



Patient Safety Authority Receives 2006 Eisenberg Award

Earlier this month I received a call from Dr. Janet Corrigan, president of the National Quality Forum. She was calling to advise me that the Patient Safety Authority had been named a recipient of the 2006 John M. Eisenberg Award for advancing patient safety and quality. The call was unexpected but certainly a nice change from the usual business call in the middle of the week.

Presented jointly by the Joint Commission on Accreditation of Healthcare Organizations and the National Quality Forum (NQF), the award acknowledges the Authority's impact on patient safety on a regional level because of efforts to make the Pennsylvania Patient Safety Reporting System (PA-PSRS) into a nationally recognized resource for education and learning about patient safety.

That's a pretty remarkable accomplishment for a relatively new agency. After all, it's been only two years since mandatory reporting of adverse events and near-misses was initiated in Pennsylvania. But from the outset, we were determined to make PA-PSRS more than a repository of data. We were committed to turning that data into usable information that would serve as a vehicle for change within the state's healthcare industry. To a great extent I think we're succeeding.

Through PA-PSRS, the Authority has developed a program that turns raw data into actionable items by analyzing and researching actual reports submitted by Pennsylvania's healthcare facilities. Then, through the *Patient Safety Advisory*, we are able to

(Continued on page 2)

Skin Tears: The Clinical Challenge

Skin tears are a painful but preventable problem for older patients.¹ When the dermis separates from the epidermis, a partial thickness wound occurs, often causing a flap above the exposed dermis.^{1,2} This common problem has been reported to PA-PSRS 2,807 times—accounting for 2% of all reports from hospitals—during the first twelve months of mandatory reporting.

These skin traumas are not serious enough to extend the hospital stay but are painful, unsightly injuries for the patient. Skin tear dressing changes are time consuming and painful. If skin tear dressing changes are done poorly, the fragile wound bed may sustain further injury.

There is a "dearth of literature available to guide the clinician in the prevention and management of skin tears."³ The literature predominantly focuses on the long-term care (LTC) experience with skin tears, and only a few published articles address skin tears in acute care settings.⁴⁻⁷

Skin tears can be sizeable and, in some cases, require more than the selection of the correct dressing as the following cases indicate:

While transferring the patient from the bed to the chair with a total assist, the left leg was lifted and a 10 cm x 10 cm skin tear resulted. The physician ordered Vaseline gauze and a dressing. Further discussion with the attending resulted in suturing and stapling the area.

Patient was found on floor after staff member heard bed alarm and thud. Skin tear assessed and treated, requiring suturing to left forearm.

(Continued on page 5)

In This Issue

Patient Safety Authority Receives 2006 Eisenberg Award	Page 1
Skin Tears: The Clinical Challenge	Page 1
Letters to the Editor	Page 3
"Sandbags" May Not Be What You Think	Page 11
Looking Beyond the Obvious Causes of Error	Page 12
Delays in the OR: Stress Between "Running Two Rooms" and "Time Outs"	Page 14
Getting Doctors to Report Medical Errors	Page 15
Let's Stop this "Epi" demic!—Preventing Errors with Epinephrine	Page 16
Foiled Again! Risk from Transdermal Patches in MRI Procedures	Page 18
What the "L" is the Dose?.....	Page 19
Medication Reconciliation Conferences.....	Page 20
Pressure Ulcers: A Look at Reports to PA-PSRS	Page 21
Upcoming Audioconferences for 100K Lives Campaign Interventions	Page 24
Rethinking the Routine: Aspiration of Oral Contrast Solution with Bowel Obstruction... ..	Page 25
Disruptive Behavior and Clinical Outcomes: Perceptions of Nurses and Physicians.....	Page 26
Self-Assessment Questions	Page 27

**Patient Safety Authority
Board of Directors**

Anita Fuhman, RN, BS
Joan M. Garzarelli, RN, MSN
William F. Goodrich, Esq.
Roosevelt Hairston, Esq.
Lorina L. Marshall-Blake
Gary A. Merica, RPh
Ana Pujols-McKee, MD
Cliff Rieders, Esq.
Stanton Smullens, MD
Marshall Webster, MD

Patient Safety Authority Staff

Alan B.K. Rabinowitz
Administrator
Laurene Baker
Communications Director
Michael Doering
Project Manager
Sharon Hutton
Administrative Assistant

PA-PSRS Patient Safety Advisory Staff

John R. Clarke, MD
Editor

Contributing Editors

Arthur J. Augustine, BS
Hedy Cohen, RN, BSN, MS
Monica Davis, RN, MSN, MBA
Edward Finley, BS
Michael J. Gaunt, PharmD
Matthew Grissinger, RPh
Janet Johnston, RN, JD
William M. Marella, MBA

Advisors

Michael Cohen, RPh, MS, ScD
Ronni Solomon, JD
Allen Vaida, PharmD

Production Assistance

Courtney Bowman
John Hall
Miranda R. Minetti, BS

Editorial Policy

PA-PSRS Patient Safety Advisory (ISSN 1552-8596) is published quarterly, with periodic supplements, by the Pennsylvania Patient Safety Authority. This publication is produced by ECRI & ISMP under contract to the Authority as part of the Pennsylvania Patient Safety Reporting System (PA-PSRS).

Copyright 2006 by the Patient Safety Authority. This publication may be reprinted and distributed without restriction, provided it is printed or distributed in its entirety and without alteration. Individual articles may be reprinted in their entirety and without alteration provided the source is clearly attributed.

Office Location: 539 Forum Building
Harrisburg, PA 17120

Mailing Address: P.O. Box 8410
Harrisburg, PA 17105-8410

Telephone: 717-346-0469

Facsimile: 717-346-1090

Web site: www.psa.state.pa.us

E-mail: patientsafetyauthority@state.pa.us

Patient Safety Authority Receives 2006 Eisenberg Award (Continued)

disseminate the lessons learned from that research and share best practices with individual providers and institutional managers within Pennsylvania and elsewhere.

While the quality of PA-PSRS research is based on the commitment and scholarship of a dedicated team of clinical analysts, the program's success is dependent on the commitment of individual healthcare facilities to actively participate in the PA-PSRS system. Facilities throughout the Commonwealth have not only complied with the technicalities of mandatory reporting, but have engaged their clinical and administrative staffs in enhancing patient safety within their organizations—by implementing innovative clinical protocols to reduce the risk of harm and improve patient outcomes, by instituting management policies that promote teamwork, empowerment and transparency among employees, and by adopting system-wide initiatives that foster a “culture of safety” within the organization.

The Authority's ongoing success as a patient safety organization committed to facilitating change is dependent on the ongoing commitment of healthcare organizations to partnering with us in this effort. Not for the first time am I asking you to share your experiences with implementing significant patient safety improvements in your facilities. Please keep in touch with this office and the PA-PSRS staff so we can learn about how you are improving patient care in your facilities and share that information with your peers.

The Authority is in august company by winning an Eisenberg Award. Dr. Lucian Leape, Dr. Don Berwick, Dr. Peter Pronovost, the VA's National Center for Patient Safety, and the Leapfrog Group are among current and previous winners, and three Pennsylvania hospitals received awards in past years. Receiving a 2006 Eisenberg Award is a great honor for the Authority's Board and staff, but it's a great honor, too, for Pennsylvania's healthcare community—institutions, individual providers and other healthcare workers alike—whose ongoing commitment to patient safety validates our hard work. So, to all: Thanks for doing your part. Working together, I'm confident we will improve patient care for the people of Pennsylvania.

More information about the Eisenberg Awards can be found on the Authority's website at www.psa.state.pa.us.

Alan B.K. Rabinowitz
Administrator
Patient Safety Authority

Acknowledgements

The PA-PSRS staff would like to thank the following individuals, who graciously offered us their insight and/or reviewed selected articles prior to publication:

Joan DeRocco, Director of Patient Safety Services, Wyoming Valley Health Care System

Jason Lauanders, Senior Project Officer and Medical Physicist, ECRI

Dean Maglinte, MD, Professor of Radiology, Abdominal/GI Radiologist, Indiana University Hospital

Frans Meuleneire, RN, Head Nurse, General Surgery Department, AZ St Elisabeth Hospital, Zottegem, Belgium

Linda Lanckenau, RN, MSN, CWON, Pennsylvania Hospital

Letters to the Editor

Propofol Administration

Regarding the article on the use of propofol in the March 2006 issue of the Patient Safety Advisory (Vol. 3, No. 1), I wanted to comment about the use of this agent for procedural sedation in the emergency department. Use of this agent in the emergency department was not discussed in the article.

In the non-intubated emergency department patient, propofol is typically used for brief, painful procedures. The prototype example of such a procedure is reduction of a shoulder dislocation. In a properly sedated patient, the actual procedure often takes less than one minute. Trained emergency physicians are skilled at airway and ventilation monitoring and can intervene if problems occur. Although propofol use has been controversial in some settings, more and more data are becoming available about its use in the emergency department for brief sedation. In fact, studies are showing that propofol sedation is more safe than traditional agents.^{1,2} Furthermore, while it is true that there is no reversal agent for propofol, the ultra-short half life of the drug minimizes the need for a reversal agent. By the time a reversal agent could be administered after a standard 1 mg/kg bolus of propofol had been given, the propofol effect would be rapidly disappearing or perhaps even gone.

We have recently begun using propofol for brief procedures in our emergency department. Furthermore, we are participating in a multi-hospital procedural sedation registry. Our experience and the experience documented in the registry are consistent with decreased complication rates when propofol is used compared to when traditional agents are used. Problems like transient apnea and hypoxemia can occur with any agent, but we are finding that the rate of such events is about 5 times less in cases where propofol was used compared to cases where propofol was not used (unpublished data).

Articles in publications such as this can be very influential at individual hospitals, and thus they should be evidence-based and cover the appropriate use of propofol in all settings, including the emergency department. I hope that when the authors update this article, they include an evidence-based section applicable to the emergency department.

Gary Senula, MD, MBA
Medical Director, Emergency Services
Susquehanna Health System

Notes

1. Burton, J, et al. Propofol for Emergency Department Procedural Sedation and Analgesia: A Tale of Three Centers. *Acad. Emerg. Med.* 2006;13:24-30.
2. Parlak, M, et al. Age Effect on Efficacy and Side Effects of Two Sedation and Analgesia Protocols on Patients Going through Cardioversion: A Randomized Clinical Trial. *Acad. Emerg. Med.* 2006;13:493-9.

