PENNSYLVANIA PATIENT SAFETY ADVISORY

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

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Violence Prevention Training for Emergency Department Staff

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ABSTRACT

In June 2011, the Pennsylvania Patient Safety Authority surveyed violence protection practices in Pennsylvania acute care hospitals. The survey was based on current best practices, including the guidelines of the International Association for Healthcare Security and Safety and Occupational Safety and Health Administration. Survey results were presented in the December 2011 Pennsylvania Patient Safety Advisory. *Gaps identified through the survey suggest opportunities for improving violence protection practices in the emergency department (ED). ED staff and patients are being exposed to violence, and studies support that violence prevention training is an important component in a comprehensive violence prevention program. Available research supports the need for violence prevention training for staff in the ED as part of a comprehensive violence prevention program. Risk reduction strategies and best practices promoted by professional organizations and accrediting bodies promote patient safety, as well as the safety of visitors and ED staff. (Pa Patient Saf Advis 2012 Mar;9[1]:1-4.)*

INTRODUCTION

Events of violence in the emergency department (ED) are a safety risk for patients and staff. In June 2011, the Pennsylvania Patient Safety Authority surveyed Pennsylvania acute care hospitals about violence protection practices in the ED. The survey was based on current best practices, including the guidelines of the International Association for Healthcare Security and Safety (IAHSS) and Occupational Safety and Health Administration (OSHA). Survey results were presented in the December 2011 *Pennsylvania Patient Safety Advisory*.[1] Gaps in violence protection practices identified through the survey suggest opportunities for improving violence protection practices to increase the safety of both ED staff and patients. Training in violence prevention practices for ED staff was one potential gap and is the focus of this article. Sixty-eight percent of survey respondents reported that their hospitals offered violence prevention training to staff; however, only 36% of all respondents reported mandatory violence prevention training for ED staff.

A comprehensive violence prevention program, which includes violence prevention training for staff, has been recognized as essential to the prevention of violent incidents in the healthcare setting.[2,3] However, violence prevention programs are not mandated under federal law, and currently only nine states have enacted laws requiring violence protection programs in healthcare facilities, better reporting, or additional study of the problem.[4] In Pennsylvania, a new bill has been introduced that would require Pennsylvania hospitals and other healthcare facilities to take steps to protect nurses and other healthcare workers from workplace violence.[5] House Bill 1992, if enacted into law, would require hospitals to establish a violence prevention committee, develop a written violence protection plan, and assess security risks annually to create a safer workplace.

Organizations such as IAHSS and OSHA promote comprehensive violence prevention programs. The Joint Commission's June 2010 issue of *Sentinel Event Alert* emphasized the existence of violence in healthcare; the risk to patients, visitors, and staff; and the need to provide more effective workplace violence education.[6] The Emergency Nurses Association and the American College of Emergency Physicians have issued policy statements recommending that hospitals educate staff on handling violence.[7,8]

Despite recommendations from professional organizations, accrediting bodies, and legislators, ED violence rates continue to rise, exposing patients, staff, and visitors to the risk of harm.[9] There is not a large body of research to quantitatively address which techniques are effective in violence prevention in the ED and none identified as of January 13, 2012, showing whether this training should be mandatory. However, several recent studies support staff training as an important component in any violence prevention program. In addition, events reported to the Authority exemplify instances in which violence prevention training may have resulted in a different outcome. Available studies supporting the need for violence prevention training as part of a comprehensive violence prevention program and related risk reduction strategies will also be discussed.

AUTHORITY EVENT REPORTS

Events of violence in the ED reported to the Authority (384 events of violent acts or verbal abuse reported from 2006 through 2010) are described in a December 2011 *Advisory* article.[1] The need for violence prevention training, particularly violence de-escalation techniques, may have been a contributing factor in the following examples of Authority reports.

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Patient was being combative and swinging his fists while staff and a family member were trying to keep him from climbing out of bed. The patient sustained bruises on both hands.

A patient was in a waiting area when another person approached the patient and punched the patient's face several times. Prior to being assaulted, the victim had gone to the registration window to alert staff that a person was verbally assaulting others in the waiting area. Security was called to the ED but had not yet arrived when the assault occurred.

The patient came to the ED complaining of back pain and was also diagnosed with a behavioral problem. The patient became extremely combative and uncooperative in the ED. The patient was physically and verbally abusive to staff. The patient scratched two employees. The police were called by hospital security.

The physician was informing the patient of the need for intravenous antibiotics for cellulitis of the foot. The patient became agitated and punched the physician in the eye. When asked why he hit the physician, the patient would not answer. Police and hospital security were notified.

The patient attempted to run out of the ED. The nurse confronted the patient and asked where the patient was going. The patient raised both hands and attempted to hit the nurse. The nurse defensively took hold of both of the patient's hands. Other staff members moved in to assist the patient in walking back to the room. The patient continued to yell at staff and attempt to get free. Staff attempted to assist the patient to lie down on the litter. The patient's hand became free and grabbed a hold of a nurse's throat . . . Staff and security took control of the patient.

VIOLENCE PREVENTION TRAINING IN THE LITERATURE

Although only 18% of states currently mandate violence prevention training for ED staff,[4] the need for a comprehensive violence prevention training program has been demonstrated in several studies. In 2007, Peek-Asa et al. compared workplace violence prevention programs in a randomly selected and representative sample of EDs in California and New Jersey.[10] California was the first state to enact legislation requiring that acute care and psychiatric hospitals implement comprehensive workplace violence prevention programs.[11] California was also the first state to release specific guidelines for the establishment of such a program.[12] In comparison, New Jersey follows only federal OSHA guidelines.

The goal of the study was to determine the most commonly implemented violence prevention program elements and identify gaps in existing programs.[10] With regard to workplace violence training, over 91% of California hospital EDs provided workplace violence prevention training as required by California law. New Jersey has no training requirements, and 72% of New Jersey hospitals provided workplace violence protection training. Mandatory training for staff regularly assigned to the ED was reported by 7.5% of California hospitals and 5.6% of New Jersey hospitals. The study showed that while the majority of hospitals offered violence protection training, few ED staff are actually trained. The study identified that it was common for hospitals to offer existing packaged programs that did not include hospital-specific policies and procedures and potential risk factors. Peek-Asa et al. note that states interested in enacting security legislation should take into account the variance in hospital environments and require that hospitals design programs that are specific to their needs.

Blando et al. also studied hospital workplace violence protection programs and examined how security features varied by size of the hospital and by the hospitals' background community crime rate.[13] During the 10-year study period, the rate of assaults against ED staff was highest in small hospitals in areas with high rates of violent crime. Small hospitals located in communities with low violent crime rates had the second-highest rate of serious assaults against ED staff among all hospital categories. These results were thought to be related to the variance in hospital security programs due in part to the perception of risk for violence. Staff in all hospitals reported incidents of violence among all types of patients and visitors due to the high stress and emotionally challenging experience of an ED visit. The authors cite that the variability in hospital security programs found in this study argues for the need to ensure consistency and implementation of security programs with features such as those in the OSHA guidelines and that a comprehensive security program is needed in all hospital EDs.

Benham et al. addressed the issue of violence protection programs and the rate of violent acts experienced by ED residents and attending physicians. In a prospective, cross-sectional online survey of emergency medicine residents and attending physicians in 65 emergency medicine residency programs, Benham et al. demonstrated that at least one workplace violence act in the previous 12 months was reported by 78% of respondents, with 21% reporting more than one type of violent act.[14] The most common type of workplace violence was verbal threats (75%), followed by physical assaults (21%), confrontations outside the workplace (5%), and stalking (2%). Security was available full-time in most settings (98%) but was least likely to be physically present in patient care areas. The majority of respondent EDs did not screen for weapons (60%) or have metal detectors (62%). Notably, only 16% of programs provided violence workshops and less than 10% offered self-defense training. Self-defense training was not associated with a reduction in violence,

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but respondents who reported attending a violence prevention workshop were less likely to report experiencing verbal abuse, suggesting that communication techniques can be used to de-escalate a situation before it erupts into physical violence. The authors also suggest that more research is needed to determine the impact of violence prevention training on violence in the ED.

ED VIOLENCE PREVENTION PROGRAMS

More research is needed to study the impact of violence protection programs on violence in the ED. However, gaps in violence protection programs were noted in the above studies and in the Authority's ED violence protection practices survey, suggesting the need for a comprehensive violence protection program that includes training ED staff. A recent project has identified implementation strategies most likely to be successful in violence prevention efforts. In 2006, a multidisciplinary team at the University of Wisconsin Hospitals and Clinics (UWHC) developed a comprehensive ED security program in response to concerns about violence voiced by ED nursing staff.[15] The program components include the following:

Stages of escalation grid. A staged escalation grid (i.e., green, yellow, and red levels) addresses security status changes and creates awareness of changing conditions in the ED.

Staff cues. Green, yellow, and red lights are placed strategically around the ED to represent the security status of the ED. A change in status is cued by a three-second audible alarm. Green represents business as usual, yellow heightened tension levels, and red a threat to safety and security (e.g., behavioral problems, surge capacity issues, gang-related activities, police involvement).

Huddle. A huddle between the ED team leader, a security supervisor, the ED attending physician, and the nursing coordinator is required before the decision is made to change the color status.

Access control/security presence. The number of visitors and amount of security presence is determined by the stage the ED is experiencing. Difficult parties are separated as necessary to de-escalate potentially dangerous situations. Difficult parties may be moved from one side of the waiting room to the other or completely outside the ED waiting room.

Staff training. Engagement and training of all staff is a critical component of the program. Staff are trained to recognize environmental changes that can escalate into violent disruptions if not handled quickly and effectively. Training is mandatory and conducted when members of all disciplines are present. Training includes presentations, videos, and interactive team exercises.

In the two years before implementation of the UWHC program, staff reported a number of injuries from being punched, hit, and bitten. After implementation, there has been one reported injury and no injury-related absences. Staff reported the belief that the program has not decreased day-to-day risk, but has helped them identify the stages of escalation and take appropriate, prompt action. The authors report that the UWHC ED security program outlines strategies to meet the needs of the patient and their support network, and that the process has allowed the nursing staff to focus on the primary nursing care needs of their patients.

In addition to considering the program components above, facilities may consider incorporating the training components of an ED violence prevention program identified by Peek-Asa et al.[9] As previously discussed, the authors compared elements of the California state guidelines and the New Jersey approach based on federal OSHA guidelines. Recommending that workplace violence training be required for all employees regularly assigned to the ED, the authors highlighted the following training topics to be covered in ED violence prevention programs:

- Hospital safety policies and procedures
- Aggression and violence predicting factors
- Characteristics of aggressive and violent patients
- Verbal methods to diffuse or avoid aggressive behavior
- Obtaining a history from a patient with violent behavior
- Techniques for restraining violent patients
- Self-defense if preventive action does not work
- Appropriate use of medications to subdue aggressive patients
- Resources available for victims of workplace violence
- How to report a violent event

Training specific to the hospital's policies, procedures, and potential risk factors has been recommended.[10] Before training interventions are implemented, a thorough needs assessment will help identify weaknesses from material, systematic, environmental, or cultural sources.[16] OSHA provides a workplace violence protection checklist that can assist in the development of a needs assessment at http://www.osha.gov/Publications/OSHA3148/osha3148.html.[3] The National Institute for Occupational Safety and Health (NIOSH) has also published strategies for workplace violence prevention training applicable to the ED setting.[17] The strategies emphasize management and worker commitment to workplace violence prevention and a multidisciplinary approach. NIOSH recommends the presence of management at training sessions to demonstrate the organization's top-down support of the program. Training (initially and on a recurring basis) can be provided on the

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hazards specific to the organization, with emphasis on reporting requirements. A train-the-trainer approach may be used, with supervisors responsible for training and evaluating training for their own staff.

CONCLUSION

Those who work in and visit the ED are increasingly being exposed to violence. A comprehensive violence prevention program is necessary to promote a safe environment for patient care in the ED. Mandatory training for ED staff is one gap in violence protection practices identified by the Authority's survey of violence protection practices. Staff training in violence prevention strategies as part of a comprehensive violence prevention program can promote the safety of patients, staff, and visitors.

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Colonoscopy-Associated Perforation: Systematic Review and Meta-Analysis of Incidence and Risk Factors

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ABSTRACT

Colonoscopy is an important tool for colorectal cancer screening and diagnosis, but reports of the incidence of perforation, a serious complication, vary widely, and risk factors have not been clearly identified. Using meta-analysis and a qualitative literature review, the authors systematically assessed the incidence of and risk factors for colonoscopy-associated perforation. Data on 966,172 screening and diagnostic colonoscopies from 38 original studies was combined in random-effects meta-analysis. The overall perforation incidence was 91 (95% CI: 77 to 104) per 100,000 colonoscopies. Screening colonoscopy had a lower incidence rate (41 [95% CI: 8 to 75] per 100,000 colonoscopies) than diagnostic colonoscopy and studies with mixed indications for colonoscopy (102 [95% CI: 86 to 118] per 100,000 colonoscopies). No other risk factor was identified by this meta-analysis. Published evidence suggests advanced age, polypectomy/biopsy, previous abdominal surgery, gastrointestinal comorbidities, and hemodialysis may be associated with increased risk. Despite the widespread use of colonoscopy and the seriousness of bowel perforation, information on risk factors, especially modifiable risk factors, is limited. (Pa Patient Saf Advis 2012 Mar;9[1]:5-10.)

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Editor's Note

Perforations of the colon associated with colonoscopy were addressed in an article in the December 2006 issue of the *Pennsylvania Patient Safety Advisory.* At that time, the analysts noted 125 to152 perforations reported to the Pennsylvania Patient Safety Authority for a one-year period in Pennsylvania. Since then, the number of reports mentioning perforation with colonoscopy has not changed greatly. The number for the most recent year is estimated to be in the range of 140 to 170. The Authority publishes this meta-analysis to provide facilities with benchmarks to assess their perforation rates for screening and for diagnostic colonoscopies. Facilities that would like to improve their perforation rates may wish to reference a June 2008 *Advisory* article, "Colon Perforations Complicating Colonoscopies: What is the Best Known Evidence for Prevention?"

