,2,15] Furthermore, re-siting of PVCs inserted in the field or emergency department, avoiding the antecubital fossa, and limiting dwell time (daily review of necessity) may help prevent PVCRI even further.[9] Refer to "Infection Reduction Strategies for the Adult Patient with a Peripheral Intravenous Catheter" for selected strategies for the reduction of risk for infection due to PVC use in the adult population.

It has been suggested that re-siting when clinically indicated versus scheduled re-siting of PVCs may result in a cost savings due to equipment and device cost and professional time spent during the insertion process.[6] For example, an acute care hospital admitting 10,000 patients per year with 76%[9] of those patients receiving a PVC (N = 7,600) at a cost of $40.00 per insertion with an average venipuncture proficiency rate of 2.18 would result in an estimated cost of $87.20 (2.18 x $40.00) per patient in operational costs of inserting one PVC.[16] This would result in an annual cost of $662,720 for initial insertion for that hospital. However, the average length of stay for a patient in acute care in 2011 was 5.4 days,[17] meaning the average patient has the potential to receive two PVCs following the 72-hour scheduled replacement rule. Consequently, the proposed savings from re-siting when clinically indicated would theoretically avoid the second PVC insertion associated with re-siting at 72 hours based on the average length of stay, which is the basis for the cost savings. However, the reimbursement based on Current Procedural Terminology code 36000 defined as "insertion of needle or catheter into a vein" results in an estimated charge of $125.00 and an estimated reimbursement of $87.50 per insertion.[18] The previously referenced example hospital could bill $950,000 and expect $665,000 in reimbursement. Essentially, the cost of inserting a PVC is a break-even scenario (if the hospital had a venipuncture proficiency rate <2.18, it could save money). If the same hospital had experienced a single PVCRI related to *S. aureus* because of increased dwell time, treatment costs could conservatively reach $19,212 to $26,424.[19] The argument of cost savings related to abandoning scheduled replacement of PVCs does not add up.

CONCLUSION

Events reported by Pennsylvania healthcare facilities suggests that *facilities may want to conduct focused surveillance for PVCRI* in order to consider the practice of re-siting peripheral catheters in adult patients every 72 hours, as opposed to re-siting when clinically indicated. The Authority proposes, in the absence of a true NHSN data field for PVCRI identification, that the number of primary *S. aureus* BSIs can be a surrogate for estimation of PVCRI in the adult acute care population. For the benefit of future research and identification of PVCRI nationally, it would be helpful if NHSN would develop criteria that specifically asks for the relationship between hospital-acquired bacteremia development and short PVC use.

Furthermore, national metrics are needed to allow for surveillance of best practices related to PVC insertion and maintenance. When there is related national rate surveillance data that is adequately captured and combined with best-practice compliance data, then it will be possible to make decisions related to increasing PVC dwell time safely. Until then, the data, at least in Pennsylvania, seems to indicate that patients are at risk for PVC-related bacteremia after a PVC is in place past the 72-hour mark.

Acknowledgments

Edward Finley, BS, data analyst, Pennsylvania Patient Safety Authority, contributed to data acquisition and validity in this article.

NOTES

1. Centers for Disease Control and Prevention. Guidelines for the prevention of intravascular-related infections, 2011 [online]. 2011 [cited 2013 Nov 1] http://www.cdc.gov/hicpac/pdf/guidelines/bsi-guidelines-2011.pdf
2. Infusion Nurses Society. Infusion nursing standards of practice. *J Infus Nurs* 2011;34(1 Suppl):S1-S110.
3. Infusion Nurses Society. Infusion nursing standards of practice. *J Infus Nurs* 2006 Jan-Feb;29(1 Suppl):S1-92.
4. Infusion Nurses Society. INS position paper: recommendations for frequency of assessment of the short peripheral catheter site [online]. [cited 2013 Oct 29]. http://www.ins1.org/files/public/07_05_12_Assessment_Position_Paper_BOD_FINAL.pdf
5. Webster J, Osborne S, Rickard CM, et al. Clinically-indicated replacement versus routine replacement of peripheral venous catheters. *Cochrane Database Syst Rev* 2010 Mar 17;(3):CD007798.
6. Webster J, Osborne S, Rickard CM, et al. Clinically-indicated replacement versus routine replacement of peripheral venous catheters. *Cochrane Database Syst Rev* 2013 Apr 30;4:CD007798.
7. Collignon PJ. Intravascular catheter associated sepsis: a common problem. *Med J Aust* 1994 Sep 19;161(6):374-8.
8. Hirshmann H, Fux L, Podusel J, et al. The influence of hand hygiene prior to insertion of peripheral venous catheters on the frequency of complications. *J Hosp Infect* 2001 Nov;49(3):199-203.
9. Trinh TT, Chan PA, Edwards O, et al. Peripheral venous catheter-related *Staphylococcus aureus* bacteremia. *Infect Control Hosp Epidemol* 2011 Jun;32(6):579-83.