Editor's Note:

As Dr. Senula points out, published and anecdotal reports do describe the advantages that propofol offers over other drugs used for procedural sedation. However, reports submitted to the Pennsylvania Patient Safety Reporting System (PA-PSRS) and elsewhere illustrate that when propofol is involved in a medication error the consequences can be catastrophic. This does not mean that the drug cannot be used safely and effectively. It only indicates that precautions should be taken to safeguard its use, no matter the length or location of the procedure.

The error reports we have analyzed describe system breakdowns that have contributed to medication errors involving propofol, negating any benefits the drug may have. Factors such as lack of complete drug information for staff, inadequate staff train-

ing/mentoring before propofol is used, unavailability of qualified staff not involved in the procedure to continuously monitor the patient, and lapses in monitoring when the patient is transported from the unit or ED to radiology create an environment in which medication errors such as the following can occur:

Propofol used in ED during rapid sequence intubation found to be running at a rate higher than expected. Patient was in cardiac arrest. Intubation was difficult. Nurse was more focused on resuscitation than medication administration.

Patient ordered propofol at 20 mcg/kg/min. Upon arrival on unit from ED, rate found to be set at 20 mL/min. Last documentation from ED indicated rate at 20 mL/min.

Our intent was not to discourage the use of propofol in appropriate situations. However, we felt it necessary, based on the number of reports submitted to PA-PSRS and other reporting programs, to describe how problems can occur during propofol administration and to provide strategies to prevent future problems. We hope that facilities will evaluate who, where, and how propofol is used and implement a comprehensive plan to safely administer and monitor propofol.

Color-Coded Patient Wristbands

Regarding the project for standardizing color-coded wristbands:

This is really an excellent and much needed project with a great deal of hard work invested. However, I am concerned that we need to have a nationwide standard rather than a standard for Pennsylvania.

First, here in the Delaware Valley, many physicians (including moonlighters and residents) work in more than one state as they can be a mere 15 minutes away from their patients in New Jersey or Delaware. Likewise, in the western part of the state, physicians can also work in Ohio. Since this blurring of the borders applies to many other states, it will not help to have separate standards for each state.

Second, with all the work that has gone into this, those hospitals in Pennsylvania who adopt the color coding mentioned here may have to change it if a national standard is adopted that is different than the one mentioned here.

Do you think this should be a nationwide standard? If so, what is the best national patient safety organization or federal agency for the initiators/authors to take this project and raise it as a national issue?

Sandra Sacks
Director, Patient Safety and Risk Management
Mercy Hospital of Philadelphia

Editor's Note:

Ms. Sacks raises important questions. We agree that a national standard would be ideal. Subsequent to the original Patient Safety Advisory on the use of color-coded patient wristbands (Vol. 2, Sup. 2, Dec. 2005), the Patient Safety Authority has been in contact with the Maryland Patient Safety Center, the New Jersey Department of Health and Senior Services, and the New York State Department of Health about a uniform standard. New York is reported to have pending legislation on the issue.

Letters to the Editor (Continued)

The Authority has made those contacts aware of the work of the Color of Safety Task Force. The Task Force, in turn, has been in contact with a collaboration to standardize color-coded wristbands initiated by the Arizona Hospital and Healthcare Association and involving the Western Regional Alliance for Patient Safety (WRAPS), consisting of Arizona, California, Nevada, New Mexico, Oklahoma, and Utah.

The Color of Safety Task Force and WRAPS initiatives differ only a little—in the color for DNR (blue vs. purple). The Authority has shared the PA-PSRS survey instrument and findings with the Hawaii Patient Safety Task Force and the Missouri Center for Patient Safety. We are optimistic that this grass-roots effort, precipitated by a single incident (near-miss) report in PA-PSRS, and initiated by the Color of Safety Task Force, will ultimately result in consistent standardization across the states and will become a de facto national—and perhaps international—standard.

This is a great initiative. I do have a suggestion regarding patients who are in isolation. Currently, we use a green bracelet to identify patients who are under isolation precautions. This visual alert communicates to staff that the patient is under some type of isolation precautions. This has worked very well for us and is a reminder to staff to check what type of transmission based precautions the patient has been placed on. I would recommend the group consider isolation patients too.

Lisa D'Amico
Director, Infection Prevention & Control
Excelsa Health

Editor's Note:

No doubt a number of institutions have preferences for whom should get wristbands and what colors should be used. The advantage of a consensus is consistency. The current consensus provides a framework for a minimum set of reasons for wristbands and the primary colors reserved for them. Hopefully, as the consensus grows, the number of institutions agreeing to a common minimal standard will grow—not the number of reasons and colors for wristbands. Other reasons and their colors will have advocates. Ideally, the reasons can be considered by those adhering to the consensus for inclusion in the essential list, along with an appropriate primary color. Hopefully, the advocates for those reasons and colors not on the consensus list of minimum reasons and primary colors will not only use secondary colors or patterns that are not confused with the primary color scheme, but will also try to be consistent in their designations as well.

MRI Sandbags and Metal Pellets

A June New Jersey Department of Health patient safety alert regarding sandbags containing metal shot was published in a National Patient Safety List Serve. The case described a cardiac catheterization patient that was sent for an emergency MRI post procedure. As is frequently the case, the patient had a sandbag placed over the catheterization site and upon entering the MRI room the sandbag was pulled off of the puncture site and adhered to the wall of the MRI. Fortunately, the patient was not harmed. One would presume that all purchased "sandbags" are filled with sand. What we found was very surprising.

Based on the event in New Jersey, St. Luke's Hospital and Health Network's Radiology Department thought it would be prudent to test our sandbags for the presence of metal. Using a handheld 1.0 tesla magnet, the Director of MRI to date has tested 122 "sandbags" and found 19 bags that were magnetic. Sandbags were found to contain sand, or sand and metal shot, or metal shot. The sandbags that contained sand and tested safe have been labeled MRI SAFE. Unsafe sandbags have been discarded. In the future, all newly purchased sandbags will be sent to the MRI department for testing prior to patient use.

Don Norder
Director of Imaging Services
St. Luke's Hospital and Health Network

Susan York
Network Director of Accreditation and Standards
St. Luke's Hospital and Health Network

Editor's Note:

PA-PSRS is aware of the original advisory in the New Jersey Department of Health and Senior Services Patient Safety Initiative's Alert of May 2006: [MRIs and Sandbags Filled with Metal Shot](#). We are pleased with the contribution of our colleagues in New Jersey to the patient safety effort and with this evidence that we can apparently all benefit from the efforts of each state's reporting, analysis, and dissemination of lessons learned.

We also commend St. Luke's Hospital and Health Network for their proactive initiative to recognize and remove a hazard before any mishaps occurred in their facility. While PA-PSRS has found only one report of a similar event in the database of over 370,000 reports, the St. Luke's Hospital and Health Network report of 19 hazardous sandbags in their facility alone indicates that this problem is potentially more serious. In response to this letter, we have searched PA-PSRS and identified information that reinforces the New Jersey experience (see page 11 of this Advisory). Our thanks to New Jersey for its initial report of the problem, to St. Luke's Hospital and Health Network for doing the survey that indicated that it was not a rare opportunity for harm, and to Mr. Norder and Ms. York for sharing the information.

Skin Tears: The Clinical Challenge (Continued)

When the procedure was done the drapes were removed and an IV infiltrate was noted. The tape over the infiltrate was removed causing an 8 cm skin tear which required suturing.

Use of equipment, patient transfers or falls, treatments and procedures all place the patient at risk of incurring a skin tear, as these cases illustrate:

When taking off the EKG lead the skin ripped off the patient (8 cm x 3 cm).

When removed from the bedpan a 2 cm x 1 cm skin tear occurred. Wound was dressed with a dry sterile dressing and tape.

Escort was moving stretcher into the room when the patient's hand fell and became caught between door jam and the stretcher resulting in a 9 cm x 9 cm skin tear. Pressure dressing applied. Doctor ordered wet to dry dressings.

This article presents the results of PA-PSRS staff analysis of reports submitted by Pennsylvania healthcare facilities. We also present information from the clinical literature on risk factors, preventative interventions, and evidence-based treatment protocols.

Statistical Review of Skin Tear Reports

Reports describing skin tears in the PA-PSRS database were reviewed for demographic information, location or department where the event occurred, event type, and other variables. The majority (62%) of reports involving skin tears were categorized as

Visit the Patient Safety Authority website for a "Skin Tears Toolkit" that includes:

- A single-topic reprint of this article, which can be downloaded and easily e-mailed to colleagues.
- A poster to remind clinicians about prevention and treatment of skin tears.
- Two sample policies on skin tears based on the guidance in this article.
- A brief, self-running streaming video on safe practices related to skin tears, appropriate for front-line caregivers.

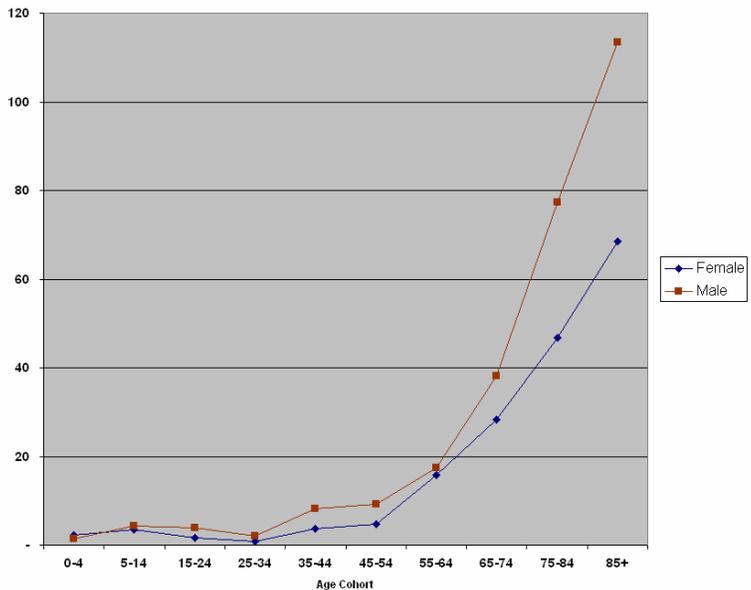


Figure 1. Reports of Skin Tears per 100,000 Patient Days by Gender and Age Cohort (Jul 2004-Jun 2005)

Skin Integrity events. However, nearly one-third (32%) were categorized as Fall events, in which the skin tear was a result of falling or actions taken to prevent a fall.