INTRODUCTION

Colonoscopy is a standard method of screening for colorectal cancer, the second leading cause of cancer death in the United States.[1] In the United States in 2009, an estimated 146,970 new cases of colon or rectal cancer were diagnosed, and 49,920 individuals died.[2] Worldwide in 2008, an estimated 695,000 people died from colon or rectal cancer.[3] Early detection of lesions by screening has been shown to reduce mortality from colorectal cancer.[4,5]

Colonoscopy has advantages over other colorectal cancer screening methods: it allows for examination of the entire length of the colon, has high diagnostic sensitivity, and enables the endoscopist to immediately biopsy or remove discovered polyps or other suspicious lesions. However, colonoscopy can result in bowel perforation, a rare but serious and potentially fatal adverse event. Because a range of perforation rates has been reported in the medical literature, the actual risk is unclear.[6] Furthermore, risk factors, especially modifiable ones, have not been well defined. The authors' research group has previously found very little published literature on the prevention of perforation or the identification of modifiable risk factors.[7] These deficiencies complicate estimating risk for an individual patient, assessing whether the perforation rate of a particular provider or center is aberrant, and determining cost-effectiveness.

Although previous reviews have addressed this topic,[8,9] to the authors' knowledge, this is the first published full-text review to systematically investigate perforation risk factors and summarize perforation incidence using a meta-analytic method in patients not selected for any particular characteristics. The authors also performed a systematic qualitative literature review to report risk factors identified in primary literature.

METHODS

The authors searched 12 databases for clinical studies and reference lists published from January 1, 1990, through June, 16, 2010, and hand-searched the results. Databases searched, controlled vocabulary terms, and search strategy are shown in Table 1.

The authors included in their study English-language full-length studies published between January 1, 1990, and June 16, 2010, that assessed patients undergoing conventional colonoscopy and reported original data collected since January 1, 1990, from objective records (i.e., patient record charts, databases, or prospective clinical studies, not recall-based surveys or questionnaires).

The authors compiled the original studies' results into a meta-analysis in order to generate an overall summary estimate of perforation incidence, investigate reasons for differences in findings among studies, and assess the robustness of the authors' own findings. (For further details, see "Methods Summary" on the Authority website.)

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RESULTS

The searches identified 535 citations, of which most were excluded, most frequently due to lack of relevance to colonoscopy-associated perforation or for reporting data collected prior to 1990. The authors included 38 clinical studies that addressed perforation incidence, of which 16 also reported risk factors (see Figure 1). The 38 studies were published between 1998 and June 16, 2010, and reported on a total of 966,172 colonoscopies (for a list of all included studies and a summary of their characteristics, see Table 2 on the Authority website). Fifteen studies were conducted in the United States; the rest were conducted in Israel, Canada, Europe, or Asia. Only 11 studies collected perforation data prospectively. Duration of follow-up was periprocedural.

Many studies did not report basic demographic characteristics or clinical information. Where reported, most studies examined perforation rates in asymptomatic patients undergoing screening colonoscopy or colonoscopy for diagnostic or therapeutic reasons, but two studies limited enrollment to either screening or follow-up of another screening method (e.g., fecal occult blood test),[10,11] and one only examined patients with acute diverticulitis.[12] The authors of this meta-analysis did not limit inclusion by patient age, but only two studies focused on pediatric patients.[13,14]

Few characteristics of the clinicians providing colonoscopy services, such as board certification or experience, were reported. For the most part, gastroenterologists provided colonoscopy services, though sometimes colorectal surgeons, general surgeons, coloproctologists, hepatologists, or medical or surgical trainees performed colonoscopies. Providers were affiliated with a variety of healthcare settings, including university hospitals, general hospitals, and ambulatory centers.

Table 1. Search Strategy

Databases Searched

Cumulative Index to Nursing and Allied Health Literature, Cochrane Central Register of Controlled Trials, Embase, Excerpta Medica database, MEDLINE, PreMEDLINE, Cochrane Database of Systematic Reviews, Cochrane Database of Methodology, Health Technology Assessment Database, Healthcare Standards Directory, National Guideline Clearinghouse, and National Health Service Economic Evaluation Database

Terms Searched

A combination of controlled vocabulary terms and text words, including but not limited to: adverse, colonoscop*, complication*, etiology, harm*, hazard*, iatrogenic, intestine perforation, perforat*, prevention and control, and risk

SEARCH STRATEGY (OVID FORMAT, PARALLEL STRATEGIES CREATED FOR OTHER DATABASES)

Set Number	Concept	Search Statement
1	Colonoscopy	Colonoscopy/ or colonoscope
2	Perforation	Exp intestine perforation/ or intestine perforation/ or perforate
3	Combine sets	1 and 2
4	Eliminate overlap	Remove duplicates from 3
5	Limit by publication type	4 not (letter/ or editorial/ or news/ or comment/ or note/ or conference paper)/ or (letter or editorial or news or comment).pt.)
6	Risk	5 and (exp risk/ or risk$.ti. or proportional hazards models/ or proportional hazards model/)
7	Etiology	5 and (etiology or et.fs.)
8	Prevention	5 and pc.fs.
9	Complication	5 and (ae.fs. or co.fs.)
10	Iatrogenic disease	5 and (iatrogenic disease/ or iatrogenic.ti,ab.)
11	Combine sets	or/6-10

Colonoscopy procedures were also poorly described. Most studies did not report methods of bowel preparation, type of colonoscope used, or polypectomy methods or frequency. Most healthcare providers administered conscious sedation for anesthesia to most or all patients; however, one study reported only 10% of patients requested anesthesia,[11] and one study reported administration of anesthesia to less than 5% of patients.[15]

Databases used in some retrospective assessments included single-hospital databases, third-party payer reimbursement databases, and the Medicare Surveillance Epidemiology and End Results database. Two studies collected data on randomized samples of patients;[16,17] the others collected data from a consecutive series. The number of patients enrolled or records examined varied widely, from 21[18] to 277,434.[19] Some studies had so few patients that they were probably underpowered to detect a rare event (e.g., perforation). Since the authors planned to conduct a meta-analysis, studies meeting inclusion criteria were analyzed regardless

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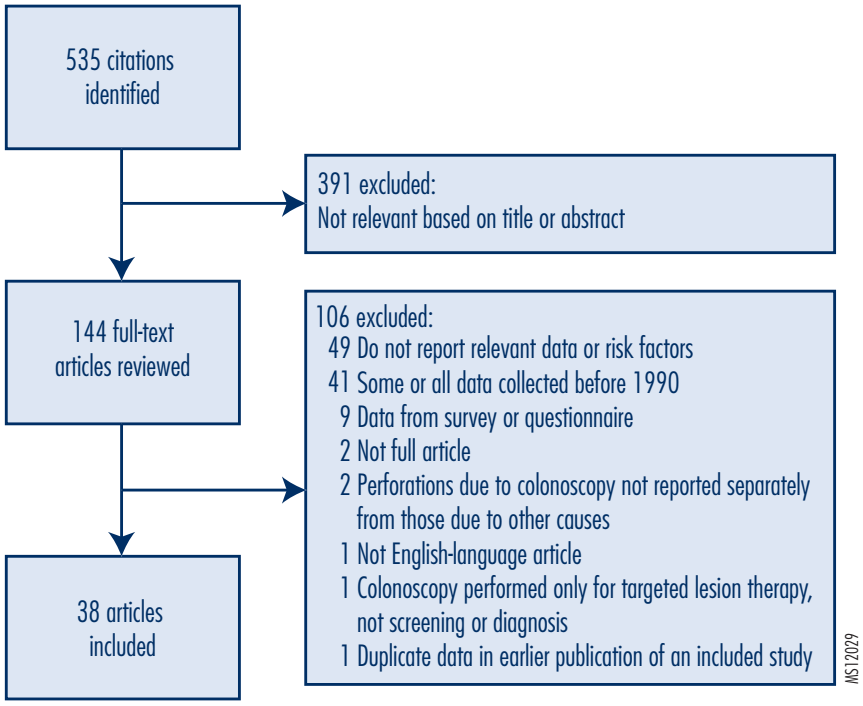
Figure 1. Study Selection Process



of the number of patients enrolled. After running the analysis again to include only studies with at least 10,000 records, the authors did not find a significant difference in summary rate. Most studies did not report how they diagnosed or searched databases for perforation. Of those that did, several database reviews used International Classification of Diseases codes to identify perforations,[10,16,17,19,20,21] and two studies reviewed only cases of perforation requiring operative intervention.[22,23]

Following the combination of all data, statistics indicated large differences among the study findings (I^2 = 99.7%). The all-studies summary estimate of perforation incidence was 91 (95% CI: 77 to 104) per 100,000 colonoscopies (Figure 2). The incidence did not substantially change when additional analyses (i.e., cumulative and influence analyses) were conducted, suggesting that no single study has undue influence over the summary effect size, and that the overall perforation rate is not very likely to change appreciably with the publication of additional studies.

Statistical investigation (i.e., meta-regression) showed that perforation rates were lower in asymptomatic patients undergoing screening than in symptomatic patients or groups of mixed-indication patients. However, these factors did not explain a significant proportion of the differences in results among studies, including when other factors were taken into consideration. The perforation incidence among asymptomatic individuals seeking screening was 41 (95% CI: 8 to 75) per 100,000 colonoscopies. The remaining studies, which enrolled symptomatic and mixed populations (i.e., both symptomatic and asymptomatic patients) had an incidence of 102 (95% CI: 86 to 118) perforations per 100,000 colonoscopies. Even with the clinical groups considered separately, large differences in perforation incidence rates remained. Additional statistical tests (e.g., sensitivity analyses) suggest the rate is stable among studies enrolling symptomatic and mixed-indication groups of patients, but appears less stable (and therefore more likely to change with the publication of additional studies) in studies with asymptomatic patients.

Additional analyses did not indicate that perforation incidence was significantly related to the following factors: country where the study occurred, number of patients, publication date or first or median year of data collection, or whether data was collected prospectively or retrospectively. No other potential factors could be investigated due to sparse reporting.

Literature Review of Published Risk Factors

Reviewing findings from original studies is useful because it provides findings from patient-level investigations of the data, whereas data was only available for study-level analysis in the above meta-analysis. All factors in the original studies identified as risk factors for perforation (or identified as not being risk factors) are reported in the following text.

Patient characteristics. Older age was investigated as a risk factor and found to be associated with perforation in six studies, Tian et al.,[24] Gatto et al.,[16] Levin et al.[10], Korman et al.,[25] Rabeneck et al.,[21] and Arora et al.,[19] but not in the two most recently published studies, Imai et al.[26] and Rotholz et al.[23] Findings regarding sex were inconsistent in five studies: Gatto et al.[16] and Arora et al.[19] reported that sex was not associated with perforation; Korman et al.[25] and Paspatis et al.[27] found that women were more likely to suffer perforation; and Rabeneck et al.[21] found women had lower rates. Gatto et al.[16] and Arora et al.[19] found that race was not associated with perforation.

Number of comorbidities was identified as a risk factor by Gatto et al.,[16] and higher comorbidity indexes were associated with perforation in Rabeneck et al.[21] and Arora et al.[19] Diverticulitis or diverticular disease was associated with perforation in two

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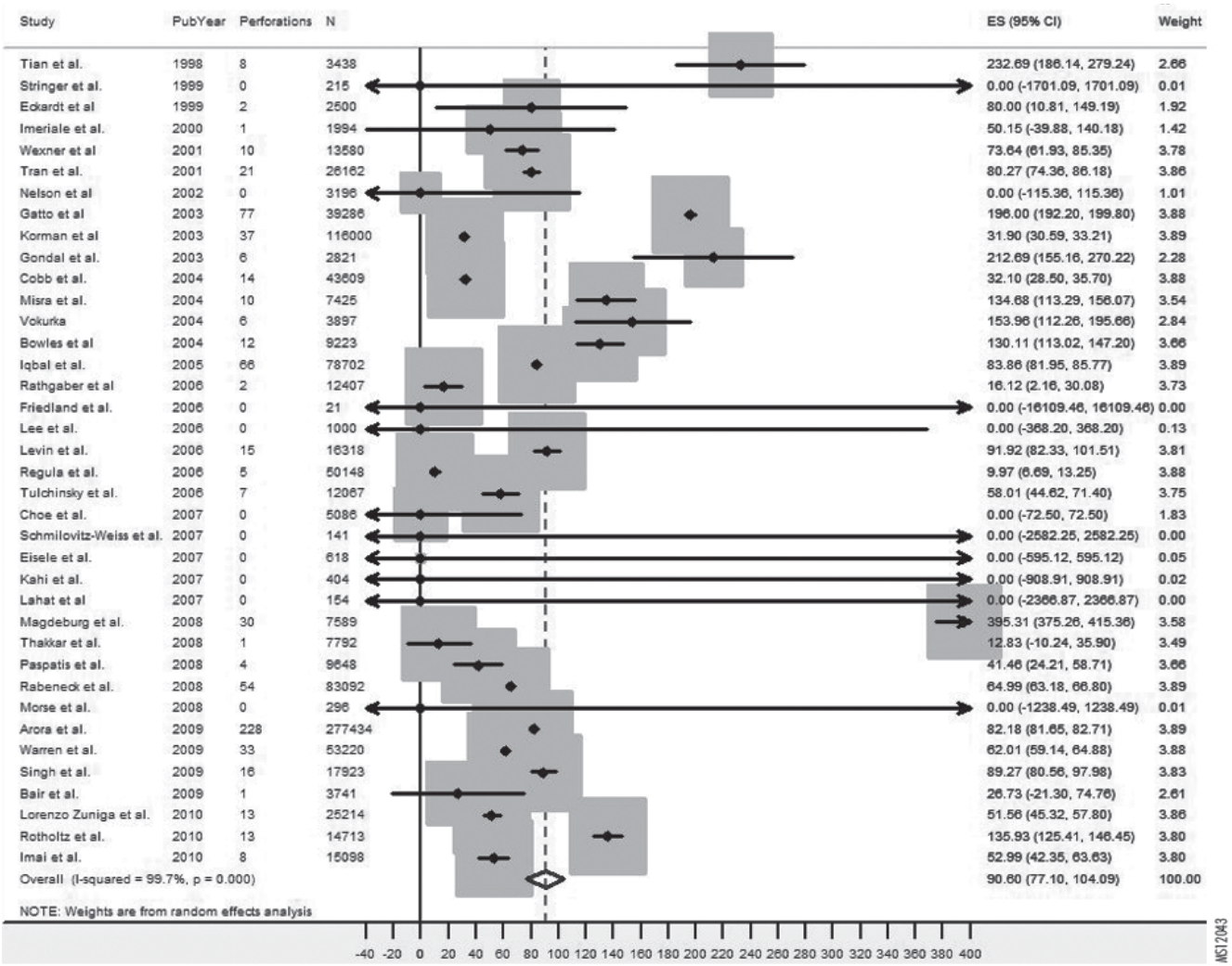
Figure 2. Incidence of Perforation per 100,000 Colonoscopies



studies, Tian et al.[24] and Korman et al.[25] Previous abdominal surgery was identified as a risk factor by both Tian et al.[24] and Korman et al.[25] Arora et al.[19] found an increased risk in the presence of obstruction; however, Misra et al.[20] did not find an association between the reason for colonoscopy and perforation. Imai et al. found that patients on hemodialysis regimens had a statistically significant increase in occurrence of perforation.[26]

Provider characteristics. Wexner et al.[28] found that practitioner experience was not associated with perforation, but Rabeneck et al.[21] and Lorenzo-Zuniga et al.[29] found that greater annual caseload was associated with lower rates of perforation. Cobb et al. reported that the rate of perforation was higher for general surgeons than gastroenterologists, although only 1 of the 14 perforations in the study occurred when a surgeon performed the colonoscopy, and that surgeon was a resident.[30] This difference was not found to be statistically significant ($P = 0.353$). Arora et al. found that surgeons had higher perforation rates than gastroenterologists but did not find this was true once other factors were taken into account.[19] Primary care practitioners had lower rates than gastroenterologists in that study.[19] Rabeneck et al.[21] did not find any association between provider characteristics and perforation.