©2014 Pennsylvania Patient Safety Authority

10. Maki DG. Improving the safety of peripheral intravenous catheters. *BMJ* 2008 Jul 8;337:a630.
11. National Services Scotland. Health Protection Scotland Infection Control Team. Care bundles for preventing infections when inserting and maintaining a peripheral vascular catheter (PVC) [online]. [cited 2013 Nov 20]. http://www.hps.scot.nhs.uk/haiic/ic/PVCCareBundle.aspx
12. Maki DG, Kluger DM, Crnich CJ. The risk of bloodstream infection in adults with different intravascular devices: a systematic review of 200 published prospective studies. *Mayo Clin Proc* 2006 Sep;81(9):1159-71.
13. Stuart RL, Cameron DR, Scott C, et al. Peripheral intravenous catheter-associated *Staphylococcus aureus* bacteremia: more than 5 years of prospective data from two tertiary health services. *Med J Aust* 2013 Jun 3;198(10):551-3.
14. Hidron AI, Edwards JR, Patel J, et al.; National Healthcare Safety Network Team; Participating National Healthcare Safety Network Facilities. NHSN annual update: antimicrobial-resistant pathogens associated with healthcare-associated infections: annual summary of the data reported to the National Healthcare Safety Network at the Centers for Disease Control and Prevention, 2006-2007. *Infect Control Hosp Epidemiol* 2008 Nov;29(11):996-1011.
15. National Services Scotland. Preventing infections when inserting and maintaining a PVC [online]. 2013 Oct [cited 2013 Nov 20]. http://www.documents.hps.scot.nhs.uk/hai/infection-control/bundles/pvc/pvc-bundle-v1.pdf
16. Hadaway L. Development of an infusion alliance. *J Infus Nurs* 2010 Sep-Oct;33(5):278-90.
17. Organisation for Economic Co-operation and Development (OECD). Average length of stay: acute care. In: OECD. Health: key tables from OECD [online]. 2013 Oct 11 [cited 2014 Jan 8]. http://www.oecd-ilibrary.org/content/table/l-o-s-acutecare-table-en
18. FAIR Health, Inc. FH medical cost lookup [online]. [cited 2014 Jan 8]. http://www.fairhealthconsumer.org/medicalcostlookup/cost.aspx
19. Cosgrove SE, Qi Y, Kaye KS, et al. The impact of methicillin resistance in *Staphylococcus aureus* bacteremia on patient outcomes: mortality, length of stay, and hospital charges. *Infect Control Hosp Epidemiol* 2005 Feb;26(2);166-74.

©2014 Pennsylvania Patient Safety Authority

Quarterly Update on Wrong-Site Surgery: Queries and Responses

John R. Clarke, MD
Editor Emeritus, Pennsylvania Patient Safety Advisory
Clinical Director, Pennsylvania Patient Safety Authority
Professor of Surgery, Drexel University

This update focuses on near-miss reports, which are bellwethers to potential wrong-site events, plus consent problems caused by electronic health records (EHRs). Also, do wrong-site blocks correlate with wrong-site operations? In addition, the article addresses two queries to the Authority's Preventing Wrong-Site Surgery Program, one with a suggestion for possibly preventing wrong-side ureteral stenting.

Ten wrong-site procedures were reported in Pennsylvania operating suites this past quarter.

Near-miss reports continue to demonstrate both areas of continued weakness and the effectiveness of the evidence-based best practices to prevent wrong-site surgery.[1,2]

There continue to be failures to reconcile documents during the preoperative verification step of the Universal Protocol, leaving them to be caught during the time-out, if at all:

> *It was discovered during the time-out that the operative consent did not match the reservation, schedule, and history and physical, which was for [surgery on the] left ring finger. The consent stated "index finger." The surgeon spoke with [the patient's] wife; the consent was corrected.*

However, there were also successes in identifying and reconciling discrepancies even before the patient came to the preoperative holding area:

> *The surgery scheduling sheet was sent to the scheduler without correct information. The procedure failed to state fifth metacarpal on scheduling sheet. The revised scheduling sheet was sent to scheduler with corrected information. Surgery schedule corrected.*

> *The incorrect patient's paperwork was faxed to the hospital from the physician's office.*

> *The preprocedure paperwork all state left side for cystoscopy and removal of left ureteral stent. However, the patient states right side, and the surgical report from the original case support right side. The error was caught in pretesting.*

> *Upon reviewing patient's surgery chart, the consent and H&P [history and physical] state left knee. The scheduling sheet and schedule state right knee. The patient [was said to have] stated right knee when scheduling the surgery. Patient [now] states left knee. The call was made [by hospital reviewer] to PAT [preadmission testing] to verify site. A phone call to the patient revealed that the left knee is the correct site of surgery. All paperwork was corrected to reflect correct site of surgery.*

An unusual problem with reconciling the documents was successfully resolved:

> *An infant was scheduled for surgery. The name on the surgical consent did not match the name on the anesthesia consent, OR [operating room] schedule, or chart. The date of birth and MRN [medical record number] matched documents. The surgeon, anesthesia providers, and nurse manager were notified. The mother confirmed that the patient's name was changed after consent was done in clinic and name on [surgical] consent was patient's name prior to name change.*

There continue to be problems with site markings, including not making them, not talking to the patient before making them, and not reconciling the mark with the documents:

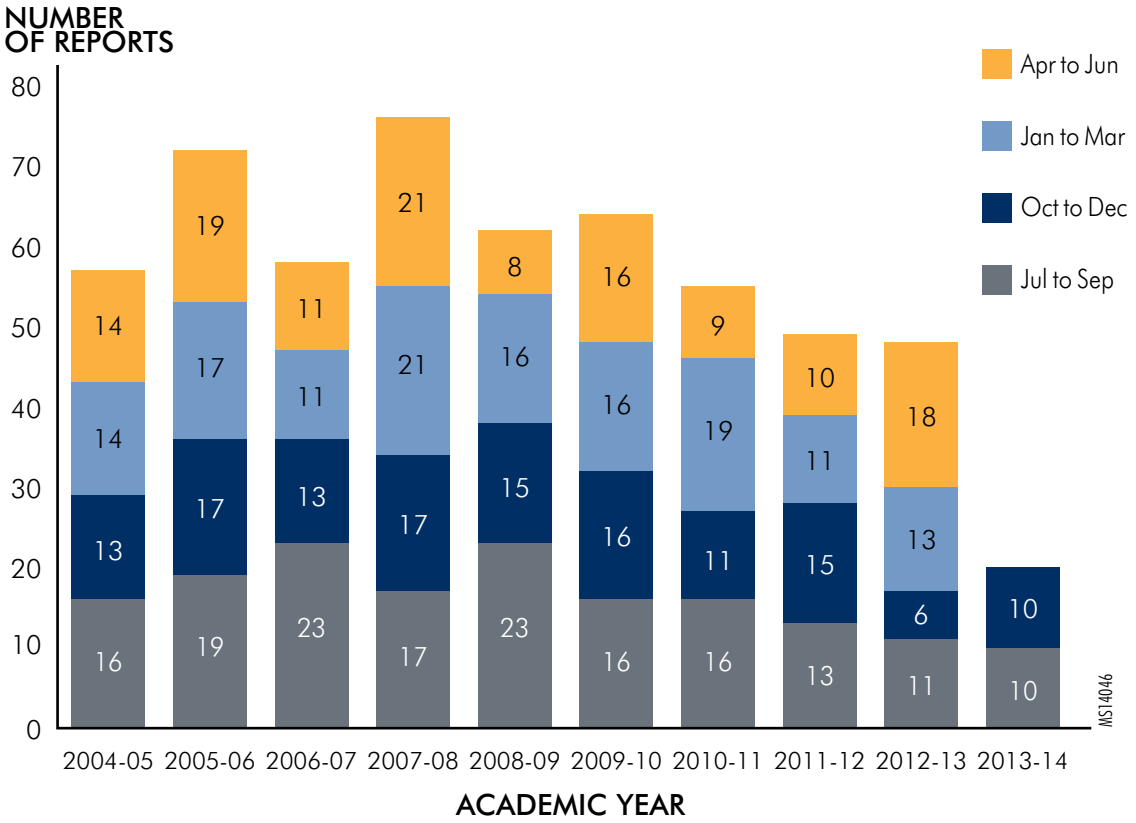
Scan this code with your mobile device's QR reader to access the Authority's toolkit on this topic.

> *The patient was brought to the OR without the surgical site being marked for a right carotid endarterectomy. The charge nurse and surgeon were notified. Site [was then] marked prior to surgery.*

> *A patient was brought into the room without being marked. The case was scheduled as exploratory laparotomy, possible gastric resection, and possible biopsy of left cervical mass. When signing the patient in, the patient stated she was having left cervical mass removed as second part of procedure and did not have a mark. When brought to*

©2014 Pennsylvania Patient Safety Authority

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



anesthesia [provider's] attention, he said he must have missed that on consent and didn't know about cervical part. Doctor was called into room and spoke to patient and marked her before any sedation was given in the room.

Doctor approached patient and put first initial on patient's right knee. At that point, he was told that was not his patient. Cleaned the initial off of patient's right knee.

The patient entered room and, while nurse was conducting the interview for the procedure, nurse asked the patient what eye we were operating on. She responded "left." The right eye was the eye marked for the procedure. Doctor notified, and the left eye was marked.

During a time-out before the start of the procedure, it was discovered that the patient was initially marked on the left side and the consent was for the right side. Everything was stopped at that moment, and the patient was re-marked on the right side to agree with the consent.

When doing the debriefing in the OR, it was noted that the patient was marked on both sides of chest. The patient was scheduled for a left breast biopsy. . . . The consent did state that we were doing left side.

One of the purposes of the mark is to be a constant reminder of the surgical site during the preparation for surgery. This OR team was able to identify a wrong-site problem before the final time-out:

> *Knee holder and tourniquet placed on right knee after anesthesia induction. Patient consented for left knee. Tourniquet and knee holder taken off right knee and placed on left knee as consented.*

The wrong patient or patient chart continues to be delivered to the waiting OR:

> *Arrived for block with incorrect patient information on the chart. The stickers and pretesting info were correct, but the pre-op packet was for another patient who was also having surgery today. All incorrect papers removed from chart. New packet printed and placed on chart.*

©2014 Pennsylvania Patient Safety Authority

Patient A was called to go to the OR. Patient A's chart was taken with patient B to the holding area by transporter. On arrival to holding, doctor stated that this was not his patient. Transporter did not check patient ID [identification] band prior to transporting patient to holding area. [Then] patient A brought into OR for surgery. Upon interview with patient, it was discovered that the wrong patient had been brought into the room. The correct chart for the patient assigned to have surgery, patient B, accompanied the wrong patient, patient A. Patient A was taken back to the pre-op holding area. The time-out procedure caught the problem immediately.

Other gratifying reports indicate that OR team members are speaking up during time-outs, preventing wrong-site surgery, including one resolution of confusion between two procedures, weeks apart, for bilateral disease; one major save from a wrong-knee replacement; and one unique save from the wrong anesthetic procedure:

Surgeon marked left eye. Consent and surgery schedule both stated right eye. During time-out, RN [registered nurse] alerted surgeon that left eye was marked, but patient consented for right eye. Surgeon examined patient's eyes and agreed that surgery was for right eye.

Patient arrived in OR for scheduled left saphenous vein ablation, but upon interview, stated she was having her right leg worked on. Patient stated that her right leg had been marked preoperatively. Patient stated that she was having both legs operated on but three weeks apart. Anesthesia noted that the patient had been scheduled for a right procedure and a left procedure. Consent in patient chart noted left procedure. Nursing staff stopped the procedure until confirmation was obtained that patient was to have left procedure today and right procedure three weeks later. Patient was re-marked in the OR, and left procedure was completed without further incident.

Patient processed through outpatient surgery department. All paperwork correctly stated left total knee arthroplasty. Consent signed, and left knee marked per policy. Patient taken to OR. Surgeon started prepping the right knee. Nurse started the time-out process, and error caught before drapes applied. Correct knee prepped, and procedure performed without incident.