Age and Gender

Not surprisingly, PA-PSRS data demonstrates that the risk of skin tears increases with age, as shown in Figure 1.

Patients aged 65 and older account for 88.2% of all skin tear reports, though they account for only 31.2% of patient days. The largest proportion of skin tears (41.3%) were reported in the 75-84 age cohort, which only accounts for 18.1% of patient days.

Reports of skin tears were more commonly associated with male (51.7%) than female (48.3%) patients. This is contrary to the literature, which suggests that elderly women are at greater risk.^{2,8,9} There were averages of 31 skin tear reports per 100,000 hospital patient days, 38 per 100,000 male patient days, and 26 per 100,000 female patient days (patient day estimates based on data from the Pennsylvania Health Care Cost Containment Council). In other words, while males accounted for 42.5% of patient days during this period, they accounted for 51.7% of skin tears reported to PA-PSRS.

Gender-specific differences have been reported in the literature. Decreased hormone levels in women

Skin Tears: The Clinical Challenge (Continued)

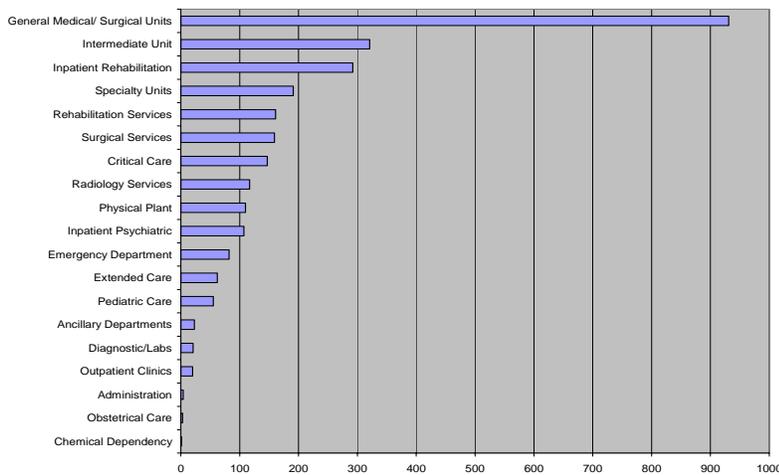


Figure 2. Reports of Skin Tears by Department or Unit

are implicated in skin changes predisposing to skin tears.⁹ The incidence of skin tears increases for females as they age, but this is not true for males, according to Malone.⁸ The PA-PSRS data found the opposite—that men were associated with more reports of skin tears than women—for all age groups but the 0-4 year cohort.

Reports by Department/Unit

Skin tears are most frequently reported from general Med/Surg units, which account for 33.2% of reported cases. This is consistent with the fact that Med/Surg units are responsible for the largest number of patient days in a facility and deliver care to a cross-section of patients for numerous conditions, especially those that require a protracted stay, as with the debilitated elderly patient (Figure 2).

Injured Body Part

The upper extremities were mentioned as the site of injury more frequently than other body parts, consistent with the literature. Reports involving skin tears do not always identify the location on the patient's body, but among those that do, the forearm was mentioned most frequently (425) followed by arm (415) and hand (308). The lower extremity or leg was mentioned 215 times.

The seminal epidemiological study of nursing home residents done by Malone in 1991 found that skin tears occur on the upper extremity 80% of the time, most frequently on the forearm.⁸ Estimates from other studies of the proportion of skin tears occurring on the arm range from 68 to 74%.^{3,10} The head, face, and neck were sometimes reported as sustaining injury, with the forehead more frequently mentioned than other locations on the head.

Equipment/Procedures Involved in Skin Tears

The hospital bed (792) is mentioned more than any other equipment or furnishing followed by chair (174) and wheelchair (144). Bedrails^{1,3,9,12} and wheelchairs^{1,3,8,12,13} are mentioned in the literature as contributing to skin tears. Inspection of surfaces with padding of bedrails and edges of equipment and furnishings is suggested as a precautionary measure to prevent skin tears.^{9,13,14} Intravenous catheters (164) are mentioned with skin tears more than any other tube or drain. Radiographic procedures (107) are the most frequently mentioned procedure.

Transfers/Positioning and Dressings

Transfers (240) are frequently mentioned in reports involving skin tears. The literature mentions transfers and positioning as a time of high risk for the patient with fragile skin. Proper lifting, turning, positioning and transferring techniques are urged to prevent skin tears.^{1,3,9,13-18} Dressing changes and procedures involving tape removal were also frequently cited.

Identified Risks for Skin Tears

McGough published nine patient risk factors after a six-month study in a VA nursing home.³ Over 65% of the sample (154 skin tears) studied had six of the following risk factors: advanced age (76% over 70), sensory loss, compromised nutrition (68%), history of previous skin tear (80%), cognitive impairment (77%), and dependency (total 82%). Bruising and poor locomotion were identified in 50% of the sample, and in 40% both polypharmacy and use of an assistive device in combination were thought to have contributed to their injury. Decreased vision existed in 39% of patients, and two or more sensory deficits existed in 37% of the sample studied.³ The risk factors frequently mentioned in the literature are summarized in Table 1.

Preventative Measures

Guidelines available from the National Guideline Clearinghouse (www.guideline.gov) provide a framework for initiating preventive skin tear measures including: environmental modifications, staff education, adequate nutrition and hydration, protection from self injury and/or injury during routine care.⁹ The patient and family require education in avoiding friction and shearing activities⁹ and other precautionary methods to minimize or eliminate skin tears (see Table 2).

Skin Tears: The Clinical Challenge (Continued)

Caution is especially important when applying or removing tape from an at-risk patient for skin tears. The recurrent use and removal of adhesive tape and adhesive backed dressings in acute care sets the stage for skin injuries. One hundred seventy eight PA-PSRS reports mention tape or tape removal in relation to a skin tear. When a patient has thin, friable skin, the smallest amount of paper tape is preferred. A common misconception is that paper tape will not damage the skin, which has been proven otherwise by the reports in the database.

Patient allergic to adhesive tape so paper tape was used by anesthesia to secure ETT. The tape was removed and a 1" x 1/8" skin tear was noted on the patient's left neck and cheek below the ear. Antibiotic ointment applied and covered with telfa.

Tape is widely used in the hospital. It is a rare patient that does not encounter an intervention involving tape. Multiple procedures predispose the patient with fragile skin to a skin tear, as the following cases indicate:

Skin tear on hip 17 x 2 x 0.1 from too much tape on dressing.

When removing tape from an intravenous-site, a 4 cm by 1 cm skin tear resulted. Area

cleansed and a sterile dressing applied. Skin tear on left antecubital area from removal of venipuncture tape on the patient's arm. Wound care for skin tear required.

During dialysis treatment skin tear on the patient's breastbone occurred, 3 cm x 2 cm with serous fluid. Wound cleansed with normal saline solution and Vaseline gauze and tape applied.

Surgical services uses tape routinely for dressings, tubes, and drapes. PA-PSRS has received many reports of skin tears occurring in the operating room.

Patient in the OR had tape removed from the endotracheal tube and a skin tear occurred to the left cheek, 2 cm x 2 cm area. Treated with bacitracin and a bandaid was applied.

Skin tear found when surgical drape was removed. Adhesive tore skin off.

Patient eyes taped shut in OR for protection. Tape was removed in OR. In PACU, staff noticed bilateral eyelids had superficial skin tears.

Table 1. Recognized Risk Factors for Skin Tears

Patient Characteristics

- Malnourishment
- Sensory changes/loss
 - Hearing
 - Sensation
 - Vision
- History of skin tears
- Assistance with ADLs
- Mental impairment
- Dementia
- Cognitive function
- Ecchymosis
- Immobility
 - Pressure points
 - Bedridden or chair confined
 - Wheelchair confinement
 - Self-propulsion
- Ambulating independently
- Neuromuscular changes
 - Spasticity or stiffness
 - Poor locomotion/balance
 - Neuropathy
- Senile purpura

- Multiple actinic or seborrheic keratosis
- Dry skin, hydration
 - Water temperature
 - Use of soap
- Incontinence
- Pitting edema
- Hemiplegia or hemiparesis
- Agitation or restlessness

Comorbidities

- Uremia
- Diabetes mellitus
- Hypothyroidism
- Hypoalbuminism
- Peripheral vascular disease
- Immunocompromise

Medications

- Steroids
 - Systemic
 - Topical
- Anticoagulants
- Polypharmacy

Skin Tears: The Clinical Challenge (Continued)

When tape use is unavoidable, as with securing an endotracheal tube or closing the patient’s eyes, consider foam tape which provides a gentle bond to the skin. Skin sealant (skin prep) and adhesive remover are not recommended to be used near eyes. To facilitate tape removal apply careful counter-pressure¹⁹ to the skin near the adhesive dressing as the tape is slowly rolled off.²⁰

In the acute care setting, awareness of a patient’s risk for skin tears and implementing preventive measures involves:

- Choosing the right products for care
- Managing the environment defensively:
 - Reducing friction and shearing
 - Using a draw sheet
 - Padding bed rails and equipment edges
- Using paper tape and skin prep^{4,14}
- Removing tape with adhesive remover wipe¹² and gently rolling off tape²⁰
- Educating ancillary staff, patients and families in measures to reduce skin tear risk.

Selection of a dressing that minimizes the necessity for dressing changes and use of skin sealants prior to applying tape can help to reduce epidermal trauma.²¹

Skin Tear Assessment

Skin tears vary in size, location, depth of injury and amount of tissue lost. A common, uniform language^{4,9} describing and classifying skin tears is essential to deliver competent care, document the assessment and management⁴ and to be able to track¹ the wound changes.

The Payne-Martin^{22,23} method is the accepted method of classifying skin tears (see Figure 3).^{1,3,9-12,15,24} This method has three levels of injury with increases according to the degree of skin flap or skin loss.^{22,23}

Skin Tear Treatments in the Literature

The John A. Hartford Foundation Institute for Geriatric Nursing guideline “Preventing Pressure Ulcers and Skin Tears” summarizes treatment recommendations as follows:

- “Gently clean the skin tear with normal saline.
- Let the area air dry or pat dry carefully.