Procedural factors. Bowles et al.,[31] Vokura,[32] and Rabeneck et al.[21] found that polypectomy/biopsy was associated with an increased perforation rate, but Arora et al.[19] did not. Cobb et al. found that four out of six colonoscopies in adults for whom colonoscopy was attempted with a pediatric colonoscope resulted in perforation, and that both cases of perforation that appeared to be due to overinsufflation in the entire series were associated with pediatric colonoscope

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use.[30] However, the difficulties that led to the selection of the pediatric colonoscope may have been the underlying risk factor for perforation rather than the colonoscope itself. Rabeneck et al. did not find a difference in rate between hospital and clinics.[21]

Methodological factors. Gatto et al.[16] and Arora et al.[19] did not find a significant association between year of data collection and perforation rate, though both observed a trend toward decreased rates over time.

DISCUSSION

The perforation incidence among asymptomatic patients undergoing colonoscopy for screening was 41 (95% CI: 8 to 75) per 100,000 colonoscopies, which is significantly lower than the rate in the rest of the studies combined, which was 102 (95% CI: 86 to 118) per 100,000 colonoscopies. Summary estimates subgrouped by indication should be more useful for modeling decisions or cost analyses; however, since sensitivity analyses suggest the incidence of perforation among screening studies may be subject to change with the publication of additional data, literature for the application should be monitored.

Several potential sources of bias may affect this data. The authors included data from any country but limited inclusion to English-language studies. Most of the data for the meta-analysis was from studies from the United States, Western Europe, and Canada. Only one study was from Central or South America and none were from Africa. As for any meta-analysis, the possibility that publication bias has affected these numbers cannot be ruled out. Since about 90% of the data came from retrospective studies, it is possible that these could be underestimations due to the mode of data collection, although meta-regression does not suggest prospectively and retrospectively collected data significantly differs. None of the other methodological factors investigated as potential quality indicators were associated with perforation rate either.

Although reporting was too limited to enable thorough investigation, no modifiable risk factors for perforation were identified, limiting the authors' ability to inform clinical practice. Findings from the individual studies using patient-level data were also few and sometimes conflicting.

Identifying factors associated with an increased risk of perforation, especially modifiable risk factors, is desirable for improving the overall safety of colonoscopy. Although the risk of perforation to any individual is not high, minimizing the perforation rate is important as a greater number of individuals can be expected to seek colonoscopy for screening, diagnostic, and therapeutic purposes. Improving the safety of colonoscopy might improve patient compliance with colorectal cancer screening, reportedly only about 60% in 2006,[33] and would improve the cost-effectiveness of colonoscopy by reducing iatrogenic morbidity. The need for reliable information on the identification of risk factors is particularly pressing as the number of individuals undergoing colorectal cancer screening can be expected to increase. To identify means for reducing colonoscopy-associated perforation, prospective study of risk factors is warranted. Such studies could be integrated with clinical care.

ACKNOWLEDGMENTS

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Medication Errors: When Pharmacy Is Closed

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ABSTRACT

When pharmaceutical services are not available, the medication-use process can be more vulnerable to errors. Between June 2004 and September 2010, Pennsylvania hospitals submitted to the Pennsylvania Patient Safety Authority 519 medication error reports that implied an event occurred while the pharmacy department was closed. The most common types of medication errors reported included wrong-drug events, drug omissions, and prescription or refill delays. The predominant medications associated with these reports were warfarin sodium, hydration solutions, insulin, guaiFENesin, and vancomycin. The incorrect drug was retrieved from an automated dispensing cabinet or night cabinet in 82.3% (n = 130) of wrong-drug events. In 28.7% (n = 43) of drug omission events, the medication was not available to the nurse to administer, leading to an omission. Strategies to prevent errors when the pharmacy is closed include providing access to a limited supply of medications to be used for urgent medication orders, standardizing processes for accessing medications when the pharmacy is closed to reduce variability and opportunity for error, and establishing a forcing function error reduction strategy to make the allergy "reaction" selection a mandatory entry in the organization's order entry systems for prescribers and pharmacists. (Pa Patient Saf Advis 2012 Mar;9[1]:11-7.)

INTRODUCTION

Pharmacists play a vital role in ensuring safe and effective medication use by reviewing medication orders before patients receive the prescribed therapy. However, because of the limited hours of pharmaceutical services in some hospitals, not all medication orders are prospectively reviewed by a pharmacist. For all U.S. hospitals, inpatient pharmaceutical services are provided an average of 112 hours per week (Monday through Sunday), or 16 hours per day, with smaller hospitals and health systems having fewer service hours per week than larger hospitals.[1] An estimated 41.2% of hospitals provide 24-hour inpatient pharmaceutical services. This also varies significantly by staffed-bed size, with larger hospitals more likely to provide 24-hour inpatient pharmaceutical services. For example, only 8.8% of hospitals with fewer than 50 staffed beds provide 24-hour inpatient pharmaceutical services, whereas 98.4% of hospitals with 600 or more staffed beds provide 24-hour inpatient pharmaceutical services.

The use of remote order entry and review technology that provides pharmacists with real-time access to a patient's medication profile, medical history, and other key patient information can provide hospitals with access to a pharmacist 24 hours a day. A 2008 survey of U.S. hospitals found that 20.7% of the hospital pharmacies that were not open 24 hours a day used an off-site pharmacist when the pharmacy was closed.[2] The most frequent providers of remote order entry were affiliated hospitals (46.5%) or a regional or national company (36.8%). The other hospitals (16.7%) using off-site pharmacist review of orders had on-call pharmacists for this activity.

Provision of on-site 24-hour pharmaceutical services contributes to a more secure drug storage and distribution system. It also reduces the need for night cabinets, non-pharmacist access to the pharmacy, and access to medications stored in automated dispensing cabinets (ADCs) without prior order review by a pharmacist. When the pharmacy is closed, a well-organized drug storage system can safeguard access to medications and thereby reduce the risk of medication errors or minimize adverse outcomes should an error occur.[3,4] Without safeguards in place, medication errors can occur, some with tragic outcomes,[5] especially if non-pharmacists have complete access to the pharmacy after hours.

During case-by-case analysis of events reported by Pennsylvania healthcare facilities to the Pennsylvania Patient Safety Authority, analysts found a number of medication errors that were occurring when the pharmacy department was closed. Some of these events, such as patients receiving a medication to which they have a documented allergy, are typically intercepted when the pharmacy department is open. This article includes examination of medication errors reported to the Authority that occurred after the pharmacy department was closed. Factors that contributed to the events are delineated where possible. Strategies to reduce the risk of error are discussed.

METHODOLOGY

In order to categorize and retrieve reports in which reporters implied that an event occurred while the pharmacy department was closed, Authority analysts created the standardized monitor code "24h" that can be entered into the program database during case-by-case analysis. This monitor code and the phrases "pharmacy closed," "night closet," and "after pharmacy hours" were used to query the data to identify reports, trends, contributing factors, and risk reduction strategies.

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AGGREGATE ANALYSIS

From events reported from June 2004 through September 2010, analysts identified 519 medication error events that occurred when the pharmacy was closed. A breakdown of these events by harm score, which is adapted from the National Coordinating Council for Medication Error Reporting and Preventions harm index,[6] shows that nearly 87% (n = 450) of the events reached the patient (harm index = C to I). Only two (0.4%) of the events resulted in harm significant enough to require additional treatment.

The two most common medication error types identified through event analysis, specifically from the event description, represented 308 (59.3%) of the 519 reports, with the most commonly represented event type being wrong-drug events (30.4%, n = 158) (see Table 1). Drug omission reports represented the second-largest category of event types (28.9%, n = 150).

Table 2 lists the top 10 medications involved in events that occurred after the pharmacy was closed. Four high-alert medications, drugs that bear a heightened risk of causing significant patient harm when used in error,[7,8] appear in the top 10. The anticoagulant warfarin sodium, a high-alert medication, was the most frequently reported medication (4.4%, n = 23). Even though only one anti-infective agent, vancomycin, appears in the first five of the listed medications, anti-infective agents as a class were most frequently involved in events (23.3%, n = 121). Other classes of medications cited in reports include cardiovascular (8.1%, n = 42), analgesic (7.1%, n = 37), anticoagulant (5.2%, n = 27), and electrolytes (5.2%, n = 27).

When analyzing the reports, analysts questioned whether or not it was necessary for the medications involved in the events to be ordered and administered when the pharmacy was closed (i.e., were they critical medications that required immediate administration?). The lack of clinical and patient details in the reports prevents definitive determination for each and every medication. However, based upon the type of medications involved (e.g., antilipemic agents, vaccines, bisphosphonates), it is unlikely they were all critical.

Analysis of the event descriptions revealed that 60.3% (n = 313) of events originated in the administration phase, or node, of the medication-use process (see Table 3). Nearly 12% (n = 62) of reports did not include sufficient information in the event description to determine in which node the event originated.

FOCUSED EVENT ANALYSIS

Wrong-Drug Events

Analysts identified wrong-drug events as the most frequently reported (30.4%, n = 158) medication error occurring after the pharmacy had closed. The top five medications involved in wrong-drug events included products containing guaiFENesin (10.1%, n = 16), hydration solutions (8.9%, n = 14), insulin (7%, n = 11), carbidopa/levodopa (3.8%, n = 6), and ampicillin sodium/sulbactam sodium (3.2%, n = 5).

Table 1. Top Five Medication Error Event Types (430 of 519) from June 2004 through September 2010

EVENT TYPE	NUMBER	% OF TOTAL EVENTS (N = 519)
Wrong drug	158	30.4%
Drug omission	150	28.9
Prescription/refill delay	57	11.0
Wrong dose/underdosage	35	6.7
Extra dose	30	5.8

Table 2. Top 10 Medications Involved in Events That Occurred After the Pharmacy Was Closed (166 of 519) from June 2004 through September 2010

RANK	MEDICATION NAME	NUMBER	% OF TOTAL EVENTS (N = 519)
1	Warfarin sodium*	23	4.4%
2	Hydration solution	20	3.9
3	Insulin*	19	3.7
4	GuaiFENesin	18	3.5
	Vancomycin hydrochloride	18	3.5
6	Potassium chloride*	14	2.7
7	CefTRIAXone sodium	9	1.7
	MethylPREDNISolone	9	1.7
9	CeFAZolin sodium	8	1.5
10	Carbidopa/levodopa	7	1.4
	Levofloxacin	7	1.4
	Metoprolol	7	1.4
	Morphine sulfate*	7	1.4

* A high-alert medication

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Night cabinets and ADCs provide nurses with access to essential medications during off-hours in hospitals where 24-hour pharmaceutical services are not available. This access helps reduce the risk of drug omissions and delays but provides more opportunity for errors. The incorrect drug was retrieved from an ADC or night cabinet in 82.3% (n = 130) of wrong-drug events. Insufficient information was provided to determine if storage or how the drug names were listed on ADC screens contributed to the mix-ups. However, it has been noted previously in the *Pennsylvania Patient Safety Advisory* that the accessibility and variety of medications available, as well as a potential lack of an independent double check of the original order to the obtained medication, contribute to medication errors.[3]

In an event published by the Institute for Safe Medication Practices, a physician ordered ampicillin 200 mg and gentamicin 5 mg intravenous (IV) push for a premature baby girl.[9] The nurse misheard the second antibiotic order as gentamicin 500 mg. Because the pharmacy had closed for the night, a nursing supervisor obtained seven vials of an adult concentration of gentamicin (80 mg/2 mL vials) from a night cabinet. The pediatric concentration (20 mg/2 mL vials) also was available in the same night cabinet, but the nursing supervisor did not notice it. She brought the gentamicin to the patient care unit where one nurse drew up 12.5 mL of medication from the seven vials, and another nurse gave the medication IV push to the infant. The infant's gentamicin level rose to 590 mcg/mL but declined steadily over the next several days. Her renal function continued to be normal and the child survived.

An unsafe practice with the use of ADCs is the use of overrides, which bypass safety features, including pharmacy verification, in favor of gaining access to the medication.[10] Slightly more than 8% (n = 13) of wrong-drug event reports indicated the nurse retrieved a medication from an ADC using the override function.