Patient was a scheduled cesarean section with scheduled general anesthesia due to her history (instead of the usual spinal anesthesia). Anesthesia was preparing to inject the anesthetic agent [with a spinal] to anesthetize the patient for surgery when a staff member spoke up.

Again, another wrong-side labeling of a specimen, a previously discussed problem:[3]

Specimen received in cytology with incorrect side labeled. Received labeled as "left" renal washing when it was from the "right."

WRONG-SITE SURGERIES RELATED TO HEALTH INFORMATION TECHNOLOGY

Although health information technology, such as EHR systems, is advocated to decrease medical errors, EHR systems can also create problems. Based on discussions with facilities, it was determined that problems involving consents in EHR systems were present in the following two cases:

Patient was consented for C3-4, 4-5 discectomy and iliac crest bone graft. Patient changed mind about bone graft and was re-consented [three weeks] later for C3-4, 4-5 discectomy with fusion and allograft. Patient presented [two weeks after that] for surgery and received an iliac crest bone graft rather than the allograft he requested.

Patient had prior surgery on right knee. Consented for surgery on left knee. Called up [in EHR] old consent [for right knee] by mistake during time-out.

In the first event, the EHR system did not have a mechanism for flagging incorrect information in the chart that had been superseded by newer information. In the second event, the availability of all the medical records facilitated access to outdated information from prior visits.

Again, redundancy with verification using multiple documents and the patient's understanding is key.[1]

THE RELATIONSHIP BETWEEN WRONG-SITE ANESTHESIA BLOCKS AND WRONG-SITE SURGERY

The 551 wrong-site procedures reported to have occurred between July 1, 2004, and September 30, 2013, were analyzed to investigate the relationship between the 116 wrong-site anesthesia blocks and the 281 wrong-site surgical procedures; excluded were 60 pain procedures and 94 procedures requiring intraoperative site verification (64 vertebral procedures, 29 ureteral procedures, and 1 rib resection). The 551 procedures were distributed among 192 facilities. The number of wrong-site anesthesia blocks ranged from 0 to 5, and the number of wrong-site surgical procedures ranged from 0 to 14 over the 9.25 years. There were more wrong-site anesthesia blocks than wrong-site surgical procedures in 28 facilities, with 7 facilities having 2 more wrong-site anesthesia blocks and 1 facility having 4 more. However, the correlation between wrong-site anesthesia blocks and wrong-site surgical procedures was highly significant ($R = 0.48$, $t = 7.46$, $p < 0.001$), with an R^2 of 0.23, suggesting that 23% of the prediction of the number of wrong-site blocks could be made using the number of wrong-site surgical procedures. The conclusion is that the tendency to do wrong-site aesthesia blocks is not independent of the general tendency to do wrong-site procedures in the operating suite. The findings suggest that some reasons for wrong-site procedures are systematic and some may be specific to a discipline.

QUERIES ABOUT UROLOGICAL PROCEDURES

Lithotripsy (Prompted by an E-mail Query from a Facility)

An e-mail query from a facility asked, "Do you know the best practice for lithotripsy

©2014 Pennsylvania Patient Safety Authority

site marking?" Background for the query was then provided: "I had a discussion with one urologist, and he identifies the stone on x-ray and is wondering why he needs to mark a site. He says if there is no stone, he does not do the lithotripsy no matter what the site marking is. My answer to date is that site marking is not only for laterality but also for correct procedure (i.e., we could take the wrong patient to the OR)."

There are 1 external and 2 laser wrong-site lithotripsy events in the database versus 18 other wrong-side ureteral stenting procedures, 12 of which were on the side other than the one planned. The other six were planned for the wrong side.

> *Patient was on the OR schedule for a right extracorporeal shock-wave lithotripsy. He has renal stone on both sides. Brought to the OR. Sign-in procedure was followed. Time-out was [done]. Everyone agreed on the right side. Patient was not positioned in any manner that emphasized the laterality. Circulator and anesthesiologist were at the head of the table. The litho tech and the surgeon were at the litho console. They were talking, but circulator did not hear the conversation. Surgeon was viewing real-time images on litho screen with tech. Procedure was completed without event. Circulating nurse and anesthesiologist took patient to the recovery room. The surgeon was in the recovery room talking to the recovery room nurse about the case. The circulator overheard him say we did his left side. She said, "You mean right side," and he said, "No, left." Nurse reminded him that he had signed off on the right. Patient was rolled, and redness of skin noted over left side of back, confirming left side was done. Nurse said she could not hear the discussion between the surgeon and litho tech. Litho tech did admit he knew that left was agreed upon, but he did not alert anyone. . . . It appears initially that only the litho tech . . . knew that the doctor was doing the left side instead of the right. The tech did not make anyone else on the OR team aware of this, but he clearly documented left side on his documentation form postprocedure.*
>
> *Case was scheduled as a right ureteroscopy, laser lithotripsy, and ureteral stent. Consent was signed consistent with scheduled case. Surgeon made aware that CT [computed tomography] scan showed left renal calculi. Surgeon decided to proceed with scheduled case. Right side was done, but no stone was found. Then, the surgeon decided that the other side should have been done. [The surgeon] removed the right ureteral stent and performed left ureteroscopy. No stones were found on left either.*
>
> *Procedure consented for right ureteroscopy and lithotripsy. No stone was seen in right ureter. Stone was seen in left ureter. The left ureteroscopy and laser lithotripsy were performed. The surgeon called the office to review ultrasound results, which reported a large stone in the patient's left ureter.*

A site mark might have benefited the first patient, who was undergoing an external lithotripsy. Apparently, lapses can occur in reconciling the imaging studies and the scheduled procedure. The e-mail correspondent is correct about the potential for the mark to potentially flag that the patient is the wrong patient or that a procedure is the wrong procedure.