Table 2. Preventative Measures

- Assure a Safe Environment:
 - Assessing the environment
 - Providing adequate light to aid visualization of furniture and equipment
 - Offering long sleeves or pants to protect extremities
- Educate staff, patient and family the importance of:
 - Maintaining adequate or improved nutrition and hydration
 - Using lotion two times a day especially on dry skin on extremities
 - Using an emollient soap for bathing
 - Obtaining a dietary consult
 - Offering fluids between meals
 - Exercising caution when handling limbs during transferring, transporting or positioning

- Protection from Injury:

- Using a lift sheet to prevent sheering injury
- Minimizing friction and shearing when: positioning, turning, lifting, sliding, transferring
- Using pillows and blankets to pad and support body parts
- Eliminating quick or harsh movements
- Padding bedrails, wheelchair arms and leg supports
- Supporting dangling arms and legs
- Using non adherent dressing (gauze wraps, stockinettes, Kerlix)
- Using only paper or cloth tape when unavoidable
- Applying adhesive remover
- Removing tape by applying counter pressure and rolling it off
- Using emollient antibacterial soap
- Using skin sealant (skin prep) with paper tape and any adhesive tape or dressing

Skin Tears: The Clinical Challenge (Continued)

Category I. Without tissue loss either linear, or with a flap that closes the tear to within an approximation of 1mm of the wound edges.



Category I - Linear Type



Category I - Flap Type

Category II. Partial tissue loss, considered scant when the loss is 25% or less and moderate or large when the tissue loss is more than 25%.



Category II - Scant, tissue loss less than 25%



Category II - Large, tissue loss more than 25%

Category III. Complete tissue loss or no epidermal flap covering the injury.



Figure 3. Payne-Martin Method of Skin Tear Classification. Images provided courtesy of Frans Meuleneire, RN, and the Journal of Wound Care. Reproduced with permission.

- Approximate the skin tear flap.
- Apply petroleum-based ointment, steri-strips or a moist non-adherent wound dressing.
- Consider putting an arrow to indicate the direction of the skin tear on the dressing to prevent any further injury during dressing removal.
- Assess the size of the skin tear and consider a wound tracing.
- Document assessment and treatment findings.⁹

Though there is limited research on skin tear treatment, two recent small studies are encouraging in innovative treatments that reduce both the pain associated with dressing changes and the healing time:

- Category I and II skin tears were treated using a soft silicone-coated net dressing (Mepitel). The dressing adheres to the flapped skin and surrounding tissue, approximating the edges. A secondary absorbent dressing is applied to manage exudate and is changed when necessary. By the eighth day, 83% (73/88) of the wounds had healed.¹⁰

Skin Tears: The Clinical Challenge (Continued)

- Category II and III skin tears were treated with formulated 2-octylcyanoacrylate topical bandage (2-OTB). The product's clear film dries in approximately 15 to 30 seconds, requires no secondary dressing and allows for routine inspection. Reapplication is done as needed if oozing of exudate occurs. Ninety percent of wounds (18/20) healed in one week with reports of minimal pain.²⁴

These preliminary studies are encouraging in suggesting new, cost-effective, efficient treatments of painful, disfiguring skin tears.

Summary

Identification of risk factors, implementation of prevention strategies, and standardizing assessment and treatment can reduce the incidence of skin tears in the acute care setting. The persistent problem of skin tears, while not life-threatening, is an injury that is painful and disfiguring to the patient. Treatment of skin tears consumes both staff time and other limited resources. Establishing policies and procedures to address skin tears and providing staff education with ongoing in-services is a good place to start.

Notes

1. Baranoski S. Skin tears: Staying on guard against the enemy of frail skin. *Nursing* 2003. 33(10) Supplement: Travel Nursing 2003:14-20.
2. Edwards H, Gaskill D, Nash R. Treating skin tears in nursing home residents: a pilot study comparing four types of dressings. *Int J Nurs Pract*. 1998 Mar;4(1):25-32.
3. McGough-Csarny J, Kopac C. Skin tears in institutionalized elderly: An epidemiological study. *Ostomy Wound Manage*. 1998 Mar; 44(3A Suppl):14S-24S.
4. Kirkpatrick M. Skin tears; The enemy of the aged. Australian Resource Centre for Healthcare Innovations. 2005 Dec 21 [cited 2005 Dec 13]. Available from Internet: http://www.archi.net.au/eLibrary/health_administration/baxter_2005_nsw_health_awards/education_and_training/skin_tears
5. Murray E. Guidelines for the management of skin tears. *Nurs Monogr*. 2005;31-6.
6. McErlean B, Sandson S, Muir D, et al. Skin tear prevalence and management at one hospital. *Prim Int*. 2004 May;12(2):83-6, 88.
7. O'Regan A. Skin tears: a review of the literature. *World Council Enterostom Therapists J*. 2002;22(2):26-31.
8. Malone ML, Rozario N, Gavinski M, et al. The epidemiology of skin tears in the institutionalized elderly. *J Am Geriatr Soc*. 1991 Jun;39(6):591-5.
9. Ayello EA., Preventing pressure ulcers and skin tears. In: Mezey M, Fulmer T, Abraham I, Zwicker DA, editor(s). *Geriatric nursing protocols for best practice*. 2nd ed. New York (NY): Springer Publishing Company, Inc.;2003.p. 165-84.
10. Meuleneire F. Using a soft silicone coated net dressing to manage skin tears. *J Wound Care*. 11(10):365-9, 2002 Nov.
11. Thomas D, Goode P, LaMaster K, et al. A comparison of an opaque foam dressing versus a transparent film dressing in the management of skin tears in institutionalized subjects. *Ostomy Wound Manage*. 1999 Jun 45(6):2228.
12. Morey P. Skin tears: a case review. *Prim Intent*. 2003 Nov;11(4):197-8, 200-2.
13. Baranoski, S. How to prevent and manage skin tears. *Adv Skin Wound Care*. 2003 Sep-Oct;16(5):268-70.
14. Hess K. Skin IQ - Preventing skin tears. *Adv Skin Wound Care*. 2004 Jul/Aug 17(6):277.
15. White W. Skin tears: a descriptive study of the opinions, clinical practice and knowledge base of RNs caring for the aged in high care residential facilities. *Prim Int*. 2001 Nov;9(4):138-49.
16. Cuzzell J. Wound assessment and evaluation: Skin tear protocol. *Dermatol Nurs*. 2002 Dec;(6):405.
17. Brillhart B. Pressure sore and skin tear prevention and treatment during a 10-month program. *Rehabil Nurs*. 30(3):85-91, 2005 May-Jun.
18. Birch S, Coggins T. No-rinse, one-step bed bath: The effects on the occurrence of skin tears in a long-term care setting. *Ostomy Wound Manage*. 2003 Jan 49(1):64-7.
19. Koepsel K., Blisters, abrasions, skin tears. PodiatryNetwork.com. [online]. 2002. [cited 2005 Dec 27]. Available from Internet: http://www.podiatrynetwork.com/r_blisters.cfm
20. Cleveland clinic. How to Care for a Skin Tear. [online]. 2003. [cited 2005 Dec 27]. Available from Internet: <http://www.clevelandclinic.org/health/health-info/docs/3800/3885.asp?index=4277&src=news>
21. Gallagher S. Morbid obesity: A chronic disease with an impact on wounds and related problems. *Ostomy Wound Manage*. 1997 Jun;43(5):18-27.
22. Payne RL, Martin ML. The epidemiology and management of skin tears in older adults. *Ostomy Wound Manage*. 1990 Jan-Feb;26:26-37.
23. Payne RL, Martin ML. Defining and classifying skin tears: need for a common language. *Ostomy Wound Manage*. 1993 Jun;39(5):16-20, 22-4, 26.
24. Milne CT, Corbett LQ. A new option in the treatment of skin tears for the institutionalized resident: formulated 2 octylcyanoacrylate topical bandage. *Geriatr Nurs*. 2005 Sep-Oct; 26(5):321-5.

“Sandbags” May Not Be What You Think

PA-PSRS, the New Jersey Department of Health and Senior Services,¹ and the Veterans' Health Administration² have received reports of sandbags flying into the MRI core. Fortunately, patients were not injured. Investigation revealed that these sandbags were filled with metal pellets instead of sand. The following PA-PSRS report is a typical example:

A post cardiac catheterization patient with a sandbag placed on the left groin went to Radiology for an MRI. The patient was placed on the table. When the technician began to advance the table, the magnet pulled the sandbag from the patient's groin to the outer housing of the MRI unit.

Recently, a Pennsylvania facility notified the Hospital and Healthsystem Association of Pennsylvania (HAP) that upon evaluating its sandbags, it discovered over a dozen “sandbags” actually contained metal particles. [See the related Letter to the Editor in this issue.]

Healthcare workers may be unaware of this risk. Manufacturer labels may not indicate that a “sandbag” contains metal pellets or whether it is MRI compatible. The “sandbag” may be covered by a towel, blanket, or sheet, concealing its presence from staff. Order forms/catalogs, invoices, or packing slips from the vendor may fail to indicate that the product contains metal rather than sand.¹

Several patient safety strategies can reduce the potential for serious patient injury from sandbags in the MRI environment:

- Evaluating all “sandbags” to confirm they do not contain metal.^{1,3} *Do not use the MRI magnet to do this.* Instead, use a powerful hand magnet (>1000G) to test sandbags/ other equipment for ferromagnetic properties.⁴
- Purchasing and using only MRI-compatible sandbags that are labeled as such in the MRI environment.^{1-3,5}
- Confirming that sandbags are non-ferromagnetic before allowing them into the MRI environment, and assuming that items are MRI incompatible until proven otherwise.^{2,4-7}
- If the facility must use ferromagnetic sandbags outside the MRI environment, clearly labeling them as containing iron and not for use in the MRI area.²
- For non-ambulatory patients, ensuring that potentially magnetic objects are not cov-

ered by blankets/sheets/towels or stored on the transport equipment.⁴ Consider transferring patients to MRI-compatible transport equipment once they enter the MRI area.