Forty-three wrong-drug events (27.2%) involved drug products available in different combination products or modified-release formulations that carry the same name with different modifiers or suffixes. Forty-one of these 43 events reached the patient. Products containing the expectorant guaiFENesin (25.6%, n =11) were the most frequently involved agents in errors involving drug products available in different combination products or modified-release formulations. GuaiFENesin is available as a single-ingredient product and in various combination products. Practitioners often refer to these products using actual and contrived names such as guaiFENesin, guaiFENesin DM (guaiFENesin and dextromethorphan), guaiFENesin AC (guaiFENesin with codeine), and guaiFENesin DAC (guaiFENesin, pseudoephedrine, and codeine), relying on the different suffixes to differentiate the products. However, this type of nomenclature is often confusing and contributes to medication errors.[11] For example, see the following:

> *A patient was ordered Robitussin® after the pharmacy was closed. The registered nurse supervisor removed Robitussin AC from the Pyxis. The patient received Robitussin AC. The error was not caught until more than 24 hours later. The patient suffered no adverse effects . . .*

The wrong insulin product was retrieved in 7% (n = 11) of wrong-drug events. Roughly 90% (n = 10) of wrong-insulin events involved products with suffixes as part of the drug name (e.g., HumaLOG® Mix 75/25™, NovoLIN® R, NovoLIN 70/30, NovoLOG® Mix 70/30). Other medications with names that have suffixes were also cited in medication error reports. Examples of these include the following:

— Depakote® and Depakote ER
— Effexor® and Effexor XR®
— Sinemet® and Sinemet CR
— Vicodin® and Vicodin ES®

Similarly, look-alike names contributed to wrong-drug events in roughly 5% (n = 8) of reports. These events involved name pairs with look-alike names such as quiNIDine and quiNINE; Solu-Cortef® and Solu-Medrol®; and cefuroxime and cefTRIAXone. All of these events reached the patient. For example, see the following:

> *A patient was ordered quinine sulfate and needed the dose after the pharmacy had closed. The nursing supervisor retrieved quinidine sulfate from the night stock for the patient, and the patient's nurse then administered the wrong medication.*

Table 3. Node in Which the Event Originated (457 of 519) from June 2004 through September 2010

EVENT TYPE	NUMBER	% OF TOTAL EVENTS (N = 519)
Administration	313	60.3%
Dispensing	63	12.1
Transcription	50	9.6
Prescribing	31	6.0

Drug Omission Events

Analysts identified drug omission events as the second-most frequently reported (28.9%, n = 150) medication error occurring after the pharmacy had closed. The drug classes most frequently mentioned in drug omission reports included anti-infectives (26%, n = 39), anticoagulants (8.7%,

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n = 13), gastrointestinal agents (7.3%, n = 11), and electrolytes (6%, n = 9). High-alert medications[7] represented 21.3% (n = 32) of all reported drug omissions; warfarin (7.3%, n = 11), HYDROmorphone (2%, n = 3), and insulin (2%, n = 3) were 3 of the top 10 individual drugs involved in drug omissions.

Overall, little detail was reported in the event descriptions as to what factor(s) contributed to the drug omission. In 28.7% (n = 43) of the reports, the medication was not available to the nurse to administer. Some reports simply noted "not available" for the reason why the medications were not available, and other responses included reasons such as the nurse being unable to locate the medication and the pharmacy not delivering the medication before it closed.

A breakdown in the transcription process was noted in 16.7% (n = 25) of the drug omission reports. In 19 of these reports, transcription did not take place after the original order was written or when copying from an old medication administration record (MAR) to a new MAR. Analysts were unable to determine why these breakdowns occurred.

Analysis of reported event descriptions revealed that some staff failed to follow after-hours procedures in 14.7% (n = 22) of the reports. For example, in 6% (n = 9) of the reports, nursing staff did not call or attempt to call the on-call pharmacist for assistance. This prevented the pharmacist from assisting in locating the appropriate drug or traveling on-site to prepare the necessary medications (e.g., morphine syringe for patient-controlled analgesia [PCA] pump). Even on-site resources were not accessed by nursing staff; in 4.7% (n = 7) of reports, the staff nurse did not contact the nurse supervisor to obtain the medication from a night cabinet or contact the on-call pharmacist. Some examples of failure to follow after-hours procedures reported to the Authority include the following:

> *Vancomycin protocol was ordered after pharmacy hours. Protocol states that the pharmacist is to be called for initiation of protocol. The nurse did not follow procedure.*

> *A patient was ordered morphine PCA after the pharmacy closed. The nurse should have notified the supervisor to call the on-call pharmacist to compound the drug.*

Prescription or Refill Delay Events

Analysts identified prescription or refill delays as the third-most frequently reported (11%, n = 57) type of medication event occurring after the pharmacy had closed. Similar to drug omissions, anti-infective agents (21%, n = 12) were more often involved in these events as any other class of drug. The high-alert medications insulin (5.3%, n = 3), fentaNYL (3.5%, n = 2), and warfarin (3.5%, n = 2) were among the top individual medications involved in delays.

The primary contributing factor to these events, like that for drug omissions, was the unavailability of the prescribed medication (17.5%, n = 10). For example, see the following report:

> *Nursing needed Demerol® PCA during 11 p.m. to 7 a.m. shift when pharmacy is closed. The night cabinet was not properly stocked, so the pharmacist had to be called in.*

Prescribing Events

One key service that the pharmacy provides is prospective medication order review. One aspect of order review is checking the patient's medication and laboratory profile for wrong doses, documented allergies, and potentially serious interactions. When pharmaceutical services are not available, either on-site or by means of remote pharmaceutical services, vulnerability is introduced into the medication-use system that can allow prescribing errors to reach patients more easily.

Analysts examined events for those that originated in the prescribing node. Thirty-two events were identified. More than 62% (n = 20) involved a patient that was prescribed a medication to which he or she had a documented allergy. Only one documented allergy was caught before reaching the patient; 95% (n = 19) of events reached the patient, with one requiring additional treatment. Examples reported to the Authority include the following:

> *Order [was placed] for cefepime 1 gram. First dose was not checked by pharmacist due to pharmacy [being] closed on nights. [Staff] used another patient's dose. . . . The patient developed a rash because he is also allergic to Rocephin®, which is also a cephalosporin.*

> *This patient is allergic to Cipro®. This patient was ordered Levaquin®, which is contraindicated in patients allergic to Cipro. The medication was removed from the night room by the nursing supervisor while the pharmacy was closed.*

Anti-infective agents, including levofloxacin, cephalexin, and azithromycin, were involved in over half (n = 11) of the documented allergy events. Celecoxib, ketorolac, and other analgesics accounted for another 20% (n = 5) of these events.

RISK REDUCTION STRATEGIES

Healthcare facilities can strive to identify systems-based causes of the medication errors that take place when on-site pharmacy services are not available and implement effective risk reduction strategies to prevent harm to patients. Although many of the reports submitted to the Authority did not explicitly reveal all of the causes and contributing factors, healthcare facilities may consider the strategies described below, which are based on a review of events reported to the Authority, observations from the Institute for Safe Medication Practices, and recommendations in the literature.

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Pharmaceutical Services

— Explore the possibility of establishing on-site 24-hour pharmaceutical services. Health-system pharmacies have an obligation to review medication orders for appropriateness and safety. Accrediting organizations, such as the Joint Commission, recognize this responsibility and require prospective review of medication orders except in certain situations.[12]

— If establishment of on-site 24-hour pharmaceutical services is not possible, investigate the concept of remote, or off-site, pharmacy order entry services.[13,14,15] These types of services allows for pharmacist review of medication orders when the pharmacy may be closed at night or on the weekends. The after-hours coverage is often provided by an affiliated hospital, another hospital, or a regional or national company.[2]

— Each morning, pharmacy staff should reconcile all medications removed from ADCs and night cabinets while pharmacy was closed by comparing what was removed against the prescribers' orders.[16]

Medication Access and Storage

— Provide access to a *limited* supply (e.g., types of medications, quantities, dosage forms, container sizes) of medications to be used for urgent medication orders.[17] Carefully select the drugs stocked according to staff expertise and the typical patient population in each patient care area.[18]

— Ensure that drugs stocked in patient care areas and night cabinets are in ready-to-administer, unit-of-use forms (i.e., not stored in bulk containers).[3,18]

— Determine those medications for which administration after pharmacy hours is not critical. Create a protocol to guide practitioners to identify non-critical medications so that they limit unnecessary distractions and better focus on those medications that require retrieval and administration while pharmacy is closed.

— Separate and segregate products using bins and dividers to improve safe drug storage.[3] For ADCs, convert matrix drawers to drawers with locking lids. For look-alike products, consider purchasing one product of an identified look-alike pair from a different vendor or clearly differentiating the products.[19]

— Store essential neonatal or pediatric medications away from adult medications, including in night cabinets, when 24-hour pharmacy service is not available.[9]

— Standardize processes for accessing medications when the pharmacy is closed to reduce variability and opportunity for error.

— Develop protocols or checklists to guide the practitioner as to when a supervisor or pharmacist should be contacted to assist in medication retrieval and preparation. Regularly review the after-hours procedures with staff.

— Limit overrides to urgent situations when a delay in therapy would harm the patient.[10,18,20]

— Incorporate an independent double check by another practitioner at vulnerable points of the after-hours medication-use system.[16] This would include when retrieving a medication from a night cabinet or via an override, as well as transcribing medication orders after pharmacy hours.

— Develop a check system to help ensure accurate cabinet stocking.[10] Another staff member from the pharmacy or a nurse on the unit can verify accurate stocking by having the pharmacy provide a daily list of items added to the cabinet. Employing barcode technology during the stocking process can also help ensure accuracy.

— Require periodic review by a pharmacist or pharmacy technician of storage areas throughout the organization.[3]

— Regularly analyze ADC override reports, requests for missing or unavailable medications, and other sources of data (e.g., voluntary error reports, administration of rescue drugs) to identify problems.[18,20] Discuss findings with pharmacy and nursing staff to identify potential risk reduction strategies.

— Use auxiliary labels to differentiate products with look-alike names or drug name suffixes in medication storage areas.

— Standardize the manner in which drug names and descriptions are displayed to nurses, including in computer systems, ADCs, and typed lists.

Allergy Information

— Establish a forcing function error reduction strategy, a technique that eliminates or reduces the possibility of a medication error by guiding the practitioner to take the correct action while making it impossible to do the wrong thing.[21,22] Make the allergy "reaction" selection a mandatory entry in the organization's order entry systems for prescribers and pharmacists.[23]

— Test computer systems to ensure complete allergy information crosses interfaces among systems and truncation of information is avoided.

— Standardize locations (e.g., front of medical record, on top of order forms, computer screens, assessment forms) in which practitioners document and retrieve complete allergy information, including descriptions of any reaction.[23] Alert staff to always refer to these areas for reliable information.

— Provide prescribers, nurses, and pharmacists with education and tools on medication allergies.[24] Focus education on screening patients for the potential of a reaction, recognition of an allergic reaction, treatment of serious allergic reactions, and

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where to access important drug information such as common allergies, cross allergies, and combination drug products that may have implications with common drug allergies.

CONCLUSION

In Pennsylvania, 519 medication errors have been reported to the Authority that imply an event occurred while the pharmacy department was closed. The predominant types of medication errors identified through analysis of the event descriptions are wrong-drug errors, drug omissions, and prescription or refill delay events. Prescribing errors primarily involved the ordering of medications to which the patient was allergic. The primary long-term goal to prevent errors when the pharmacy is closed is to explore the possibility of establishing on-site 24-hour pharmaceutical services or remote, or off-site, pharmacy order entry services. Regular monitoring of medication retrieval when pharmacy services are unavailable could unveil potential errors. Employment of strategies to safeguard the storage and access of drugs can help prevent errors and harm to patients.

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LEARNING OBJECTIVES

— Recognize the most frequently reported medication error types involving medication therapy delivered when the pharmacy is closed.

— Recall contributing factors associated with wrong-drug events that occur after the pharmacy is closed.

— Recognize the most frequently reported high-alert medications involved in errors when the pharmacy is closed.

— Distinguish between effective and ineffective strategies to reduce the risk of medication errors when the pharmacy is closed.

SELF-ASSESSMENT QUESTIONS

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

1. Which of the following is the most frequently reported type of medication error involving medication therapy delivered when the pharmacy is closed?
   a. Drug omission
   b. Extra dose
   c. Wrong dose/underdosage
   d. Wrong drug
   e. Wrong dose/overdosage
2. *The incorrect drug was retrieved from an automated dispensing cabinet (ADC) or night cabinet in 82.3% of reported wrong-drug events.*

   Select the factor *least* likely to contribute to wrong-drug selection from ADCs or night cabinets when the pharmacy is closed.
   a. Combination drug products that carry the same name with different modifiers
   b. Lack of a review of the patient's documented allergies
   c. The volume and variety of medications available
   d. Use of overrides to gain access to the medication
   e. Drug names that look alike
3. The predominant high-alert medications involved in medication errors when the pharmacy is closed included all of the following EXCEPT:
   a. Warfarin sodium
   b. Morphine sulfate
   c. Meperidine hydrochloride
   d. Insulin
   e. Potassium chloride
4. All but one of the following are effective strategies to reduce the risk of medication errors when the pharmacy is closed. Select the *ineffective* strategy.
   a. Create a protocol to guide practitioners to identify noncritical medications so that they limit unnecessary distractions and better focus on those medications that require retrieval and administration while the pharmacy is closed.
   b. Standardize locations in which practitioners document and retrieve complete allergy information, including descriptions of any reaction.
   c. Develop a check system to help ensure accurate ADC stocking.
   d. Standardize processes for accessing medications when the pharmacy is closed to reduce variability and opportunity for error.
   e. If using ADCs, organize stock using matrix drawers.
5. *The patient was ordered quiNINE and needed a dose after the pharmacy department had closed for the day. The patient's nurse asked the nurse supervisor to retrieve the medication from the hospital's night stock. However, the nurse supervisor retrieved quiNIDine. The patient's nurse then administered the incorrect medication to the patient.*

   Select the appropriate strategy to help prevent this event from reoccurring.
   a. Use auxiliary labels to differentiate products with look-alike names or drug name suffixes in medication storage areas.
   b. Store essential neonatal or pediatric medications away from adult medications, including in night cabinets, when 24-hour pharmacy service is not available.
   c. Ensure that drugs stocked in patient care areas and night cabinets are in ready-to-administer, unit-of-use forms.
   d. Develop protocols or checklists to guide the practitioner as to when a supervisor or pharmacist should be contacted to assist in medication retrieval and preparation.
   e. Limit overrides to urgent situations when a delay in therapy would harm the patient.

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Survey of Ambulatory Surgical Facility Preoperative Screening Processes in Pennsylvania

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ABSTRACT

The Pennsylvania Patient Safety Authority developed and administered a statewide survey to inform its ambulatory surgical facility (ASF) collaboration that examines presurgical screening and assessment processes and the frequency of ASF cancellations and transfers. The results identified that 37.4% of facilities have implemented an electronic health record and 41.7% receive medical forms electronically. Secretaries and schedulers are the primary contact person 11.7% of the time for preoperative screening and 20.5% of the time for preoperative instructions. The 2010 ASF transfer rate was 1.16 per 1,000 completed procedures, and cardiac conditions were the most frequent reason for an ASF transfer. The 2010 ASF cancellation rate was 18.09 per 1,000 completed procedures, and medical conditions were the most frequent reason for an ASF cancellation. The baseline ASF prescreening activities, transfer rates and reasons, and cancellation rates and reasons obtained in this survey provide direction for the Ambulatory Surgical Facility Preoperative Prescreening and Assessment Collaboration. (Pa Patient Saf Advis 2012 Mar;9[1]:18-22.)