Possible Aid for Preventing Wrong-Side Ureteral Stents

A query was received from Linda Waddell, RN, MSN, CEN, an improvement specialist at the Donald D. Wolff, Jr. Center for Quality Improvement and Innovation at the University of Pittsburgh Medical Center and a member of the Authority's Editorial Advisory Board for the *Pennsylvania Patient Safety Advisory*: "A unit in our facility would like to use an EKG [electrocardiogram] electrode to radiographically mark the physician's initials on the skin for reference during procedures under fluoroscopy to avoid doing the procedures at the wrong site. Does this seem reasonable?"

Facilities may wish to consider placing a radiopaque mark on the surgeon's preoperative site mark to make the mark visible during intraoperative verification of the ureteral stent with imaging studies. Twelve of the previously mentioned 18 wrong-site ureteral stent insertions (two-thirds) might have benefited from radiopaque marking of the surgeon's preoperative site mark, assuming the urologists follow the Authority's suggestion for intraoperative verification of the stent placement before the patient leaves the OR.[1,2] The Authority suggests that the radiopaque marker be unambiguous. An EKG electrode could be appropriate, but only if the patient is not being monitored using multiple other EKG electrodes that could be confused with the radiopaque site marker. Alternative radiopaque markers could be recommended by the department of radiology, if necessary. The Authority would appreciate any feedback regarding an experience with such a strategy to prevent wrong-side ureteral stenting.

NOTES

1. Pennsylvania Patient Safety Authority. Principles for reliable performance of correct-site surgery [online]. 2012 [cited 2014 Jan 22]. http://patientsafetyauthority.org/EducationalTools/PatientSafetyTools/PWSS/Documents/principles.pdf
2. Quarterly update: the evidence base for best practices for preventing wrong-site surgery. Pa Patient Saf Advis [online] 2010 Dec [cited 2014 Jan 22]. http://patientsafetyauthority.org/ADVISORIES/AdvisoryLibrary/2010/dec7(4)/Pages/151.aspx
3. Bixenstine PJ, Zarbo RJ, Holzmueller CG, et al. Developing and pilot testing practical measures of preanalytic surgical specimen identification defects. *Am J Med Qual* 2013 Jul-Aug;28(4):308-14.

©2014 Pennsylvania Patient Safety Authority

Commitment to Patient Safety Recognized in Pennsylvania

Michael C. Doering, MBA
Executive Director
Pennsylvania Patient Safety Authority

The Pennsylvania Patient Safety Authority held its inaugural "I Am Patient Safety" poster contest during the last several months to highlight individuals and groups within Pennsylvania's healthcare facilities who have made a personal commitment to patient safety. The Authority plans to hold the recognition poster contest each year, with posters delivered in time for Patient Safety Awareness Week. The contest recognizes those who have made the personal commitment to patient safety and helps patient safety officers promote what progress is being made within their facility to improve patient safety. As one of the judges for the competition, I am impressed by the number of patient safety improvements individuals and groups are making throughout Pennsylvania, and I want to thank everyone who made a submission for the contest. I appreciate the time taken to tell us what strides you are making to improve patient safety in Pennsylvania.

Authority board members and management staff comprised the judging panel. Submissions were judged upon the following criteria: the person or group (1) had a discernible impact on patient safety for one or many patients, (2) demonstrated a personal commitment to patient safety, and (3) demonstrated that a strong patient safety culture is present in the facility. Bonus points were awarded for submissions that demonstrated initiative taken by an individual. Winners received their photo and patient safety efforts highlighted on posters that can be displayed within their facilities. They also received a certificate and an "I Am Patient Safety" recognition pin from the Authority. The individuals and groups recognized for the "I Am Patient Safety" poster contest and their achievements are as follows (in alphabetical order):

Sharon Best, Housekeeper 1, Environmental Services (former employee)
Children's Hospital of Pittsburgh of UPMC

Sharon "knew something was not right" with a patient while she was cleaning his room. Sharon's awareness and immediate action to get help for the patient, who was having a seizure, showed her commitment to patient safety.

Terri Bugnizet, RN, BSN, CEN, CPEN, Emergency Department
Chester County Hospital—Penn Medicine

While Terri was reviewing a medication order for a diabetic patient in the emergency room, she noticed that a physician had incorrectly ordered a one-time dose and type of insulin that could have resulted in a serious medication event and injury to the patient. Thanks to Terri's attention to detail, the patient received the correct type and dose of insulin.

Kelly Crist, Transcriptionist Unit Clerk, Imaging Services
WellSpan Gettysburg Hospital

[Submitted with Kimberly Wolfe] Kelly pointed out to the appropriate staff the correct test results for her patient. Kelly ensured timely and accurate communication of critical test results, which allowed for immediate and necessary treatment of her patient.

Kathy Fowler, MSN, RN, CMSRN, Quality Improvement Project Manager
UPMC St. Margaret

Kathy's commitment to patient safety led to implementation of several process improvements to decrease falls with injury. Kathy facilitated the implementation of the Safe Patient Handling Campaign, which led to a reduction in the number of injuries experienced by staff when handling or moving patients during care activities. Kathy also modified the just culture initiative for UPMC St. Margaret to encourage staff to learn from events occurring in the facility.

Tim McFeely, RN, BSN, NE-BC, Nurse Manager of the Coronary Care Unit
WellSpan York Hospital

As nurse manager of the coronary care unit and chair of the resuscitation review team at WellSpan York Hospital, Tim ensures his team looks at every resuscitation event in

©2014 Pennsylvania Patient Safety Authority

the hospital. He works with his team to dig deep and find every reason why American Heart Association guideline targets are not met. Tim regularly shares best practices with his nursing staff, along with outcomes. Through Tim's leadership, post-cardiac-arrest survival-to-discharge rates improved from 17.2% in 2011 to 31.6% in 2012.