- Revising MRI screening checklists to include evaluating the patient for ferromagnetic sandbags prior to entering the MRI environment, and replacing such items with MRI-compatible sandbags.^{4,5}
- Heightening awareness:
 - Of MRI staff about the need to check for ferromagnetic sandbags on patients brought from other departments/facilities.⁵
 - Of all healthcare personnel throughout the facility/transferring facilities of the dangers of ferromagnetic items, such as sandbags, in the MRI environment.⁴
- Prior to MRI, checking patients' medical records to determine whether a recent procedure/complication may have required the use of a sandbag (such as cardiac catheterization).⁴
- Maintaining/posting a list of MRI-incompatible equipment (such as ferromagnetic sandbags).¹
- Assigning trained healthcare workers responsibility for physically evaluating the patient and securing the MRI area.⁵

Notes

1. New Jersey Department of Health and Senior Services. MRIs & sandbags filled with metal shot. Patient Safety Initiative [online]. 2006 May [cited 2006 Aug 30]. Available from Internet: www.nj.gov/health/hcgo/ps/.
2. National Center for Patient Safety Veterans Health Administration Warning System. Magnetic resonance imaging (MRI) systems. Patient Safety Alert [online]. 2001 Feb 5 [cited 2006 Aug 30]. Available from Internet: <http://www.va.gov/hcps/alerts/MRIgenalert.doc>
3. ECRI. Sandbags: may contain metal, posing hazard in MRI environment. *Health Devices Alerts Action Item*. Accession Number: A7418. Plymouth Meeting (PA):ECRI; 2006 Jul 14.
4. ECRI. Safety concerns in the MR environment. *Health Risk Control Risk analysis* 2006 Mar;4:Radiology 5.
5. ECRI. Ferromagnetic sandbags are hazardous in magnetic resonance imaging (MRI) environments [hazard report]. *Health Devices* 1998 Jul;27(7):266-7.
6. Institute for Safe Medication Practices. NJ department of health issues warnings: what's in your sandbags? ISMP Med Saf Alert Acute Care [online]. 2006 Jun 1 [cited 2006 Aug 30]. Available from Internet: http://www.ismp.org/Newsletters/acutecare/articles/20060601_1.asp
7. ECRI. The safe use of equipment in the magnetic resonance environment. Guidance Article. *Health Devices* 2001 Dec;30 (12):421-44.

Looking Beyond the Obvious Causes of Error

To truly understand the underlying causes that can lead to medication errors, we must first understand the medication use system. This system is a complex group of related processes that includes obtaining patient information, communicating drug orders, storage of medications, labeling and packaging of medications, patient education, medication administration, and environmental factors.

Medication errors are a property of this system as a whole, rather than purely the result of the acts or omissions of the people who interact with the system. Even when an error is due to the mistake of an individual, deeper investigation will likely determine that a variety of causes contributed to that individual's perceived failure. Such causes could include:

- Poor order communication between the physician, nurse, and pharmacist.
- Dangerous medication storage practices.
- Look-alike packaging and labeling.¹

Unfortunately, when analyzing errors, some organizations tend to focus only at the active or "sharp end" of the error: the frontline practitioner most directly associated with it, such as the prescriber who wrote an order, the pharmacist who dispensed the medication, or the nurse who administered it. Some healthcare practitioners are taught early in their careers that they must be perfect—an unattainable and unrealistic expectation for any human.

When errors occur, the human tendency is to blame individuals. Those individuals blamed for the errors are considered to be inattentive, incompetent, lazy, or uncaring, and they are often subject to punitive action (Table 1) such as disciplinary action, private reprimands, remedial education (e.g., to follow the

"5 rights"²), or termination. As a result, the practitioners involved may feel guilty and unworthy of their professional status.

In this type of environment, it's not surprising that individuals may be tempted to hide future errors. In the end, punitive actions do little, if anything, to prevent the same error from happening again within the organization. It does nothing to focus attention on the most manageable component of an error: the system itself.

Effective analysis considers the *latent failures* that led to the error. Latent failures (also called contributing factors or "blunt end" failures) are weaknesses in organizational structures that support medication processes. These failures range from poor planning for an information management system to inadequate personnel training and education. Many of these failures are due to poor decisions made by management.³ By themselves, latent failures often are subtle and may not appear to directly cause an error. Their individual consequences are usually hidden, becoming apparent only when they occur together and in combination with failures or "slips" made by individuals at the "sharp end."⁴ Examples of latent failures can be found in Table 2.

This medication error report submitted to PA-PSRS includes several latent failures that led to the wrong medication reaching a patient:

A nurse entered the organization's automated dispensing cabinet (ADC) to obtain a 2 mg dose of morphine to be given intravenously to a patient. The ADC screen read "morphine sulfate 8 mg tubex."

Table 1. Examples of Punitive Approaches to Error Reduction

- Private reprimand
- Public reprimand
- Written reprimand
- Remedial education
- Point system
- Errors recorded in performance appraisal
- Appearance before a peer review committee
- Termination

Table 2. Examples of Latent Failures

- Incomplete patient information, such as missing allergy or diagnosis information
- Unclear communication of a drug order
- Lack of independent double checks before dispensing
- Lack of computer warnings or alerts
- Ambiguous drug references
- Drug storage issues
- Unclear policies/procedures

Looking Beyond the Obvious Causes of Error (Continued)

Instead of taking this dose and following the procedure for wastage, the nurse hit the override key, and the screen then listed every type of morphine sulfate available. The nurse then selected the first medication listed at the top of the screen, which read "morphine sulfate 2 mg/mL."

The drawer to the ADC opened, and the nurse removed the bottle. The bottle was unopened, and the nurse was unsure how to withdraw the medication. A second nurse told her to get a syringe and draw up one milliliter. The nurse administering the medicine noticed that the color of the solution was blue. The second nurse came back and asked, "Did you have to mix it?" The first nurse responded, "Oh no, I gave it intravenously." The second nurse responded, "I thought you were giving it orally."

Through our experience in reviewing medication errors, some possible contributing factors that led to this patient receiving an oral solution of morphine sulfate intravenously include the following:

- The strength of morphine available to the nurse was four times the dose needed. This led the nurse to seek another strength, since she was unwilling to waste the left over medication in the 8 mg tubex of morphine to administer the 2 mg dose.
- The list of medications that appeared on the ADC screen listed "every type of morphine sulfate available" instead of only those stocked in the ADC. In addition, all dosage forms of morphine were included (oral tablets, oral solutions, and injections).
- The description of the oral solution as "morphine sulfate 2 mg/mL" on the ADC screen did not indicate that this medication was an oral solution.
- The ADC was stocked with a multi-dose bottle of the oral morphine solution, instead of unit-dose cups.
- There was no pharmacy review of the order prior to administration of the medication.
- There was no independent double check of this high-alert medication while it was in the

syringe to verify the correct dose prior to administration.

- Staff may have been unaware of the dangers of over-riding alerts or of high-alert medication procedures, such as an independent double check.

Reducing medication errors requires an effective, non-punitive reporting environment, an effective reporting system, and a multidisciplinary group to analyze the error reports. Armed with these tools, facilities can identify system deficiencies and make performance improvement changes to prevent harm to your patients. Without them, we are only addressing errors when they surface, rather than reviewing the cause. To proactively prevent errors from occurring in the future, they must be reported, within your organization, as well as to state reporting programs such as PA-PSRS and others, and the contributing factors need to be identified. A cursory analysis focused on the front-line practitioner at the "sharp end" ignores the potential latent errors that can contribute to the same error recurring.

Organizations with an eye towards safety that *encourage* reporting of actual errors, "near misses" and even potentially hazardous conditions will gain rich information about the factors that may lead to an error.⁵ Where medication errors are concerned, the question of who was involved offers less information than *what* went wrong, *how* it happened, and *why* it occurred. A systems perspective begins with the assumption that errors will occur in the healthcare setting and that the multi-factorial nature of errors is system-based, not people-based. Most importantly, if we are going to strive to improve medication safety, we must focus on redesigning the system that may have led individuals down a path of failure.

Notes

1. Wunderlich GS, Kohler P, Eds. *Improving the Quality of Long-Term Care: Institute of Medicine Report*, December 13, 2000. Available from Internet: <http://books.nap.edu/books/0309064988/html/index.html/>
2. Pennsylvania Patient Safety Reporting System. Patient Safety Advisory. The Five Rights: Not the Gold Standard for Safe Medication Practices [online]. Available from the internet: http://www.psa.state.pa.us/psa/lib/psa/advisories/june_2005_advisory_v2_n2.pdf
3. Reason J. The contribution of latent human failures to the breakdown of complex systems. *Philos Trans R Soc Lond B Biol Sci*. 1990;327:475-84.
4. Institute for Safe Medication Practices (ISMP). Medication Safety Alert! Acute Care Edition. 11 Feb 1998;(3)3.
5. ISMP. Medication Safety Alert! Community/Ambulatory Care Edition. Sep 2003;(2)9.

Physicians may receive continuing medical education (CME) credits related to this article through a partnership with the Pennsylvania Medical Society. See page 27 for details.

Delays in the OR: Stress Between “Running Two Rooms” and “Time Outs”

The following cases reported to PA-PSRS describe delays in operative procedures in which patients were kept under anesthesia for longer than their procedures required:

A patient was brought into the OR by anesthesia. Intubated under general anesthesia for start of surgery. Surgery was delayed because surgeon was in the OR with another case. Patient was maintained under light anesthesia until the surgeon was available. Patient asleep for an additional 45-60 minutes.

Sedation started. Doctor remained in the other [OR] room while this patient received anesthesia care for 75 minutes without surgical care. Actual surgical time [was] 11 minutes.

There are many reasons for delays in the operating room, some of which are unavoidable. A review of the PA-PSRS database for all operating room delays between June 2004 and September 2005 identified 48 reports of delays because of problems involving the surgeon. Those reports are categorized in Table 1.

Of the total of 48 reports:

- Six (6) involved lack of planning regarding equipment, checking the schedule, or reviewing techniques.
- Nineteen (19) involved the surgeon being unavailable for unspecified reasons.
- Twenty (20) involved the surgeon being involved in another procedure.

Of the 20 reports in which the surgeon was reported to be involved in another procedure:

- Seven (7) implied a problem with coverage during the operative case.
- Thirteen (13) implied the conflict was due to tight scheduling.