INTRODUCTION

In 2010, Pennsylvania ambulatory surgical facilities (ASFs) reported 3,648 events to the Pennsylvania Patient Safety Authority; 66% (n = 2,403) of these events were reported as "Incidents" and 34% (n = 1,245) of these events were reported as "Serious Events." Of the reported serious events, 34% (n = 423 out of 1,245) indicated that the patient was transferred from the ASF to an acute care hospital. ASFs also reported 335 cancellations of procedures on the day of surgery in 2010. Transfers from an ASF to an acute care hospital may represent good patient care but may also be the result of insufficient rigor in patient or procedure selection.[1,2,3] Similarly, cancellations on the day of surgery may be an indicator that practice patterns or patient selection criteria are in need of review. The Authority initiated a northeast Pennsylvania regional ASF collaboration in January 2012 to examine presurgical screening and assessment processes and the frequency of ASF transfers and cancellations. In order to understand the factors related to transfers and cancellations, a statewide survey of ASF presurgical screening and assessment practices and transfer and cancellation information was conducted.

METHODS

The survey evaluated freestanding ASFs as defined by the Pennsylvania Department of Health[4] and was made up of 37 questions:

— 13 organizational characteristic questions
— 10 patient characteristic questions
— 7 history and physical questions
— 3 cancellation questions
— 2 preoperative screening questions
— 2 transfer questions

The questions focused on ASF activities that occurred during the 2010 calendar year. Not all respondents answered all of the questions, so non-responses were removed from the analysis with the percentages calculated based on the actual responses for each question. The 10 patient characteristic questions focused on gender, insurance status, and physical health status. Questions about patient gender mix and insurance status accounted for 7 of the 10 questions. Because response rates for the gender and insurance status questions were less than 25%, which limited the reliability of this data, these questions were removed from the analysis. The unit of analysis was the ASF facility.

RESULTS

Response Rate

An e-mail invitation was sent to 260 Pennsylvania ASFs. Excluding 13 e-mails that were undeliverable, there were a total of 247 delivered invitations. The response rate was 46.5% (n = 115 out of 247).

Organizational Characteristics

Over half (63.5% [n = 73 out of 115]) of the responding ASFs are owned by physicians. The remaining ASFs are owned by hospitals or healthcare systems (16.5% [n = 19 out of 115]), corporations (11.3% [n = 13 out of 115]), and partnerships or joint ventures between physicians and hospitals (8.7% [n = 10 out of 115]).

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Ninety-seven percent of the responding ASFs are accredited, four ASFs are not accredited, and two ASFs have accreditations with two different organizations. The majority of ASFs, 66.9% (n = 77 out of 115), are accredited by the Accreditation Association for Ambulatory Health Care, 20.8% (n = 24 out of 115) are accredited by the Joint Commission, 9.5% (n = 11 out of 115) are accredited by the American Association for Accreditation of Ambulatory Surgical Facilities, and 0.9% (n = 1 out of 115) is accredited by a magnet organization. ASF size, as indicated by the number of operating rooms and/or procedure rooms, ranged from 1 to 20 rooms per facility, with an average of 3.56 rooms per facility. Three facility responses were removed from the analysis because these facilities opened in 2011; therefore, they did not match the 2010 survey time frame. The majority of responding facilities (59.3% [n = 64 out of 108]) identified themselves as providers of specialty surgical or diagnostic services. The remaining 40.7% (n = 44 out of 108) of facilities identified themselves as providers of general surgical or diagnostic services.

Ninety-nine percent (n = 83 out of 84) of responding ASFs provide ongoing patient safety educational programs or activities for their staff, and 42.3% (n = 33 out of 78) of responding ASFs participated in a culture of safety survey.

Patient Characteristics

The Pennsylvania Department of Health classifies patients based on physical status. A Class 1 patient has no organic, physiologic, biochemical, metabolic, or psychiatric disturbance.[5] A Class 2 patient has a mild or moderate systemic disturbance that is either controlled or has not changed in severity for some time. A Class 3 patient suffers from significant disturbance, although the degree to which it limits the patient's functioning or causes disability may not be quantifiable. ASFs were asked to identify the class of patients that they served the majority of the time. Class 1 patients were the most commonly treated group in 17% (n = 17 out of 102) of ASFs, Class 2 patients were the most commonly treated group of patients in 71% (n = 73 out of 102) of ASFs, and Class 3 patients were the most commonly treated group in 12% (n = 12 out of 102) of ASFs.

History and Physical

The quality of systems and processes used to obtain a completed history and physical (H&P) for an ASF was evaluated. Three-quarters of ASF respondents (75.7% [n = 87 out of 115]), have a policy in place requiring a completed H&P prior to the actual day of surgery; the other 24.3% (n = 28 out of 115) of ASFs do not have a policy in place requiring a completed H&P prior to the actual day of surgery. The time a completed H&P is received prior to the surgery date varied from one week to one month. ASFs completing the H&P on the day of surgery reported that the time frame was inapplicable. See Table 1.

The survey also evaluated the number of facilities that had an electronic health record (EHR) and whether a facility receives any medical forms electronically. Fewer than half (37.4% [n = 43 out of 115]) of ASFs have implemented an EHR and 41.7% (n = 48 out of 115) of ASFs receive medical forms electronically. See Table 2.

In assessing how ASFs received the H&P, EHR transmission was the fourth-most common method. Fifty-four percent (n = 60 out of 112) of facilities indicate two or more means of receiving the H&P information. See Table 3.

Out of 74 facilities that perform their own H&P, 95.9% (n = 71) rely heavily on information from the patient, family member, or caregiver; 47.3% (n = 35) indicated that they obtain H&P information from medical records; 31.1% (n = 23) noted that they obtain H&P information from diagnostic tests; and 8.1% (n = 6) indicated that they obtain H&P information from a provider physical assessment or phone call.

Table 1. Actual Time Prior to Surgery Date to Having Completed History and Physical

TIME	FACILITY RESPONSES	PERCENTAGE
1 to 7 days prior to surgery date	68	61.3%
8 to 14 days prior to surgery date	16	14.4%
15 to 21 days prior to surgery date	2	1.8%
22 to 30 days prior to surgery date	11	9.9%
No specified time frame	14	12.6%
Total	111	100%

Table 2. Facility Use of Electronic Health Records (EHRs) and Facilities Sharing Information Electronically

ELECTRONIC ACTIVITY	YES	NO	TOTAL
Implemented an EHR system	43 (37.4%)	72 (62.6%)	115 (100%)
Receive medical forms electronically (i.e., fax, electronic mail, EHR) from other office practices	48 (41.7%)	67 (58.3%)	115 (100%)

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ASFs were asked to identify which healthcare provider completed the H&P the majority of the time. According to the survey, surgeons complete the H&P 50.5% (n = 55 out of 109) of the time; referring physicians 23.8% (n = 26 out of 109) of the time; non-surgeon physicians 8.3% (n = 9 out of 109) of the time; nurse practitioners, certified registered nurse anesthetists (CRNAs), or physician assistants 7.3% (n = 8 out of 109) of the time; primary care physicians 6.4% (n = 7 out of 109) of the time; and registered nurses and anesthesiologists 3.7% (n = 4 out of 109) of the time. In addition to the regular H&P, 60.4% (n = 67 out of 111) of facilities also require a separate history form from the patient, family member, or caregiver.

Preoperative screening, including preoperative testing, was another part of the H&P process to evaluate. For the survey, ASFs identified the primary patient contacts for preoperative screening. Nurses are by far the primary patient contact for any preoperative screening, serving in this role for 63.9% (n = 71 out of 111) of responding ASFs. Nurse practitioners, physician assistants, and surgical and non-surgical physician offices are the primary patient contact for preoperative screening at 12.6% (n = 14 out of 111) of facilities, followed by secretaries and ASF schedulers, who were noted as the primary patient contact for preoperative screening at 11.7% (n = 13 out of 111) of responding ASFs. The remaining 11.7% (n = 13 out of 111) of facilities do not have a primary patient contact for preoperative screening.

Table 3. Methods of Delivering the History and Physical

METHOD OF DELIVERY	FACILITY RESPONSES	PERCENTAGE*
Faxed from provider	79	69.9%
Delivered by patient, family member, or caregiver	35	31.0%
Mailed by provider	28	24.8%
Electronic health record transmission	23	20.4%
Hand delivered	15	13.3%
Electronic mail	13	11.5%
History and physical performed at the facility	13	11.5%
Unidentified delivery method	6	5.3%
Total number of responding facilities	113	

* Facilities could choose more than one item

Table 4. Ambulatory Surgical Facility Cancellations

MOST FREQUENT REASON FOR ASF CANCELLATIONS	FACILITY RESPONSES	PERCENTAGE
Medical	44	44%
Patient (e.g., no show, changed mind about surgery)	27	27%
Failure to follow protocol (e.g., incomplete history and physical, failure to maintain nothing by mouth status, failure to stop medications, no ride home)	24	24%
Other (e.g., unsuccessful completion of all conditions for the procedure, no one main reason (i.e., multiple reasons), no cancellations, unsure, data unavailable)	5	5%
Total	100	100%

Cancellations

Based on 56 facility responses, the ASF survey revealed a 2010 cancellation rate of 18.09 per 1,000 completed surgeries or procedures (95% CI: 17.5 to 18.68). The cancellation rates ranged from 0 to 144.22 cancellations per 1,000 completed surgeries or procedures performed. There was great variation in the reported number of cancellations. The range of ASF cancellations for 2010 was from 0 to 650 cancellations. The average number of cancellations was 64.88, with a standard deviation of 127.66, median of 96.27, and mode of 5.

ASFs were asked to identify when the majority of their same-day patient cancellations occurred: prior to admission, after admission, or after anesthesia. In this survey, out of 100 facilities, 56% indicated that the majority of their same-day patient cancellations occurred prior to admission, 31% indicated the majority of their same-day cancellations occurred after admission, 13% did not know when the majority of their same day cancellations occurred, and none indicated that the majority of their same day cancellation occurred after anesthesia. See Table 4 for the reasons for patient cancellations.

ASFs were asked who the primary patient contact was for any preoperative instructions. Out of 112 facilities, 70% have a nurse as the primary contact; 20.5% have a scheduler, secretary, or technician as the primary patient contact; and 8% designate the primary patient contact as a nurse practitioner, CRNA, physician assistant, clinical staff member, or non-ASF

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physician. One facility indicated that they do not have a primary patient contact for preoperative instructions.

Transfers

ASF transfer rates were calculated using the 74 facility responses that provided answers to the questions asking for the total number of ASF transfers to the inpatient setting in 2010 and the total number of completed surgeries and/or procedures in 2010. Responses such as "unknown" or "unavailable," those using the percentage of transfers rather than the number, and responses that were inconsistent (e.g., transfer rates greater than number of completed surgeries or procedures) were removed from the calculations. The transfer rate was 1.16 transfers per 1,000 completed surgeries or procedures (95% CI: 1.04 to 1.29).

The 2010 ASF number of transfers range from 0 to 50 with a median of 2, mode of 0, and average of 4.35. These numbers were deemed to be statistically valid. Twenty facilities had no transfers in 2010, and seven facilities had 11 or more transfers in 2010. A detailed analysis of the transfers and facility organizational characteristics was performed and revealed that the 20 facilities with no transfers were facilities that provided services for four or fewer medical specialties. Six of the seven facilities with 11 or more transfers in 2010 were generalists that provided services for six or more medical specialties. ASF facilities were then divided into two groups based on the number of medical specialties they provided (i.e., one to four medical specialties and five or more medical specialties). Transfer rates were recalculated for each group. See Table 5 for a comparison of transfer rates based on medical specialty designation.

Facilities were asked to identify the most frequent reason their facility transferred their patients to a hospital setting. Cardiac conditions (e.g., arrhythmias, chest pain), which 52.8% (n = 37 out of 70) of facilities reported as the most frequent reason for an ASF transfer to a hospital. Table 6 provides a breakdown of the facility-level reasons for transferring patients to the hospital.

LIMITATIONS

Hospital-based ASFs were not included in this survey, which limits the results to freestanding ASFs. Hospital-based ASFs may have different presurgical screening and assessment processes, as well as different cancellation and transfer information and rates. Many of the ASF facilities indicated that some of the information requested for this survey (e.g., number of male and female patients, number of patients with specific types of insurance coverage) was not routinely collected, which limited their ability to answer some of the questions. The other set of questions with a high percentage (>75%) of missing data focused on the type of anesthesia. The missing data prevented the analysis of these patient characteristics and their potential association with ASF transfers.

CONCLUSIONS

This survey of freestanding ASFs came from facilities that were physician-owned, accredited by the American Association for Ambulatory Health Care, and providers of patient safety education programs and activities. The results uncover variation in how H&P information is obtained and collected. Seventy percent of facilities receive H&Ps by fax and 20.4% by EHR transmission. While less than half of the ASFs have implemented an EHR system, the number of ASFs transmitting information with an EHR is expected to rise as

Table 5. Comparison of Ambulatory Surgical Facility (ASF) Transfer Rates by Number of Medical Specialties

ASF MEDICAL SPECIALTY GROUPING	TRANSFER RATE PER 1,000 COMPLETED SURGERIES AND/OR PROCEDURES
All ASF medical specialties combined (n = 74)	1.16 (95% CI: 1.04 to 1.29)
ASFs that offer 4 or fewer medical specialties (n = 55)	0.75 (95% CI: 0.63 to 0.87)
ASFs that offer 5 or more medical specialties (n = 19)	2.06 (95% CI: 1.76 to 2.36)

Table 6. Ambulatory Surgical Facility Transfers to Hospitals

MOST FREQUENT REASON FOR TRANSFERS	FACILITY RESPONSES	PERCENTAGE
Cardiac (e.g., arrhythmias, chest pain)	37	52.9%
Uncontrolled pain	11	15.7%
Unspecified surgical complications	6	8.6%
Perforations	5	7.1%
Respiratory	4	5.7%
Anesthesia difficulties	3	4.3%
Bleeding	2	2.9%
Hypertension	1	1.4%
Procedural complication	1	1.4%
Total	70	100%

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more ASFs implement an EHR system. The information provided in this survey provides a starting point to address ASF transfers and cancellations and will help guide the Authority's ASF collaboration in Pennsylvania's northeast region.