Ann Norwich, CRNP, WellSpan Gettysburg Hospitalist Service
WellSpan Gettysburg Hospital

Ann assumed care of a patient admitted with an altered mental status whose cognitive condition did not improve after treatment for an underlying infection. After hours of research, Ann discovered a significant medication error that occurred on admission and contributed to the patient's altered mental state. The medication error was corrected and reported immediately. During investigation of this event, a previously unknown problem with the electronic medication reconciliation and ordering process was revealed. Without Ann's persistence in trying to understand this patient's situation, this latent error might have gone undiscovered.

Regional Gastroenterology Associates of Lancaster (RGAL)
Patient Safety Committee Team Leaders Jennifer Bean, BSN, RN, Clinical Coordinator and Infection Control; Trudy Chernich, Patient Safety Committee Community Representative; Judy Fry, Health Information Team Leader; Valerie Geyer, MSN, RN, NE-BC, Director of Clinical Services; Denise Jackson, Billing Associate; Linda Leayman, Manager, Patient Relations; Elsie Lunger, LPN, Open Access; Cindy Nichols, Surveillance Coordinator; Connie Ream, Clinical Administrative Assistant; Joan Schaum, RN, Patient Safety Officer; and Christopher Shih, MD

The patient safety committee at the Regional Gastroenterology Associates of Lancaster (RGAL) is comprised of individuals representing various departments from management, endoscopy and office nursing, infection control, and community representation. The RGAL patient safety team worked together and reviewed its patient identification process from the time of registration to discharge through a failure mode and effects analysis, resulting in proper patient identification and consistent labeling of all pathology specimens. Zero errors have been made with specimen mislabeling since this process was implemented.

In 2013, RGAL looked at potential complications for patients with implanted pacemakers and completed several performance improvement projects, including one that resulted in quicker insurance approval turnaround times for patients, which helped reduce the wait times of patients in need of infusions and reduce their out-of-pocket costs. Larger process improvements completed in 2013 included a revision of endoscopy medication management, including drug labeling and coding for look-alike, sound-alike medications. The RGAL staff also made suggestions for improved patient safety that included infection control stations in waiting areas for patients and new chairs for bariatric patient needs.

Maria Stesko, RN, Operating Room
Phoenixville Hospital

While checking medical device items in carts for packaging defects and expiration dates, Maria found several items missing expiration dates. After investigating other reprocessed items in storage, Maria noticed there were others that did not have expiration dates. A call to the company that supplied the items verified that they should have had expiration dates on them as well. All reprocessed items were pulled from the shelves and checked. Also, the company requested the opportunity to do a site visit and review all reprocessed items in the hospital and surgical center for any other items that were missing the expiration information to ensure safety.

Roslyn (Roz) Syrkett, Unit Assistant
Substance Detox/Behavioral Health
Eagleville Hospital

Roz overheard a patient having a distressing phone call with his mother. Once the patient went back into his room, Roz followed him to make sure he was okay. When Roz arrived in the room, the patient was trying to harm himself. Roz calmed the patient down and ensured he did not harm himself.

Kimberly Wolfe, Transcriptionist Unit Clerk, Imaging Services
WellSpan Gettysburg Hospital

[Submitted with Kelly Crist] Kimberly alerted the appropriate staff to the correct test results for her patient. Kimberly ensured timely and accurate critical test results were given to staff, which allowed for immediate and necessary treatment of her patient.

Rachel Wamba Yadrnak, RN, Pediatric Hematology/Oncology
Penn State Hershey Children's Hospital

As one of the founding members of the Chemotherapy Safety Task Force, Rachel led staff within the department and brought a "closed chemotherapy system" to Penn State Hershey Children's Hospital. Through her work, this transition in chemotherapy administration systems has decreased the nurses' exposure and risk of chemotherapy-related spills for over three months. Rachel has also worked for two years to develop and implement an annual chemotherapy competency test to monitor the skills of the nurses on the unit. This competency test helps ensure patient safety by promoting consistency and safety in administration and continued education on different administration techniques.

Thank you, again, to all who participated in the "I Am Patient Safety" poster recognition contest, and join me in congratulating the individuals recognized for their efforts to improve patient safety in Pennsylvania's healthcare facilities. Well done.

©2014 Pennsylvania Patient Safety Authority

Enhancing the Authority's Educational Programs to Promote Patient Safety

Megan Shetterly, RN, MS
Senior Patient Safety Liaison, Education
Pennsylvania Patient Safety Authority

The breadth, depth, and scope of patient safety education programs sponsored by the Pennsylvania Patient Safety Authority are designed to meet the needs of their audiences, including all key stakeholders who have an interest in seeking knowledge that can be applied to enhance patient safety in the delivery of healthcare. Therefore, the programs encompass material that is geared toward those in a variety of roles and responsibilities, from frontline staff to clinicians to executive leadership.

The initial point of contact for integration of learning has historically been those healthcare personnel whose title specifically identifies them as the person spearheading the patient safety program within their respective healthcare organization. The very first offering of the Patient Safety Liaison program was in early 2009 and included basic patient safety education to 15 patient safety officers (PSOs). The full-day curriculum, called Patient Safety Officer Basics, covered the key elements contained in chapters 3 and 4 of the Medical Care Availability and Reduction of Error (Mcare) Act, the role and responsibility of the PSO, the framework and components of a patient safety infrastructure, recognition of patient safety challenges, and identification of key terms associated with patient safety. Later that year, a sequel program called Beyond the Basics was offered. This two-day program allowed attendees to apply learned concepts using simulation, role-play, and group work. Content covered key patient safety concepts and methods such as human factors, human error, root-cause analysis, failure mode and effects analysis, patient disclosure, teamwork and communication, and measuring patient safety.