Though not all reports mentioned the length of the delay, and it is likely that only the most egregious delays were reported, the average length of the delays, when reported, are shown in Table 2. More

<u>Pre-operative delay</u>	
Surgeon not available (including 1 report that delay was unavoidable)	16
Surgeon still doing another procedure	11
Surgeon involved in an emergency	4
Surgeon becoming familiar with new equipment	2
Surgeon doing a delivery	2
Assistant not available	1
Wrong surgeon listed – Correct surgeon doing another procedure	1
<u>Intra-operative delay</u>	
Second surgeon (for two-part procedure) not available	3
Surgeon failed to make sure needed equipment was available	2
Surgeon became ill, requiring replacement	2
Second surgeon (for two-part procedure) doing another procedure	1
Surgeon left temporarily for a delivery	1
Surgeon left temporarily for another procedure	1
Surgeon failed to do the procedure properly, requiring a redo	1

Table 1. Delays in OR Procedures Due to Problems Involving the Surgeon (June 2004-September 2005)

worrisome is that conscious sedation or general anesthesia was already being given to 11 of the 16 patients whose surgeons were not available (for an average of 30 minutes) and to 11 of the 18 patients whose surgeons were still doing other cases (averaging 43 minutes).

It is possible that some of the unspecified delays were because of late notification of the surgeon for a “to follow” case, rather than a delayed response by the surgeon. Sometimes “double coverage” of operating and taking call is unavoidable.

Cause of Delay	Average Duration of Delay	Number of Cases
Lack of planning re: equipment and checking schedule	74 min	3
Surgeon doing another procedure without indication of coverage problem	47 min	12
Surgeon doing another procedure likely because of coverage problem	43 min	4
Surgeon not available, reason not specified	39 min	16
Surgeon became ill, requiring replacement	15 min	1

Table 2. Average Duration of Reported OR Procedure Delays

Delays in the OR: A Sign of Stress Between “Running Two Rooms” and “Time Outs” (Continued)

Many busy surgeons “run two rooms” so that they can start one operation immediately upon completing another, without the delay necessitated by cleaning the room – and apparently, in some reported instances, without the delay of inducing anesthesia.

Although delay without the patient under anesthesia is usually an efficiency problem, delays under anesthesia can be a safety problem. The initial “time out” to verify the correct patient, procedure, site, and side are best done with the patient awake and, ideally, coherent. It is clear from most of these reports that the anesthesia team did not wait for the delayed surgeon.

PA-PSRS suggests the following strategies to reduce the risk of procedure delays:

- The surgeon can check the OR schedule prior to the start of the daily elective schedule and be fully prepared to do the case, including checking the equipment, prior to induction of anesthesia.
- The surgeon can transfer care of other patients to a backup colleague, if possible, while operating.
- The OR can notify the surgeon of a “to follow” case, in a timely fashion, typically when the orderly is being asked to bring the patient to the OR.
- If a surgeon is “running two rooms,” the switch can occur before the induction of anesthesia, rather than after, so that a proper “time out” can be done.

Getting Doctors to Report Medical Errors

Editor’s Note: This article was abstracted from: King E, Moyer D, and Couturie M, et al. Getting doctors to report medical errors: *Journal on Quality and Patient Safety* 2006; 32(7):382-92.

A recent study at Temple University Hospital in Philadelphia significantly boosted physician compliance with adverse event and near miss reporting requirements. During the three-month study period, physicians submitted 2.6 times as many reports using this new model as they submitted through the hospital’s traditional reporting system.

This new physician reporting model – called DISCLOSE* addressed many of the barriers to physician reporting such as:

- Incident form location
- Lengthy questions

*This acronym stands for:

- D — Drugs
- I — Iatrogenic complications
- S — System errors
- C — Communication errors
- L — Lab and test issues
- O — Oversights
- S — Staffing issues
- E — Equipment issues

- Obtaining multiple signatures
- Uncertainty about what is reportable
- Dissatisfaction with lack of closure or feedback

Participating physicians were given a simplified paper-based report form that could fit in their pockets, making it easy to incorporate them into daily patient rounds. They could submit reports at multiple locations throughout the hospital.

During the study, participants were asked to provide detailed narrative information regarding the incident on both the DISCLOSE form and on the traditional hospital report form. Those events reported with the DISCLOSE tool that qualified as a sentinel event were brought to the attention of risk management and forwarded to the proper committees. The narrative portions of all reports were analyzed, and some incidents were recategorized to conform as much as possible.

Physicians who used the DISCLOSE tool seemed much more willing to report all events from minor to life-threatening. Where improvements were needed with staff, physicians were encouraged to address staff related incidents with department heads. Staff-related events and patient transport problems were the most frequently reported categories. Drug related events and communication errors were also commonly reported.

Let's Stop this "Epi"demic!—Preventing Errors with Epinephrine

The Pennsylvania Patient Safety Reporting System (PA-PSRS) has received numerous reports of accidental administration of concentrated epinephrine: a high alert drug. While not more prone to error than other drugs, epinephrine does pose a greater risk of serious patient harm and death when used in error. Based on the reports submitted to PA-PSRS and elsewhere, the majority of the errors involving epinephrine can be traced to two problems: 1) expressing the concentration as a ratio strength rather than a metric per volume concentration, and 2) confusion between epinephrine and ephedrine.

Problem 1—Ratio Strength

Many epinephrine-related reports submitted to PA-PSRS describe situations in which clinicians administered undiluted epinephrine (i.e., 1:1,000 [1 mg/mL]) intravenously instead of a less concentrated solution (i.e., 1:10,000 [0.1 mg/mL]). Unfortunately, when this occurs, the result to the patient is dramatic and life-threatening, as can be seen in this example from PA-PSRS:

During a diagnostic bronchoscopy, the patient developed bleeding. Epinephrine was instilled to control bleeding, and the patient developed ventricular tachycardia and possible ischemic changes on EKG monitoring. Patient was stabilized and transferred to Critical Care. Initial cardiac enzymes negative for myocardial infarction. On investigation, it was determined that the patient received the incorrect concentration of epinephrine. Measures are being undertaken to remove the incorrect concentration of epinephrine from the bronchoscopy set up to avoid a recurrence.

Often in situations like this, the more diluted epinephrine (1:10,000) is available for use, but staff inadvertently prescribe or select the 1:1,000 concentration. One such situation occurred in an outpatient radiology unit where the nurse rarely administered medications.¹ The patient developed hives and respiratory distress after administration of contrast media. The physician prescribed 3 mL of the 1:10,000 concentration IV, but 3 mL of the 1:1,000 concentration was administered in error. The patient developed a rapid heart rate and increased blood pressure, requiring hospital admission.

Physicians may receive continuing medical education (CME) credits related to this article through a partnership with the Pennsylvania Medical Society. See page 27 for details.

More tragically, a 16-year-old boy was brought into the emergency department with priapism and died due to an epinephrine overdose.² A urologist ordered epinephrine, but he thought that the 1:1,000 ratio on the epinephrine 1 mg/mL label meant that the epinephrine had already been "prediluted" with 1,000 mL of fluid. The patient received 4 mL of 1:1,000 undiluted epinephrine injected into his penis. The patient arrested and died when the epinephrine reached his systemic circulation.

These errors highlight the problem of drug concentration presentation. The contents of most injectable medications are given as their mass concentration (mg or mcg per mL). Only a few drugs have concentrations expressed as a ratio or percentage. These expressions are error-prone because: 1) practitioners, even physicians and emergency medicine residents, may not recognize or understand the difference between dose concentrations, such as 1:1,000 or 1 mg/mL and 1:10,000 or 0.1 mg/mL,³⁻⁵ and 2) it is easy to confuse numbers in the thousands because there are so many zeros (i.e., 1,000 looks like 10,000).

Most alarming, these poorly understood expressions are particularly prevalent with drugs used for resuscitation (e.g., epinephrine, lidocaine, sodium bicarbonate). An inappropriate dose or life-threatening delay in treatment is quite possible, especially if these drugs are prescribed in mg (which requires prior knowledge of ratio or percent concentrations and calculations) or mL (which is a problem if multiple concentrations exist).

Problem 2—Look-Alike Names: Epinephrine and Ephedrine

Another cause of errors involving epinephrine is confusion between epinephrine and ephedrine. Not only do these drug names look similar, but their use as vasopressors or vasoconstrictors makes storage near each other likely. Both products also may be packaged alike in 1 mL ampuls or vials.

In one case reported to PA-PSRS, a patient in the post anesthesia care unit (PACU) was prescribed ephedrine. However, the nurse inadvertently chose and administered epinephrine IV push. An ECG was performed, and the patient required a longer stay and further monitoring in PACU.

Another case involved a healthy young woman in a labor and delivery unit who became hypotensive after epidural anesthesia. A nurse called the obstet-

Let's Stop this "Epi" demic! Preventing Errors with Epinephrine (Continued)

rics resident to inform him of the patient's condition. The resident became irritated and ordered ephedrine 10 mg to be given slow IV push. The nurse, who was anxious because of the physician's behavior, mistakenly processed the order as epinephrine. Because there was not enough epinephrine on the unit, she borrowed some from the nursery. She found a 30 mL vial of epinephrine 1:1,000, withdrew 10 mL (10 mg), and administered that amount to the patient. The patient developed tachycardia, severe hypertension, and pulmonary edema. Fortunately, an anesthesia staff member was present and recognized the problem immediately. The patient was treated successfully and the baby was delivered safely.⁶

Safe Practice Strategies

Because many of the emergency medications with concentrations expressed in ratios or percentages, including epinephrine, date back to before the 1938 Food Drug and Cosmetic Act, they do not fall under current FDA labeling standards. Epinephrine is a United States Pharmacopeia (USP) drug, subject to USP labeling requirements. Until USP eliminates the use of ratio expressions on epinephrine labels and changes the nomenclature to prevent confusion between epinephrine and ephedrine, consider these strategies as you strive to improve the safe use of epinephrine.