ACKNOWLEDGMENTS

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Pennsylvania: On the CUSP of Measuring Infection Prevention Culture

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ABSTRACT

The Comprehensive Unit-based Safety Program (CUSP) works to establish a safety climate through the establishment of a unit-based culture of safety. The second progress report on the national On the CUSP: Stop Blood Stream Infection project states that the pre- and post-CUSP implementation safety culture survey showed little change upon comparison. Instead, CUSP's success has been measured by a surrogate outcome (infection rate). When central venous catheters are in use, safe culture is evident in direct measurement of compliance with best practices, as well as in device utilization ratio (DUR). The implementation of CUSP in cohort 2 in Pennsylvania units has resulted in improved compliance with best practices and an 8% decrease in DUR from baseline. (Pa Patient Saf Advis 2012 Mar;9[1]:23-6.)

INTRODUCTION

The Comprehensive Unit-based Safety Program (CUSP) is a structured, strategic framework with the intent of improving the culture of patient safety.[1] The CUSP methodology is flexible as it can be applied to many patient safety issues. For the purpose of this article, Pennsylvania Patient Safety Authority analysts have chosen to focus on cohort 2 of the On the CUSP: Stop Blood Stream Infection (BSI) project in Pennsylvania. The second progress report on the national On the CUSP: Stop BSI project exhibits results from the pre- and post-CUSP implementation Hospital Survey on Patient Safety (HSOPS). HSOPS was administered as part of the project and showed little change pre- and postimplementation.[2] Interested in whether CUSP implementation improved safety culture in participating Pennsylvania critical care units, Authority analysts queried National Healthcare Safety Network (NHSN) event data reported by Pennsylvania hospitals in order to determine compliance with best practices related to CUSP implementation. Authority analysts found an increase in best-practice compliance possibly related to improved safety culture in the CUSP group.

BACKGROUND

The intensive care unit project of the Michigan Health and Hospital Association's Keystone Center for Patient Safety and Quality (MHA Keystone Center) achieved impressive results with clinical interventions that mainly focused on central venous catheter (CVC) care. The MHA Keystone Center project recommended evidence-based procedures for CVC insertion and daily goal sheets. The MHA Keystone Center study also implemented a comprehensive program (CUSP) that sought to improve the culture of safety in the units where data was collected.[3] Zhang et al. have defined *safety culture* as "the enduring value and priority placed on worker and public safety by everyone in every group at every level of an organization. It refers to the extent to which individuals and groups will commit to personal responsibility for safety [and] strive to actively learn, adapt and modify (both individual and organizational) behavior based on lessons learned from mistakes."[4] *Safety climate* is defined as "the temporal state measure of safety culture, subject to commonalities among individual perceptions of the organization. [Safety climate] is therefore situationally based, refers to the perceived state of safety at a particular place at a particular time, is relatively unstable, and subject to change depending on the features of the current environment or prevailing conditions."[4] Climate refers to environmental influence on culture, and culture is the behavior of the individual within the climate. CUSP's intent is to have the clinicians learn from mistakes, thereby improving the culture of safety.[1] The CUSP manual states that "culture is a major focus [of CUSP] because it represents a set of shared attitudes, values, goals, practices, and behaviors that make one unit distinct from another."[1] Furthermore, Bandura observed that "what people [clinicians] think, believe, and feel affects how they [clinicians] behave."[5]

Although the CUSP project may not have been able to statistically prove—as measured by the questionnaire—that a culture of safety had been caused by CUSP, the CUSP group did demonstrate a reduction in central line-associated bloodstream infection (CLABSI) rates after CUSP was implemented, which may allude to the presence of improved safety culture. If CUSP methodology has influenced how participants think, believe, and feel about safety culture, participant behavior toward compliance with best practices related to CVC care would change. Can measurement of compliance with best-practice data reflect the prevalence of safety culture?

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METHODS

The Authority collects responses to compliance questions in custom data fields through NHSN that can be used to gauge compliance in Pennsylvania hospitals. Cohort 2 of the On the CUSP: Stop BSI project was instituted by the Hospital and Health System Association of Pennsylvania (HAP), the Health Research and Educational Trust (HRET), the Johns Hopkins University Quality and Safety Research Group, and MHA Keystone Center. Cohort 2 was chosen for analysis related to the availability of a complete pre- and post-CUSP implementation data set that was inclusive of the Authority's custom data fields. The Authority's data pull from NHSN was conducted on September 20, 2011. Baseline, or preimplementation, data query started September 2008 and continued through August 2009. CUSP cohort 2 data query started in September 2009, and the data through June 2011 was analyzed. September 2009 marks the beginning of the postimplementation period. The tables break out baseline (pre-September 2009) and postimplementation (post-September 2009) data for both groups despite the non-CUSP group having had no direct intervention related to official CUSP participation in cohort 2. The best-practice compliance question fields included in the analysis are part of the NHSN CLABSI event report. The responses to the questions have been normalized and reflected as percentages for comparison between non-CUSP critical care units and CUSP cohort 2 critical care units.

CVC insertion is a quick procedure performed by a group of providers that adhere to the culture of their practice. Maintenance of the line occurs over many hours to months and involves a host of individuals (e.g., nurses, physicians, caregivers, patients, families), all of whom have a culture in regard to causing or preventing the development of CLABSI.[6] Therefore, given the distinct differences between insertion and maintenance, it should be understood that each phase of CVC life would possess its own unique climate based solely on the culture of the individuals involved in a CVC phase. Noting the distinct differences between insertion and maintenance phases, Tables 1 and 2 speak to the culture associated with insertion. The ability to determine CVC necessity (see Table 3) would be indicative of a quality-based system for tracking and surveillance of the line post-insertion, transcending into the maintenance phase of CVC culture. Culture (behavioral choices) associated with compliance with best practices would then be measured by the answers associated with each compliance question. To fully evaluate CUSP's impact through a traditional outcome metric, Authority analysts also examined the pre- and postimplementation device utilization ratios (DUR) of each group.

RESULTS

Tables 1, 2, and 3 show the responses to the individual questions that target compliance with best practices. Overall, CUSP cohort 2 units outperformed non-CUSP units in percent compliant with best practices both pre- and post-CUSP implementation. Note the decrease in "blank" and "unknown" responses and the difference between the "no" and "yes" fields post-implementation in the CUSP group, indicating better surveillance of compliance metrics, possibly due to CUSP climate. Furthermore, the CUSP intervention took demonstrated high-performers (as noted by preimplementation percentages) and pushed compliance even higher.

Table 4 refers to the DUR of non-CUSP units and DUR of CUSP cohort 2. Central line-days divided by patient-days equals DUR. When considering the lower DUR in the CUSP group and the results represented in Table 3, it would appear anecdotally that removal of unneeded CVCs is a high priority in the CUSP group. If compliance with best-practice culture (removal of unnecessary CVCs) is in fact due to CUSP, there should be a significant difference of differences in proportions between the groups.

Table 1. Maximal Barriers on Insertion

	NON-CUSP		CUSP COHORT 2	
	Baseline	Post-Implementation	Baseline	Post-Implementation
Yes	58.6%	67.2%	81.4%	91.5%
No	1.7%	1.3%	0.7%	0.6%
Unknown	39.4%	31.1%	17.9%	7.9%
Blank	0.3%	0.5%	0.0%	0.0%

Table 2. Chlorhexidine Prep Preinsertion

	NON-CUSP		CUSP COHORT 2	
	Baseline	Post-Implementation	Baseline	Post-Implementation
Yes	57.2%	64.8%	80.0%	84.8%
No	3.6%	2.7%	0.0%	0.6%
Unknown	38.3%	31.0%	17.9%	7.9%
Contra-indicated	0.6%	0.9%	2.1%	6.7%
Blank	0.3%	0.6%	0.0%	0.0%

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The DUR for the CUSP hospitals decreased from 34.4% to 31.1% (before CUSP implementation versus after implementation), which is a decrease of 3.3 percentage points. Some of this decrease may not have been due directly to CUSP, but may have in part been general cultural changes that were also experienced at non-CUSP hospitals. To estimate this impact, analysts found that in non-CUSP hospitals, in the exact same time period, the DUR decreased from 38.3% to 37.8%, which is a decrease of only a half of a percentage point. Therefore, subtracting the general decrease of 0.5 percentage points from the raw 3.3 percentage points yields an estimated impact of CUSP of 2.8 percentage points. Analysts formally tested this 2.8% and found it to be *statistically significant* using the Gaussian method described by Wallis.[7] The decrease of 2.8 percentage points in DUR represents an 8% decrease in DUR from the baseline level of 34.4%.

DISCUSSION

The relationship between clinical change (compliance with best practices) and culture is noted in the second CUSP progress report as "clinical changes require and reinforce changes in safety culture."[2] The importance of linking culture and quality improvement is stressed in the CUSP manual through the statement: "culture and quality improvement need to be linked."[1] If clinical change is evident and positive, safety culture would be reinforced; therefore, one should observe positive compliance (behavior) and better outcome rates would follow. Benner has observed that experts behave with the future in mind, and that they consider likely possibilities based on current data.[8] Kunkel and Nagasawa note that "present circumstances provide information about probable future events based on past experiences, and thus serve as signals for present behavior."[9]

The challenge for those who wish to improve compliance will be to set the circumstance (climate) that delivers current data to bedside experts about their behaviors (culture) in regard to best practice in order to achieve desired future events (outcome). CLABSI prevention is at a unique juncture; many facilities can report CLABSI rates at or approaching zero for individual units. How can one have situational awareness, deliver current data, and intervene when the metric of monitoring outcome (infection rates) fails to be sensitive enough to address cultural drift? If compliance with best practices is monitored by way of methods like statistical process control (SPC), infection preventionists can identify behaviors that fail to comply with best practices based on process signals, allowing the experts to be informed of potential issues ahead of time instead of waiting for an infection rate increase in order to investigate system defects.

At the unit level, compliance data should be collected at regular intervals. Systems can be designed to use snapshot data depicted in SPC format of *carefully chosen* best-practice metrics in order to gauge safety culture. In addition, systems can be designed to make it extremely difficult for those who function within them to misstep; however, if someone does misstep, others within the system may then, because of established climate, discourage behavior that is not part of a safe climate. If there is widespread cultural deviance or normalization of deviance, one would expect to see compliance data signals. When the data signals for a particular metric, action can be taken in order to correct the culture associated with the defect, normalizing compliance. Wiemken noted that "through adequate data collection and critical analysis of control charts, the infection preventionist can detect aberrant data early, which allows for prompt intervention and mitigation of any poor outcomes."[10]

Following similar methodology, Harpel et al. decreased the incidence of CLABSI by redesigning the traditional intravenous team into a vascular resource team (VRT) whose duties included weekly audits of best practices related to CVC maintenance.[11] Bedside nurses were educated by the VRT in central line maintenance techniques. In addition, bedside nurses and managers were provided with regular feedback on compliance audit data. When best-practice compliance defects signaled via SPC, the infection preventionist and

Table 3. Daily Review of Central Venous Catheter Necessity

	NON-CUSP		CUSP COHORT 2	
	Baseline	Post-Implementation	Baseline	Post-Implementation
Yes	53.4%	57.6%	72.1%	79.3%
No	8.0%	7.4%	8.6%	12.2%
Unknown	38.3%	34.3%	19.3%	8.5%
Blank	0.3%	0.7%	0.0%	0.0%

Table 4. Device Utilization Ratio (DUR)

	NON-CUSP		CUSP COHORT 2	
	Baseline	Post-Implementation	Baseline	Post-Implementation
DUR (95% CI)	0.383 (0.382-0.384)	0.378 (0.377-0.379)	0.344 (0.341-0.346)	0.311 (0.309-0.313)

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VRT would investigate issues and mentor staff nurses in performing high-quality, evidence-based vascular access care. Harpel et al. found that "compliance with central line dressing changes rose from 68% to more than 90%." The authors also wrote: "This collaborative approach between the bedside nurses and the vascular resource team [which allowed for the optimum balance of resources] led to a hospital-wide reduction in CLABSI." The VRT is an example of a system that was created to identify behavior, nourish a climate that supports competence, encourage cultural compliance with best practices, and achieve reductions in CLABSI.

CONCLUSION

System Framework

CUSP is a valuable framework providing a climate for the development of cultures that are centered in, and supportive of, compliance with best practices, which is essential for the well-being of all patients. CUSP is the centerpiece of a patient safety foundation that is essential for an effective infection prevention program. Aligning CUSP methodology, current evidence-based guidelines, and dedicated administrative support helps to set the foundation of an effective program. Foundations, however, need to be built upon for the structure to be useful. When epidemiological and compliance measurement are tracked through SPC, it is possible to have current telemetry of culture, which will enable activities for clinical change providing for actionable defect mitigation. Continuous mapping of behavioral data from compliance telemetry allows for balanced resources, thereby influencing and supporting the climate of best future practice and effectively deflecting CLABSI from patients. According to Streed, "elimination of HAIs [healthcare-acquired infections] requires this constant investment of resources in terms of enquiry, action, vigilance, and ownership strategies to increase sustainability."[12]

Rely on Outcome Metrics or Process Control?

Control of process, or lack thereof, leads to an outcome. There is value in the monitoring of data points aimed at evaluation of best practices. In the current climate of infection prevention, outcome has been the traditional measurement of success. Proactive intervention using process control data as telemetry of culture—rather than the traditional method of reacting to outcome (infection) rates—can possibly hold the key to less CLABSI. Streed states that "outcome measurement is at best a surrogate indicator of process adherence, and that effective process control leads to predictable outcomes."[12] Outcomes need to be predictable in order to know the risk to the patient in the designed systems. The future of infection prevention will rely on the preventionist's ability to measure processes, predict outcomes, and control processes with appropriate interventions that focus on improving the culture of compliance.

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Data Snapshot: Death Rate among CUSP Facilities

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The adjoining article, "Pennsylvania: On the CUSP of Measuring Infection Prevention Culture," focuses on the establishment of safety climate through implementation of the Comprehensive Unit-based Safety Program (CUSP). During analysis for that article, using Pennsylvania event data reported through the Centers for Disease Control and Prevention National Healthcare Safety Network, the analysts observed that the required data field labeled "Died" was answered with "Y-Yes" responses in 21.2% of the analyzed events (as opposed to 78.6% "N-No"). This field requires a positive response if the patient died during the facility admission, whether or not the death was attributable in any way to the central line-associated bloodstream infection (CLABSI). There is an optional field, "Death," that may be completed for an event for being "assessed by surveillance personnel as having contributed to the death. That is, the event [CLABSI] either directly caused death or exacerbated an existing disease condition, which then led to death."[1] This optional field corresponding to direct cause was not completed for any of the events analyzed, so the data analysts focused on the "Died" field.