Today, the Authority is reaching a wider audience with more in-depth education on a variety of patient safety concepts (see the Table). The Authority has expanded from offering an educational event in Pennsylvania every 3 days to every 1.5 days. Education topics include but are not limited to the importance of event reporting, human factors, just culture, TeamSTEPPS, organizational patient safety and patient engagement, identifying and managing risk, disclosure, and achieving and sustaining change. During fiscal year 2012-2013, the Authority educated an average of 18.5 individuals per workday. The Authority continues to offer the Patient Safety Officer Basics and Beyond the Basics courses, but the programs have fundamentally grown to meet the increased educational demands of PSOs, their delegates, and other key stakeholders who have expressed interest in learning more about patient safety.

Within the last fiscal year (2012-2013), the Authority offered a statewide program to hospitals, ambulatory surgical facilities, abortion facilities, and birthing centers that included four half-day sessions. It was called Patient Safety You Design. Topics included enhancing teamwork and communication, implementing a just culture model, conducting root-cause analysis in healthcare, and using data for patient safety. Participants included PSOs, quality directors, risk managers, human resources personnel, and other healthcare leaders. All sessions provided a more in-depth review of the topic and its application to healthcare. Participants learned from group activities and exercises using case studies.

Since the publication of the Institute of Medicine's *To Err Is Human: Building a Safer Health System*, there has been a heightened awareness of the magnitude of medical errors and the urgent need to respond. Programs offered by the Authority provide foundational concepts of patient safety and a base for stakeholders to learn more about how the application of key principles can influence a culture that supports and promote patient safety. It is a transformative journey that moves from a culture of blame and shame, communication silos, hiding errors, workarounds, and business as usual toward a culture of teamwork and communication, just and fair culture, patient

©2014 Pennsylvania Patient Safety Authority

Table. Fiscal Year 2012-2013 Educational Matrix (not including Pennsylvania Hospital Engagement Network educational programs)

EDUCATIONAL PROGRAM	TYPE OF EVENT	NO. OF EVENTS	ATTENDEES	ATTENDEES PER EVENT
Ambulatory surgical facility healthcare-associated infection workshops	Regional	4	200	50
Networking	Regional	11	261	24
Patient Safety Officer Basics	Regional	2	107	54
Patient Safety Officer Beyond the Basics	Regional	2	92	46
Patient Safety You Design*	Statewide	4	138	35
Professional organizations	Statewide	14	714	51
Quality Curriculum for Trustees	Facility-specific	2	69	35
Varied topics†	Facility-specific	111	3,454	31
Webinars	Statewide	2	165	83

* Half-day programs with a more in-depth review of just culture, teamwork and communication, measures and metrics in patient safety, or root-cause analysis.

† One-hour programs on topics such as human factors, why reporting matters, teamwork and communication, culture of safety, just culture, methicillin-resistant *Staphylococcus aureus*, falls prevention, and operating room fire safety.

centeredness, and transparency. Programs are geared toward achieving active learning and high reliability. Since the inception of the Authority's educational programs and continuing to this day, these key elements have been a mainstay of patient safety curriculums.

Recognizing that healthcare workers have multiple demands and time constraints, the Authority understands that it is sometimes difficult to attend in-person sessions. With this in mind, other platforms have been explored to offer programs that individuals can access remotely through the use of our patient safety webinars. In 2013, statewide webinar topics included falls prevention, infection prevention in long-term care, safety for bariatric patients, operating room fire safety, and anesthesia time-outs. Webinars averaged more than 200 attendees per session, and attendees represented multiple disciplines from reporting facility settings (nursing homes, hospitals, ambulatory surgical facilities, abortion facilities, and birthing centers). The Authority will continue to strive to offer these programs at least monthly, if not more often, in response to facility feedback.

The Authority recognizes that learning can be accomplished on a variety of platforms. Webinars meet the learning needs of those unable to attend in-person sessions. However, in-person programs have added value because of face-to-face interactions and the networking that take place among attendees. With this in mind, the Authority continues to offer regional networking sessions and encourage participants to share their wisdom and/or lessons learned in the field. The platform also provides an opportunity for education.

The western regional session has a one-hour educational program called Author in the Room in which Authority staff offer didactic presentations on recent *Pennsylvania Patient Safety Advisory* articles and entertain questions from the audience. Outside of this one-hour educational session, attendees are given the opportunity to openly share and talk about items of interest. These could be conversations about things like recently released standards or regulations and/or how facilities are addressing certain patient safety topics, issues, or barriers within their organization. It is an opportunity for collective sharing, lessons learned, and ideas for new approaches to patient safety issues.

Facility-specific programs are also offered based on requests and/or identified needs. The Authority either develops new topic content or customizes existing topic content in response to facility requests. Some of the existing educational programs provided to healthcare workers have focused on foundational concepts in patient safety or clinically specific topics such as infection prevention, prevention of wrong-site surgery, falls prevention, medication safety, fire safety in the operating room, and others. The Authority also has master trainers who can assist facilities in conducting TeamSTEPPS train-the-trainer programs, as well as staff who are certified in just culture training.

Typically, these programs are geared toward the healthcare worker, clinician, or executive leadership. However, there are some programs offered to patient groups (e.g., senior citizen programs, children's hospital programs). Consumer tips and other pertinent patient safety information are made available to public consumer groups through patient safety fairs and educational programs.