- Do not expect all healthcare practitioners to be familiar with percent or ratio expressions of concentrations, or to be adept at calculating doses for drugs with concentrations expressed in this manner.
- To the extent possible, use prefilled syringes, and limit storage of concentrated epinephrine to crash carts (except in the ED and OR) to reduce the risk of dilution errors or administration of the wrong product.
- Store a single concentration wherever possible, and affix warning labels as appropriate to minimize confusion between the two concentrations of epinephrine.
- In units where multiple concentrations are needed (such as the ED), apply auxiliary warning labels to 1:1,000 ampuls to alert staff to the concentration in mg and to dilute it before IV use.
- Epinephrine 1:1,000 in 30 mL vials for systemic use presents a hazard and, at least in nurseries, should not be available on units. If this concentration is necessary, stock just the 1 mL ampuls so that the need for multiple ampuls can serve as an alert to the healthcare provider. If a 30 mL vial must be stored outside the pharmacy, alert staff about potential problems. Use auxiliary warning labels or circle "30 mL" to make the total volume more prominent.
- Post a dose conversion chart reflecting available concentrations on emergency carts and in other areas where these medications may be prepared.
- During annual CPR certification for clinical staff, review the dose chart and mention potential confusion with emergency drugs dosed in ratio or percent concentrations alone.
- Use "tall man" lettering to help differentiate EPInephrine from ePHEDrine. Consider using this on computer screens, pharmacy and nursing unit shelf labels and bins (including automated dispensing cabinets), pharmacy product labels, and medication administration records.
- Avoid storing epinephrine and ephedrine side-by-side.
- To ensure an independent double-check system, it would be best to have pharmacy prepare all infusions and bolus doses for these drugs, when possible.

Notes

1. Institute for Safe Medication Practices. (ISMP) It doesn't pay to play the percentages. ISMP Medication Safety Alert!, Acute Care Edition. 2002 Oct 16;2(21).
2. ISMP. Just say no to ratio! ISMP Medication Safety Alert!, Acute Care Edition. 2004 Jul 29;9(15).
3. Rolfe S, Harper NJ. Ability of hospital doctors to calculate drug doses. *BMJ* 1995; 310:1173-4.
4. Jones SJ, Cohen AM. Confusing drug concentrations. *Anaesthesia* 2001;56:195-6.
5. Nelson LS, Gordon PE, Simmons MD, et al. The benefit of house officer education on proper medication dose calculation and ordering. *Academic Emergency Medicine* 2000; 13:11-6.
6. ISMP. "Looks" like a problem: ephedrine – epinephrine. ISMP Medication Safety Alert!, Acute Care Edition. 2003 Apr 17;8(8).

Foiled Again! Risk from Transdermal Patches in MRI Procedures

In a recently submitted PA-PSRS report, a patient underwent an MRI while wearing a transdermal medication patch. Though this patient apparently suffered only minor skin irritation directly beneath the patch, a less healthy patient with impaired skin integrity could have sustained a significant burn from this type of event. While this is the first MRI safety report received by PA-PSRS related to transdermal patches, healthcare workers have reported patient injuries in similar cases to other patient safety organizations for several years.

MRI systems generate radiofrequency (RF) pulses that create the magnetic resonance signal used in imaging. If electrically conductive materials are introduced within the bore of the MR system, the RF pulses produce electrical currents that can excessively heat the conductor and burn tissue.^{1,2}

Transdermal patches have three basic components: a liner that is peeled away before application, the drug, and the backing.³ Some patches have an aluminized or foil backing in the layer furthest from the skin. This layer contains the drug and allows it to slowly disperse through the skin, but aluminized backings also serve as electrical conductors.⁴ The dangers of ferromagnetic materials near MRI systems are well documented.⁵ Though transdermal patches are not ferromagnetic, they can result in burns during an MRI procedure.⁶

Healthcare workers can reduce the risk of this problem by:

- Including in a pre-MRI screening checklist a question asking patients whether they use a patch for administering any drug such as nitroglycerin or for smoking cessation.^{4,7}
- Having patients remove any patches before undergoing MRI and replacing them with a

Following are examples of patches that may have aluminized backings.^{1,4} If in doubt, it's best to advise the patient to remove the patch prior to the MRI and to apply a new patch after the MRI is completed. Contact the patch prescriber to determine whether the drug delivery system can be interrupted during the MRI procedure.

Androderm (testosterone)
 Catapres-TTS (clonidine)
 Deponit (nitroglycerine)
 Habitrol (nicotine)
 Nicoderm (nicotine)
 Nicotrol (nicotine)
 Transderm-nitro (nitroglycerin)
 Transderm-scop (scopolamine)

new patch after the MRI is completed.^{3,7} Re-using the removed patch is not advised because the patch may have lost its adhesiveness or the drug may leak once the patch is exposed to the air for an extended period.⁴

- Posting a warning/list of specific patient items/implants that prohibit the use of MRI, including aluminized/foil-backed medication patches. This can be a helpful reference for both healthcare workers and patients.^{4,8}
- Providing physician offices, patient care departments, and patients with a brochure concerning MRI hazards and contraindications.^{8,9}
- Contacting the patch prescriber, if necessary, to determine whether the drug delivery system can be interrupted for the time required to conduct the MRI.⁴
- Educating those responsible for prescribing, medication administration, screening, transporting, and performing the MRI about the hazards involved with this procedure.⁶
- Prior to conducting an MRI, reviewing the medication patch drug package insert to identify whether wearing the patch during MRI is contraindicated.

Notes

1. Institute for Safe Medication Practices. Burns in MRI patients wearing transdermal patches. *ISMP Medication Safety Alert!* 2004 Apr 8;9(7):1.

2. ECRI. Safety concerns in the MR environment. *Healthcare Risk Control Risk Analysis*. 2006 Mar;4(5):1-28.

3. Schulmeister L. Transdermal patches: medicine with muscle. *Nursing* 2005 Jan;35(1):48-52.

4. Karch AM. Practice errors: don't get burnt by the MRI: transdermal patches can be a hazard to patients. *AJN* 2004 Aug;104(8):31.

5. Pennsylvania Patient Safety Reporting System. MRI hidden risks. *Patient Safety Week Advisory*. 2004 Mar;1(1):3.

6. Health Canada. Health Products and Food Branch Inspectorate. Association of transdermal drug patches with thermal burns during magnetic resonance imaging procedures [notice to hospitals online.] 2005 Apr 26 [cited 2006 Apr 27]. Available from Internet: http://www.hc-sc.gc.ca/dhp-mpps/medeff/advisories-avis/prof/2005/mri-irm_patch-timbre_nth-ah_e.html

7. Shellock FG. Screening patients for MR procedures and individuals for the MR environment [online.] 2002 [cited 2005 Dec 15]. Available from Internet: http://www.MRIsafety.com/SCREENING_FORM/PreScrnF.pdf

8. NE Wisconsin MRI Center. MR safety [online.] [cited 2006 Apr 25]. Available from Internet: http://www.newmri.com/html/mr_safety.asp

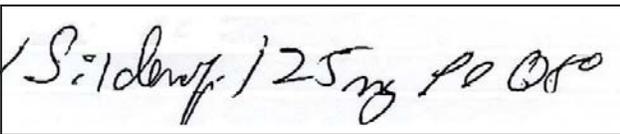
9. Healthtouch Online for Better Health. Magnetic resonance imaging [online.] 2006 [cited 2006 Apr 27]. Available from Internet: http://www.healthtouch.com/bin/EContent_HT/cnoteShowLfts.asp?fname=02601&title=MAGNETIC+RESONANCE+IMAGING+&cid=HHTLTH

What the “L” is the Dose?

It's not uncommon to read a letter of the alphabet or number differently than the writer intended. One example of letters that can be confused are the lower case letter “l” and the upper case letter “1.”

For example, while reviewing a handwritten, faxed order, a pharmacist read the word “IODINE” in the space for patient allergies. A second pharmacist read the allergy as “LODINE.” The prescriber was contacted for clarification, and she identified **LODINE** (etodolac), a nonsteroidal anti-inflammatory, as the drug to which the patient was allergic.¹ The patient was not harmed, but an incorrect allergy could have been documented, which could carry a high risk of harm.

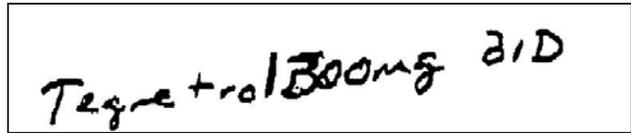
The lower case letter “l” has also been confused with the number 1. This was the case in a report submitted to PA-PSRS that described an error due to the letter “l” at the end of a drug name being misread as the number 1 in the medication strength. The prescriber wrote an order for sildenafil 25 mg PO q 8 hours for a patient with pulmonary hypertension. The order (see Figure 1) was misinterpreted as sildenafil 125 mg, and the patient received a first dose of 125 mg. Sildenafil exists as two brands: one is Revatio, indicated for pulmonary hypertension at a dose of 20 mg every 8 hours. The other brand is Viagra, indicated for erectile dysfunction. Revatio is available as 20 mg tablets, whereas Viagra is available as 25 mg, 50 mg, and 100 mg tablets. The non-conventional strength for this indication likely added to this order's misinterpretation.



A handwritten prescription in black ink that reads "Sildenafil 125mg PO Q8H". The word "Sildenafil" is written in a cursive style, and the numbers "125" and "8" are written with a slant, making them difficult to read accurately.

Figure 1. An Order for Sildenafil 25 mg Misread as 125 mg. Provided courtesy of the hospital that reported this occurrence to PA-PSRS.

In a similar case previously reported by the Institute for Safe Medication Practices, a patient was admitted to a hospital from another facility, and on the transfer order form, an order for 300 mg of **TEGRETOL** (carbamazepine) BID was misinterpreted as 1300 mg BID. The small case letter “l” at the end of Tegretol was written very close to the numerical dose of 300 mg (see Figure 2). The pharmacist was unfamiliar with the maximum daily dose of the medication, and the pharmacy computer did not alert him that the dose exceeded safe limits. The

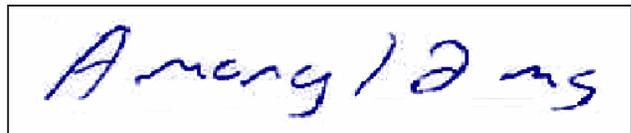


A handwritten prescription in black ink that reads "Tegretol 300mg BID". The word "Tegretol" is written in a cursive style, and the numbers "300" and "2" are written with a slant, making them difficult to read accurately.