More information about the relationship between CUSP implementation and less mortality from CLABSI could be obtained if the optional (contributed to) death field data was available for analysis.

Table. Deaths in CLABSI Events Analyzed in Relation to Critical Care Units in CUSP, September 2008 to June 2010

DEATHS	BASELINE	POST-IMPLEMENTATION	TOTAL
Cohort 2	29	22	51
Number of Patient Days			
Cohort 2	234,887	430,123	665,010
Deaths per 100,000 Patient Days			
Cohort 2	12.35 (7.85 - 16.84)	5.11 (2.98 - 7.25)	7.67 (5.56 - 9.77)

The Table shows that the number of deaths in the analyzed units decreased post-implementation, regardless of whether the death was attributable to the infection. This decrease coincided with a larger number of patient days in those units. Further investigation may be warranted.

NOTE

1. Centers for Disease Control and Prevention National Healthcare Safety Network (search term Primary Bloodstream Infection (BSI); cited 2012 Jan 10). Available from Internet (digital certificate required): https://sdn7.cdc.gov/nhsn/help/NHSN_Help.htm.

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Quarterly Update on Preventing Wrong-Site Surgery

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This quarterly update will discuss five issues:

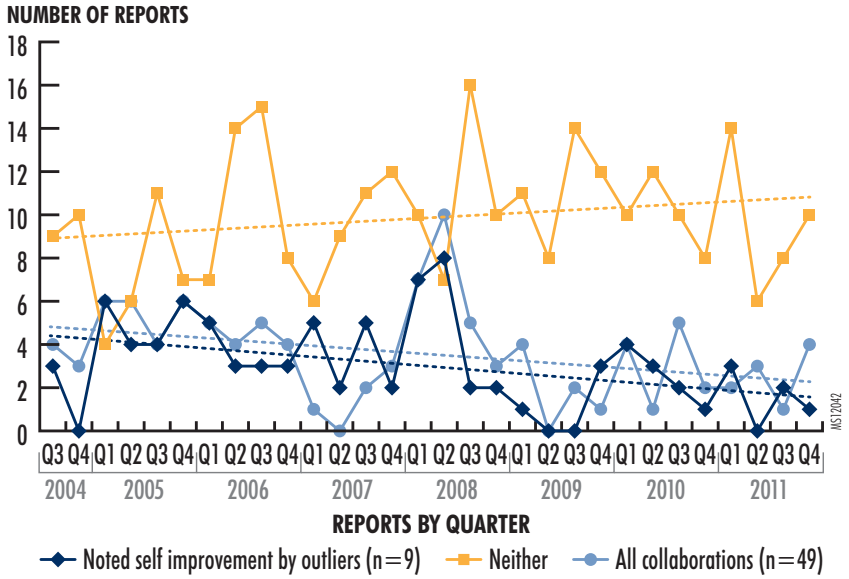
1. The direction of the Patient Safety Authority project to prevent wrong-site surgery and considerations of its recommendations to prevent wrong-site surgery
2. Estimates of the incidence of wrong-site anesthetic blocks and ureteral stent insertions
3. Informative near-miss reports
4. Preventing misinformation from the surgeon's office
5. The relationship between wrong-site surgery and the operating room (OR) culture of safety

DIRECTION OF THE AUTHORITY'S PROJECT TO PREVENT WRONG-SITE SURGERY AND CONSIDERATIONS OF RECOMMENDATIONS TO PREVENT WRONG-SITE SURGERY

There were another 15 wrong-site surgeries this quarter, bringing the total since reporting began in July 2004 to 469, in a seemingly inevitable weekly march to an unenviable 500. However, the project to prevent wrong-site surgery, starting with the initial identification of evidence-based best-practice principles in September 2007,[1] shows progress. The Authority previously reported on the commitments of eight (now nine) facilities to implement wrong-site surgery prevention programs on their own.[2] It has also described the results of two collaborations totaling 49 facilities to implement evidence-based best practices to prevent wrong-site surgery. The first collaboration of 30 facilities resulted in a 73% reduction of wrong-site surgery.[3] The second collaboration resulted in no wrong-site surgeries in any of the facilities' ORs for more than one year.[4] Extensive analysis has shown no difference in recidivism rates between facilities exhibiting a commitment to self-improvement and facilities participating in collaborations, suggesting that both can be equally successful.

All of the progress in preventing wrong-site surgery has occurred in the 58 facilities that made a serious effort to prevent wrong-site surgery. The remaining facilities in

Figure. Wrong-Site Surgery Trends by Intervention



Scan this code with your mobile device's QR reader to access the Authority's wrong-site surgery prevention toolkit.

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Pennsylvania have actually shown an increase in wrong-site surgeries (see Figure). These opposite trends support the notion that institutional commitment is critical to preventing this "never" event. The Authority encourages the remaining facilities in Pennsylvania to make the institutional commitment to join in the collaborations to prevent wrong-site surgery.

The variation—or volatility—of the reported number of events per quarter (or of the time between events) has an inverse relationship to the degree of standardization or consistency of processes within the groups: the more the volatility, the less the consistency in the processes. Volatility can be measured by the standard deviation of the time between events: the higher the standard deviation, as a percentage of the mean, the greater the volatility and the less likely that the processes to prevent wrong-site surgery are consistently followed. The Authority examined the time between events from July 2004 through September 2011 (to avoid open-ended reporting at the end of the current quarter). The results confirm that demonstrated efforts to prevent wrong-site surgery are associated not only with better results, but also with less volatility, implying that the improvements are not due to random variation, but to more consistency in following procedures (see Table 1).

The Authority is circulating draft recommendations for preventing wrong-site surgery. It invites comments about the potential barriers to implementation of the recommendations from facilities that provide surgical services. The Authority specifically encourages the OR managers of all facilities in Pennsylvania to indicate facility-specific barriers to possible implementation, as well as provide stories about successful implementation for each of the draft recommendations. To solicit this information, the Authority has circulated a survey to all of the Pennsylvania OR mangers through their patient safety officers.

ESTIMATES OF THE INCIDENCE OF SOME FREQUENT TYPES OF WRONG-SITE PROCEDURES

Wrong-Site Anesthetic Blocks

There were another three wrong-site anesthetic blocks reported this quarter, despite the attention given to this problem in recent issues of the *Advisory*.[5,6] A report by Stanton et al.[7] allows one to infer an incidence of wrong-site anesthetic blocks. The authors reported on their experience with a verification protocol to prevent wrong-site blocks. Despite their prevention protocol, they experienced two events over three years in a hospital practice in which peripheral nerve blocks accounted for 44% of approximately 19,500 anesthetics per year. These estimates produce an incidence of approximately one wrong-site block for every 12,870 peripheral nerve blocks.

Wrong-Site Ureteral Stent Insertions

There were three wrong-site procedures involving ureteral stents reported this quarter, bringing the total number for these wrong-site procedures to 25. As mentioned in an earlier update, procedures involving stenting of the ureters account for about 80% of all wrong-site urological procedures.[6]

The Authority obtained the number of insertions of ureteral stents from the Pennsylvania Health Care Cost Containment Council to calculate an incidence of insertion of ureteral stents, as a primary procedure, on the wrong side. The techniques for estimating the number of single ureteral stent insertions as primary procedures was not straightforward. The method for obtaining a point estimate is explained in the "Calculation of the Number of Ureteral Stents Inserted as a Primary Procedure." The median point estimate was 81,317 insertions of a single ureteral stent as a primary procedure from the beginning of the third quarter of 2004 through the end of the first quarter of 2011. During that period, the Authority received 19 reports of a ureteral stent being inserted in the incorrect ureter as a primary procedure without realization and reinsertion in the correct ureter before the end of the procedure, for an incidence of one wrong-site procedure for every 4,280 procedures. Assuming the upper range of the estimates for the number of unilateral procedures, the incidence is at least one wrong-site procedure for every 4,765 procedures.

Table 1. Volatility of the Time between Wrong-Site Surgery Events for Different Initiatives to Prevent Wrong-Site Surgery, Pre- and Post-Intervention

GROUP	DAYS PRE	SD	%	DAYS POST	SD	%
Self-improvement	27	27	101%	44	32	71%
First collaboration	39	40	103	55	23	42
Second collaboration	54	42	78	116	45	39
No known initiative	10	7	69	9	5	61

SD = standard deviation

% = standard deviation as a percentage of the mean

INFORMATIVE NEAR-MISS REPORTS

A Proposed Addition to Critical Near-Miss Reports

In the December 2011 update,[4] the Authority listed three types of wrong-site near-miss events identified by the World Health Organization's High 5s project as critical near misses worthy of root-cause

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CALCULATION OF THE NUMBER OF URETERAL STENTS INSERTED AS A PRIMARY PROCEDURE

The Authority obtained the number of insertions of ureteral stents between the beginning of the third quarter of 2004 and the end of the first quarter of 2011 from the Pennsylvania Health Care Cost Containment Council in order to calculate an incidence of insertion of ureteral stents, as a primary procedure, on the wrong side.

In-patient procedures were determined from International Classification of Diseases-Ninth Revision (ICD-9) codes for insertion of ureteral stents as primary procedures.

Outpatient procedures were determined from the same ICD-9 codes from the third quarter of 2004 through the second quarter of 2007. Subsequently, only Current Procedural Terminology (CPT) codes for ureteral stents were available for outpatient procedures through the first quarter of 2011. The Authority extrapolated the number of outpatient stents done as primary procedures by four methods:

1. Calculate the percentage of stents as primary procedures from ICD-9 codes compared to all stents from CPT codes for the times (until mid-2007) when both were available and then use that percentage as the conversion factor for each subsequent quarter.
2. Calculate the percentage of stents as primary procedures from ICD-9 codes compared to all stents from CPT codes for each quarter (until mid-2007) when both were available and then take the average of those percentages as the conversion factor for each subsequent quarter.
3. Calculate the percentage of stents as primary procedures from ICD-9 codes compared to all stents from CPT codes for each quarter (until mid-2007) when both were available and then extrapolate the subsequent percentages over time using linear regression.
4. Use the correlation of the number of stents as primary procedures from ICD-9 codes compared to all stents from CPT codes for each quarter (until mid-2007) when both were available and then extrapolate the subsequent number of stents as primary procedures over time using linear regression.

The number of patients who received bilateral stents, with no potential for right-left confusion, was estimated by calculating the difference between the counts of primary ureteral stent procedures on all the records and the number of records with primary ureteral stent procedures. This difference was then subtracted from the number of records with primary ureteral stent procedures to estimate the lower limit on the number of unilateral stents. The upper limit was estimated by assuming all of the stents were unilateral, placed sequentially, if there was more than one count per record.

These calculations resulted in eight point estimates, ranging from 72,782 to 90,582, for the number of ureteral stents done as primary procedures from July 2004 through March 2011. The median point estimate was 81,317 insertions of a single ureteral stent as a primary procedure. In that period, the Authority received 19 reports of a ureteral stent being inserted in the incorrect ureter as a primary procedure, without timely realization and reinsertion in the correct ureter, for an incidence of 1 every 4,280 procedures. Assuming the upper range of the estimates for the number of unilateral procedures, the incidence is at least 1 every 4,765 procedures.

analyses, perhaps using the Authority's standard form: wrong-site near misses resulting in the following:

1. Procedures that are done correctly on the correct patient despite incorrect information
2. Errors caught by the last step of the Universal Protocol, the time-out
3. Near-miss situations resulting in cancellation of the procedure

A report this quarter suggests a fourth category:

4. Medically indicated procedures done, *with prior approval*, that differ from the originally scheduled procedure because of a near-miss event caught during the preparation of the patient for surgery. An example of a report that would fall into this category is as follows:

Left eye was marked with the word "right" over it. Drops were put in the left eye prior to surgery. Error noted prior to patient having procedure. The patient did require the surgery on the left side, so the surgeon spoke with the patient and his wife, got a new consent, and proceeded with the left eye.

As previously noted,[4] treating critical near misses as seriously as wrong-site events should help maintain awareness of the constant risk of wrong-site events.

Reminders from Other Near-Miss Reports This Quarter

All verbal verification should be done using questions that require an active response of specific information rather than a passive agreement, such as in the following example:

> *The patient was identified in preoperative [area]. The patient was asked if name and physician were correct,*

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and the patient answered yes. The bracelet was checked for identification and allergies. Upon entering the OR, during bracelet check and correct surgery confirmation, it was determined that it was the incorrect patient. The patient was for another physician. The patient was returned to the preoperative [area], and the correct patient was taken to the OR.

Even after the completion of the procedure, attention must be paid to proper documentation regarding the pathology specimen, postoperative orders, and dictation of the operative note. This report shows improper documentation in the postoperative orders:

Eye surgery orders were completed and sent to pharmacy with the wrong eye indicated (written as "right" when it should have been "left"). The surgery center called the pharmacy and gave a new copy of the orders with the correct eye indicated.

PREVENTING MISINFORMATION FROM THE SURGEON'S OFFICE

The two major causes of wrong-site surgery are misinformation and misperception. Ensuring the completeness and accuracy of information from the surgeon's office is the first step in preventing misinformation from leading to wrong-site surgery.

Three wrong-site surgeries, one near miss with cancellation of the operation, and three other reports of near misses during the past quarter underline the importance of the surgeon's office providing accurate information. As usual, all cases have been edited to provide contextual de-identification.

A patient was scheduled for needle localization and sentinel node injection, and then surgery to remove sentinel nodes. The surgeon scheduled the surgery for Nov. 8, but scheduled the sentinel node injection in nuclear medicine for Nov. 9. The patient had the needle localization on Nov. 8 and then was taken to the OR without first going to nuclear medicine. It was then discovered that the patient was not injected in nuclear medicine.

A patient was on the OR schedule for total right-hip arthroplasty. The consent signed by the patient in the physician's office was for left-shoulder surgery that he had completed in June. A new consent was signed by the patient.

A patient was scheduled for a procedure on the left foot. The surgery was actually to be done on the right foot. The consent was incorrect, as was all dictated information on the chart. The correct consent was obtained by the physician in the holding area. The handwritten history and physical from the physician was correct. Most incorrect areas have been corrected by appropriate personnel. Follow-up with involved hospital staff was done.