©2014 Pennsylvania Patient Safety Authority

Collective feedback from certain facility types has also generated patient safety programs focused on topics of interest. In response to both formal and informal survey activities with ambulatory surgical facilities, the Authority has offered a succession of programs over the past few years that have focused attention on infection prevention. In 2013, there were 200 ambulatory surgical facility participants who attended four regional, full-day workshops in which infection prevention analysts shared information about safe injection practices, disinfection and sterilization, and overall general infection prevention information.

Clinically oriented students are also key stakeholders in the future delivery of healthcare. Medical and nursing educational programs train students as individuals; yet, as practitioners, they must work in teams within healthcare organizations. Authority-sponsored programs teach the value of teamwork and communication using the TeamSTEPPS model. This is a teamwork program developed by the US Department of Defense Patient Safety Program in collaboration with the Agency for Healthcare Research and Quality that has been scientifically rooted in 20 years of research and lessons from the application of teamwork principles. It has been shown to produce highly effective medical teams that optimize the use of information, people, and resources to achieve the best clinical outcomes for patients. It is a powerful solution to improving patient safety within healthcare organizations.

With patient safety and quality being a key focus of healthcare facilities, there is an ever-increasing demand for boards to have an active role in inspiring even greater performance. The Authority has partnered with other organizations—for example, the Hospital and Healthsystem Association of Pennsylvania and American Hospital Association's Center for Healthcare Governance—to offer a curriculum encompassing interactive learning modules on mission, culture, performance, leadership, strategy, and resources.

The Authority continues to customize programs in order to meet the needs of varying audiences, from board members to frontline staff to patients. Consumer feedback that is received from formal program evaluations, annual survey responses, and other verbalized input is used in program development and planning. It is an important component in evaluating the value of the programs and provides direction for future development of patient safety education.

Further, in order to recognize the participant's commitment to patient safety and provide evidence of their attendance at varied programs, the Authority offers certificates of attendance for Authority-sponsored educational programs. Some national, state, and local licensing boards and professional organizations will grant continuing education credits for attendance when the course outline and certificate of attendance are submitted. Each attendee is encouraged to contact their practice board or organization to find out what is required and if the educational offering meets those requirements.

Making healthcare safer is the challenge for all those working in this industry. It is a complex system made of multiple disciplines providing patient care in a world that is constantly adapting to changes, including complex technology, powerful drugs, and new devices. At its heart are humans providing care to humans. The Authority has learned over the last decade that adverse events overwhelmingly occur not because bad people intentionally hurt patients but rather because the system of healthcare today is so complex that the successful treatment and outcome for each patient depends on a range of factors, not just the competence of an individual healthcare provider. With this knowledge, healthcare systems are challenged to mitigate the risk of patient harm due to medical errors.

Programs to enhance knowledge surrounding patient safety provide the learner with the tools to make effective changes and reduce the likelihood of adverse events. Topic development and offerings are generated in response to the audience needs. Therefore, input and feedback from those attending Authority programs through the use of postevaluation surveys and completion of annual Authority surveys are strongly encouraged. Updates and information about Authority educational program offerings can be accessed by PSOs and their delegates on the calendar of the Patient Safety Knowledge Exchange website (https://psapasskey.org) or by contacting the Authority directly at (717) 346-0469 or at patientsafetyauthority@pa.gov. Full Authority contact information is listed at http://patientsafetyauthority.org/Pages/ContactPatientSafetyAuthorityStaff.aspx.

©2014 Pennsylvania Patient Safety Authority

Healthcare Workers Recognized for Their Personal Commitment to Patient Safety Through "I AM PATIENT SAFETY" Poster Contest

Regional Gastroenterology Associates of Lancaster (RGAL),
Patient Safety Committee
Team Leaders

Phoenixville Hospital,
Maria Stesko, RN
Operating Room

Penn State Hershey Children's Hospital,
Rachel Wamba Yadrnak, RN
Pediatric Hematology/Oncology

UPMC St. Margaret,
Kathy Fowler, MSN, RN, CMSRN
Quality Improvement
Project Manager

Individuals and groups from 10 Pennsylvania healthcare facilities were recognized by the Pennsylvania Patient Safety Authority during Patient Safety Awareness Week for their commitment to patient safety within their healthcare facilities.

Winners received their photo and patient safety efforts highlighted on a poster for display within their facility. They also received a certificate and "I Am Patient Safety" recognition pin from the Pennsylvania Patient Safety Authority.

Join the Authority in congratulating the 2014 winners. An article listing all of the recognized facilities and their patient safety efforts is in this *Advisory* issue.

Scan this QR code with your mobile device's QR reader to access all 10 Patient Safety Awareness Week Posters.

PATIENT SAFETY AUTHORITY
An independent agency of the Commonwealth of Pennsylvania

For more information, visit the Pennsylvania Patient Safety Authority website at www.patientsafetyauthority.org

MS14108

PENNSYLVANIA PATIENT SAFETY ADVISORY

THE PENNSYLVANIA PATIENT SAFETY AUTHORITY AND ITS CONTRACTORS

The Pennsylvania Patient Safety Authority is an independent state agency created by Act 13 of 2002, the Medical Care Availability and Reduction of Error (Mcare) Act. Consistent with Act 13, ECRI Institute, as contractor for the Authority, is issuing this publication to advise medical facilities of immediate changes that can be instituted to reduce Serious Events and Incidents. For more information about the Pennsylvania Patient Safety Authority, see the Authority's website at http://www.patientsafetyauthority.org.

ECRI Institute, a nonprofit organization, dedicates itself to bringing the discipline of applied scientific research in healthcare to uncover the best approaches to improving patient care. As pioneers in this science for more than 40 years, ECRI Institute marries experience and independence with the objectivity of evidence-based research. More than 5,000 healthcare organizations worldwide rely on ECRI Institute's expertise in patient safety improvement, risk and quality management, and healthcare processes, devices, procedures, and drug technology.

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