A patient with back and right-leg pain was scheduled for L4-5 discectomy. No laterality was identified by the physician when scheduling, nor was laterality identified on the consent. In the preoperative holding [area], the site was marked (lumbar area of the back). The surgeon performed a left L4-5 hemilaminotomy and excision of herniated disk. The next morning, the surgeon saw the patient, and when questioned about how his left leg was feeling, the patient stated his left leg was always fine, the pain was in his right leg. The surgeon realized the procedure was done on the incorrect side; the patient was taken back to the OR and underwent a right hemilaminotomy and excision of herniated disk.

The patient information received from the physician's office identified the wrong side.

A patient was scheduled for L total hip replacement. While setting up, the doctor heard a [sales] representative talking to a technician about instruments for L hip. The doctor stated that it was not L but R hip. The office sheet was checked, and it was verified that it stated L hip. Implants and instrumentation present were for L hip. The patient [had discussed with surgeon doing] R hip. The case was cancelled and rescheduled for a later date.

A middle-aged man was scheduled by the surgeon for insertion of a left ureteral stent. The imaging studies were performed at another institution. The report was not present in patient information received from the office. The procedure was performed for ureteral calculus. The consent, reservation form, and registration all stated the left ureter. A time-out was conducted with the information as stated, with participation of the surgeon. The pyelogram [showed no irregularities]. After the procedure, when the surgeon consulted office notes, the surgeon determined that it should have been a right ureteral stent because the stone was present on the right. A right ureteral stent was inserted [later].

This year, the Authority had the opportunity to visit a facility that had requested a consultation as part of its initiative to prevent wrong-site surgery after experiencing four events within one year. The facility stated that its preadmission testing (PAT) personnel identified incomplete or inconsistent information on the schedule, consent, and/or history and physical from the surgeon's office. These deficiencies were corrected with calls to the surgeon's office. The PAT staff estimated that they caught inconsistencies on an average of four patients every day. That means the offices were putting incorrect information

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Table 2. Differences in Agreement with Statements on a Culture of Safety Survey by Operating Room Personnel between Facilities with No History of Wrong-Site Surgery and a History of Wrong-Site Surgery

STATEMENT	PERCENTAGE		*P* CHI-SQUARE
	No Wrong-Site Surgery	Wrong-Site Surgery	
Agreement with the Following Statements was Significantly More Likely with No Wrong-Site Surgery than with Wrong-Site Surgery			
I know the first and last names of all the personnel I worked with during my last shift.	88%	61%	0.000
It is easy for personnel in the operating rooms (OR) here to ask questions when there is something that they do not understand.	79	63	0.001
Working in this hospital is like being part of a large family.	65	51	0.001
There is widespread adherence to clinical guidelines and evidence-based criteria regarding patient safety here.	79	59	0.001
Patient safety is constantly reinforced as the priority in the ORs here.	86	72	0.001
I know the proper channels to direct questions regarding patient safety in the ORs here.	89	81	0.002
Staff/attending physicians in the ORs here take responsibility for patient safety.	74	58	0.002
Medical errors* are handled appropriately in this hospital.	83	72	0.003
I would feel safe being treated here as a patient.	83	72	0.003
Decision making in the OR utilizes input from relevant personnel.	66	46	0.004
Important issues are well communicated at shift changes.	71	56	0.004
Briefings are common in the OR.	67	51	0.005
I receive appropriate feedback about my performance.	73	53	0.005
The culture in the ORs here makes it easy to learn from the errors of others.	66	54	0.007
This hospital does a good job of training new personnel.	69	55	0.011
The levels of staffing in our ORs are sufficient to handle the number of patients.	50	36	0.014
Nurse input about patient care is well received in the OR.	78	63	0.014
I am encouraged by my colleagues to report any patient safety concerns I may have.	83	70	0.024
I have the support I need from other personnel to care for patients.	76	67	0.024
Hospital administration supports my daily efforts.	50	37	0.027
Information obtained through incident reports is used to make patient care safer in the ORs here.	65	58	0.028
Agreement with the Following Statements was Significantly More Likely with Wrong-Site Surgery than with No Wrong-Site Surgery			
High levels of workload are common in the ORs here.	77%	92%	0.000
I have made errors that had the potential to harm patients.	4	18	0.004
In the ORs here, it is difficult to speak up if I perceive a problem with patient care.	16	28	0.005
I have seen others make errors that had the potential to harm patients.	26	41	0.006

* Medical error is defined as any mistake in the delivery of care by any healthcare professional, regardless of outcome.

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(continued from page 31)

on the schedules, consents, and/or histories and physicians of 1,000 patients per year. Another approximately 500 patients per year were operated on without passing through PAT.

In contrast, AnMed Health Women's and Children's Hospital in Anderson, South Carolina, is reported to have never had a wrong-site surgery. Nevertheless, when staff of the 72-bed hospital looked at their system, they found 15 scheduling errors per day. A project team created a manual for each surgeon's office and reduced scheduling errors by approximately 93%.[8] Ms. Martha Rush, in a personal communication to the Authority, was gracious in sharing the following critical advice provided to AnMed surgeons' offices:

> The schedule must include the patient's legal name and two other identifiers, the name of the procedure—including laterality if pertinent—without abbreviations and with all numbers written out, and the preoperative diagnosis.
>
> The surgical procedure consent should be completed in the surgeon's office, if possible. It should include the patient's legal name and the name of the procedure, including laterality if pertinent, without abbreviations and with all numbers written out. The name of the procedure on the consent should match the surgeon's order and the procedure scheduled. All spaces should be completed, including date, patient's signature, and witness's signature.
>
> The history and physical should include the preoperative diagnosis and the planned surgical procedure.

The Authority advocates that facilities make a goal of 100% completeness, accuracy, and consistency of the information on the schedule, consent, and history and physical when the information leaves the surgeon's office, prior to verification in PAT or the preoperative holding area. Achieving this goal would eliminate information errors and require more uniformity of processes from surgeon offices.

Surgeon offices and surgical facilities should establish systems to verify that the following information is complete and accurate before leaving the surgeon's office once the decision to operate is made and the procedure is scheduled, during PAT, and in preoperative admissions, as well as before entering the OR. At minimum, this information includes the following:

- Schedule
- Consent
- History and physical examination, including office notes if relevant
- Laboratory results
- Imaging studies
- Pathology reports when relevant

The information required for scheduling the procedure should include the side or site, if pertinent. The suggestion that the procedure be scheduled without abbreviations and with all numbers written out is consistent with general principles for preventing errors.[9]

The description of the procedure on the consent should also include the side or site, if pertinent, with the patient's signature to indicate verification by the patient. The suggestion that the procedure be scheduled without abbreviations and with all numbers written out is again consistent with general principles for preventing errors.

The history and physical should include the preoperative diagnosis and planned procedure, including the side or site, if pertinent. Again, the suggestion that the procedure be scheduled without abbreviations and with all numbers written out is consistent with general principles for preventing errors. Pertinent supporting information uniquely found in the office records should be included, or copies attached, with the history and physical.

Everyone reviewing the schedule, consent, history and physical examination, and/or reports documenting the diagnosis should check for discrepancies among all those parts of the patient's record and reconcile any discrepancies with the surgeon whenever noted.

A sample checklist and a sample monitoring tool are available from the Authority to help in achieving that goal (see http://patientsafetyauthority.org/EducationalTools/PatientSafetyTools/PWSS/Pages/home.aspx).

THE RELATIONSHIP BETWEEN WRONG-SITE SURGERY AND THE OR CULTURE OF SAFETY

Eleven facilities in Pennsylvania that happened to use the same culture of safety survey instrument have cooperated with the Authority by sharing the results of their culture of safety survey responses for OR personnel to create an aggregate report; eight of the facilities had experienced a wrong-site surgery and three of the facilities had not. They agreed to cooperate on the condition of confidentiality. The eight facilities with wrong-site surgery reported aggregate responses from 328 respondents. The three OR facilities without wrong-site surgery reported aggregate responses from 105 OR respondents. The results revealed statistically significant relationships between perceptions of the culture of safety by operating room providers and the histories of the facilities regarding wrong-site surgery (see Table 2). The results reinforce the importance of conducting proper briefings, being engaged, and expressing concerns.

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NOTES

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Partnership for Patients

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As a patient safety liaison (PSL), most of my conversations with facilities focus on what the facility's patient safety officers are doing well and where opportunities for improvement exist within their facilities. Representatives of the Pennsylvania Patient Safety Authority often hear about the challenges of meeting requirements of external agencies such as the Joint Commission and the Centers for Medicare and Medicaid Services (CMS), coupled with the internal challenges of running a hospital. Many of the requirements impact not only the facilities' finances, but also patient safety, patient satisfaction, and employee satisfaction. Many facilities are working on the same initiatives and barriers. A few of these shared challenges include falls, medication errors, infections, and readmissions. Partnership for Patients, a program developed by CMS, encourages collective learning through hospital engagement networks (HENs) that support finding strategies and solutions through collaboration.

HOSPITAL ENGAGEMENT NETWORK

On December 14, 2011, CMS announced the award of $218 million to 26 state, regional, and national hospital system organizations to serve as HENs. The Department of Health and Human Services (HHS) sponsored the contract, which is a part of Partnership for Patients. This initiative was started to help keep patients from being harmed while in the hospital and heal without complications once they are discharged.[1]

Partnership for Patients has two goals:[2]

1. Keep patients from getting injured or sicker. By the end of 2013, preventable hospital-acquired conditions would decrease by 40% compared to 2010. Achieving this goal would mean approximately 1.8 million fewer injuries to patients, with more than 60,000 lives saved over the next three years.
2. Help patients heal without complication. By the end of 2013, preventable complications during a transition from one care setting to another would be decreased so that hospital readmissions would be reduced by 20% compared to 2010. Achieving this goal would mean that more than 1.6 million patients would recover from illness without suffering a preventable complication requiring re-hospitalization within 30 days of discharge.

Partnership for Patients was launched in April 2011 to help improve quality, safety, and affordability of healthcare. The partnership consists of more than 65,000 partners, 3,167 of which are hospitals. Achieving these goals will save lives and prevent injuries to U.S. patients, as well as potentially save up to $35 billion across the U.S. healthcare system over the next three years, including up to $10 billion in Medicare savings. Over the next 10 years, it could reduce costs to Medicare by about $50 billion and result in billions more in Medicaid savings.[2]

In April 2011, the Authority released information about tools that are provided to assist facilities with meeting the goals of Partnership for Patients. The Authority's website contains a "Hospital-Acquired Condition" link that will help healthcare providers link directly to research, information, and tools developed from Pennsylvania data on 10 event types.[3] The targeted areas include retained foreign objects, air embolism, blood incompatibility, pressure ulcer stages III and IV, harmful falls, manifestations of poor glycemic control, catheter urinary tract infections, vascular catheter-associated infections, surgical site infections, and deep-vein thrombosis following hip and knee replacements.

The 26 organizations that serve as HENs will help identify solutions that healthcare facilities have already implemented to reduce healthcare-acquired conditions and

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disseminate the solutions to other hospitals and healthcare providers.[3] Some requirements of the HENs are as follows: conduct intensive training, develop learning collaborations, provide technical assistance for hospitals and other providers, and establish monitoring systems to help observe progress and improvement.

The Hospital and Healthsystem Association of Pennsylvania (HAP) is the only Pennsylvania-based organization that serves as a HEN as part of the Partnership for Patients initiative.[4] According to HAP, it will be under a two-year contract with its partners (the Authority, the Health Care Improvement Foundation, Quality Insights of Pennsylvania, and the Pennsylvania Healthcare Quality Alliance) to implement strategies to support Pennsylvania hospitals in achieving Partnership for Patients' goals of reducing preventable hospital-acquired conditions, readmissions, and complications during hospitalization.

Topics that will be included in the Pennsylvania HEN are as follows: falls, obstetrical adverse events, surgical site infections, adverse drug events, venous thromboembolism, pressure ulcers, central line-associated bloodstream infections, ventilator-associated pneumonia, and wrong-site surgery. A culture of safety curriculum will be offered to hospitals that participate in the projects.[4] All of these projects will provide opportunities for improvement using both outcome and process measures; have guidelines, tools, and resources for each topic; and include technical assistance, networking, and other support to the participating facilities.

The topics that will be included in the Pennsylvania HEN will be led by the following partners:[5]

- The Authority
  - Patient falls
  - Adverse medication events
  - Wrong-person, wrong-site, and wrong-procedure surgeries
  - Education—culture of safety curriculum
- The Health Care Improvement Foundation
  - Adverse obstetrical events
- Quality Insights of Pennsylvania
  - Venous thromboembolism
- HAP
  - Surgical site infections
  - Ventilator-associated pneumonia
  - Central line-associated bloodstream infections
  - Pressure ulcers
  - Readmissions

All of these projects are high-interest areas for hospitals. Having a resource and network available to share information will be a great asset to Pennsylvania hospitals. For more information on HENs or the projects listed above, contact your regional Authority PSL or see http://www.haponline.org/quality/engagement-network.[6]

NOTES

1. Department of Health and Human Services, Centers for Medicare and Medicaid Services. Hospital Engagement Networks: connecting hospitals to improve care [fact sheet]. 2011 December. http://www.haponline.org/downloads/CMS_Fact_Sheet_Hospital_Engagement_Networks_Connecting_Hospitals_to_Improve_Care_December2011.pdf.
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NEED HELP GETTING THE WORD OUT?

Join your fellow healthcare providers in funneling patient safety research and resources directly into hands of facility leaders, patient safety committee members, healthcare providers, and other patient safety-minded individuals. Visit the Pennsylvania Patient Safety Authority's website to:

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Quickly search or browse to the topic of choice among the hundreds of articles available for free. If there is a patient safety topic of interest to your peers, use the "e-mail to a friend" option to let them know about it.

Subscribe to *the Advisory*
Provide your name and e-mail address to receive notification and article summaries about the next *Advisory* issue. Forward topics of interest to your peers, or suggest they subscribe, too.

Obtain *patient safety tools and tips*
Sample policies, educational videos, assessment tools, checklists, and patient handouts are available about a growing collection of patient safety topics addressed in the *Advisory*.

Backed by analysis of real patient safety events and scientific evidence, the *Pennsylvania Patient Safety Advisory* can help improve healthcare delivery systems and educate providers about safe healthcare practices.

PATIENT SAFETY AUTHORITY

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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.