Figure 2. An Order for Tegretol 300 mg Misread as 1300 mg. Provided courtesy of ISMP.

patient received only one dose in error before a unit-based pharmacist caught the mistake on rounds and intervened. The single dose made the patient lethargic, but it was not seriously toxic.²

In another case, a nurse misread an order for 2 mg of **AMARYL** (glimepiride) as 12 mg, due to the medication name ending in an “l” and insufficient space between the last letter in the drug name and the numerical dose (see Figure 3). However, in this case, the pharmacist processed the order correctly as 2 mg, and the error never reached the patient. The automated dispensing cabinet profile displayed the correct dose when the nurse went to retrieve the medication.³



A handwritten prescription in blue ink that reads "Amaryl 12mg". The word "Amaryl" is written in a cursive style, and the numbers "12" and "mg" are written with a slant, making them difficult to read accurately.

Figure 3. An Order for Amaryl 2 mg Misread as 12 mg. Provided courtesy of ISMP.

Computerized physician order entry (CPOE) can overcome most problems with poor handwriting, and fortunately use of such technology is growing. However, even typed or computerized prescriptions may not help prevent all problems. Anyone familiar with e-mail knows how easy it is to misidentify a computer-generated lower case letter “L” (l) in an e-mail address as the numeral (1), or the letter “O” as a zero (0). Even when using character recognition software, drug names may be translated incorrectly.

For example, when you type in the drug name Lodine into a word processing program like Microsoft Word using a lower case L, the software suggests replacing the drug name with Iodine. Likewise, it's easy to confuse the upper case letter Z with the number 2. In fact, research conducted by Bell Laboratories found that some symbols are more vulnerable than others to misidentification. The previously mentioned characters (l/l; O/0; and Z/2) plus the number 1, which can look like a 7, accounted for 19% of the alphanumeric system, but caused well over 50% of the errors caused by character misidentification in the study.⁴

What the “L” is the Dose? (Continued)

Suggested Safe Practices

- Allow adequate spacing between the drug name and the dose on handwritten prescriptions, printed prescriptions and order sets, and electronic formats such as pharmacy computer selection screens, computer-generated medication labels and records, printed forms and communications, and shelf labels. Even a clearly typed prescription for 25 mcg of **LEVOXYL** (levothyroxine) could be misread as 125 mcg if it appears without proper spacing as Levoxyl25 mcg, especially since both dosage strengths are available for this medication.
- Encourage prescribers to use block printing with uppercase characters to reduce the risk of handwritten drug name recognition errors. Some prescription forms incorporate shaded blocks to promote this practice.
- Use symbolic differentiation to reduce the risk of character misidentification. For example, in Europe, it's common to see a zero written with a slash through it to differentiate it from the letter “O.” The number 7 can be written with a bar through it to prevent confusion with the number 1. The letter “Z” with a bar through it also can prevent confusion with the number 2.
- Test electronic prescribing systems and pharmacy computers for maximum dose checks, and build alerts into computer software if needed.
- Make sure the drug and dose make sense. Is this the usual recommended dose? Is the medication available in that strength? Otherwise, follow-up with the prescriber may be necessary to clarify the order. Keep in mind that the context in which the order is read may not be helpful in all cases to properly identify alphanumeric characters. For example, it would be unlikely to read ZETAR as “2TAR,” but it would be easy to interpret an order for “HCTZ50mg” as either hydrocortisone 250 mg or hydrochlorothiazide 50 mg.

Notes

1. Institute for Safe Medication Practices (ISMP). Misidentification of alphanumeric characters. *ISMP Medication Safety Alert! Acute Care Edition*. 12 Jan, 2000; 5(1).
2. ISMP. Tricks but no treats: Illusions and medication errors. *Medication Safety Alert! Acute Care Edition*. 30 Oct 2002;7(22). Available online: <http://www.ismp.org/Newsletters/acute/20021030.asp>.
3. ISMP. Misidentification of alphanumeric characters. *ISMP Medication Safety Alert! Community/Ambulatory Care Edition*. Jan 2003;2(1):3.
4. Nierenberg GI. Do it right the first time: A short guide to learning from your most memorable errors, mistakes, and blunders. New York: John Wiley and Sons, 1996;158.

Medication Reconciliation Conferences

Institute for Healthcare Improvement (IHI) Pennsylvania node partners: the Hospital and Healthsystem Association of Pennsylvania (HAP), VHA East Coast, and VHA Pennsylvania are sponsoring an interactive educational conference entitled “Medication Reconciliation: Improving Patient Safety across the Continuum of Care.” The conference will be held October 13, 2006, in Trevoze, PA, and October 16, 2006, in Coraopolis, PA.

This conference brings together patient safety officers, risk managers, nurse managers, CEOs, CMOs, COOs, quality and performance improvement professionals, directors of phar-

macy, hospital pharmacists and others. Participants will learn what contributes to medication errors by exploring adverse events and medication error data. Participants will also enhance their understanding of the Joint Commission on Accreditation Healthcare Organizations recommendations for incorporating the National Patient Safety Goals on Medication Reconciliation.

For more details about the conference, contact HAP Education Services at (717) 561-5270. The deadline to register is Friday, October 6, 2006.

Pressure Ulcers: A Look at Reports to PA-PSRS

In the 18 months between June 28, 2004, and December 31, 2005, PA-PSRS received 10,913 reports of pressure ulcers, medically known as decubitus ulcers and colloquially known as bed sores. There is little in these patient safety reports that add to the large existing body of knowledge about the accurate assessment of patients for risk of developing this complication, effective preventive measures, or effective treatments (see Pressure Ulcer Resources). However, pressure ulcers have been a traditional marker for medical care quality and, more recently, have been a patient safety indicator. Therefore, facilities may wish to analyze their patient safety reports of pressure ulcers as a monitor of quality and may want to have those reports as accurate as possible for that reason.

Analysis of the Reports to PA-PSRS

- Pressures ulcers were reported in patients of all ages, although the elderly predominated, with an average age of 73 and a median age of 77. Not surprisingly, 55% were female.
- The pressure ulcers were noted to be present on admission in 66% of the reports and developed after admission in 34% of the reports.
- Among the pressure ulcers reported as present on admission, 12% were classified as stage I, 44% stage II, 9% stage III, and 7% stage IV; 27% of the reports did not report a stage. Further, 16% were reported as Serious Events and 84% as Incidents.
- Among reports involving pressure ulcers that developed after admission, 16% occurred in patients assessed to be at low risk and 45% in patients assessed to be at high risk; 39% did not report a risk assessment.
- Among reports involving patients assessed to be at low risk, 28% of pressure ulcers were classified as stage I, 54% stage II, 2% stage III, and less than 1% stage IV; 16% of the reports did not note the stage. Further, 38% were reported as Serious Events and 62% as Incidents.
- Among reports involving patients assessed to be at high risk, 27% of pressure ulcers were classified as stage I, 62% stage II, 3% stage III, and 1% stage IV; 7% of the reports did not note the stage. Further, 20% were reported as Serious Events and 80% as Incidents.
- Among reports involving patients who did not have an initial assessment noted, 11% of pressure ulcers were classified as stage I, 36% stage II, 1% stage III, and less than 1% stage IV. Not surprisingly, 51% of these reports also did not note the stage. Only 5% were reported as Serious Events and 95% as Incidents.
- Among reports of pressure ulcers that developed after an initial documented assessment and in which the stage was reported, 30% were stage I, 66% stage II, 3% stage III, and 1% stage IV. Though there was a correlation between the risk of pressure ulcers and the reporting of the subsequent ulcer as an unanticipated Serious Event, there was no correlation between the stage of the ulcer documented in the report and the classification of the report as a Serious Event or Incident. This is consistent with the interpretation that it is events involving the care (such as not turning the patient)—not the resulting unanticipated injury *per se*—that determines if a report is that of a Serious Event. For instance, if an elderly patient fell at home and was wedged between the tub and radiator overnight, unable to move, stage IV pressure ulcers might be predicted at the contact points and would not meet the definition of unanticipated injury if they occurred.
- There were inconsistencies between reporting the events as having been present on admission, occurring in the first 24 hours, or developing later in the admission when we compared those sub-classifications of this event type with the dates of admission and the dates the events were reported to have occurred. While we accepted that the date of “occurrence” might be later, because of delayed detection or documentation, there were logically inconsistent reports of pressure ulcers occurring after admission but being reported to have occurred on the date of admission.

Pressure Ulcers: A Look at Reports to PA-PSRS (Continued)

Conclusions

- Facilities are reporting pressure ulcers present on admission from other venues. Most of the reports were of pressure ulcers present on admission (65%).
- Facilities are reporting stage I and II pressure ulcers. Most of the pressure ulcers with stages reported were stage II (63% overall) and almost all of the pressure ulcers with stages reported were either stage I or stage II (84% overall).
- As would be expected, the percentage of pressure ulcer complications reported as Serious Events was much higher among patients initially assessed to be at low risk (38%) than among patients initially assessed to be at high risk (20%).
- There is a significant number of reports in which the valuable stage information is not reported (26% overall).
- Facilities should develop quality control standards to ensure consistency between the dates of occurrence, relative to the date of admission, and the sub-classifications of the pressure ulcer event type as being present on admission or occurring subsequently.
- There is a significant number of reports that do not document any assessment of the patient's risk of developing a pressure ulcer (39% of those without a pressure ulcer on admission). **If assessments are not being**

made, this is a potential area for improvement in the quality of care. There was a disturbing correlation between not documenting any assessment of the patient's risk of developing a pressure ulcer, not documenting the stage of the ulcer, and not reporting the subsequent pressure ulcer as an unanticipated Serious Event: 20% of pressure ulcers not present on admission had neither assessments nor stage documented, and only 3% of those were reported as unanticipated Serious Events. (In contrast, of the patients assessed – and anticipated – to be at high risk for subsequently developing pressure ulcers, with stages documented, 19% were reported as unanticipated Serious Events.)

Summary

Facilities are reporting pressure ulcers, even when they pre-date that facility's care and are not severe. Those who report assessments are accepting responsibility for Serious Events even in high-risk patients and more so in low-risk patients. Facilities may be missing useful information for tracking their own quality improvement and patient safety program if they do not collect information about the stage of the pressure ulcer. Facilities that are not assessing patients for their risks of developing pressure ulcers are missing an opportunity for improving the quality of their care. By recording information about patient assessments for risk and the stages of pressure ulcers, facilities can more accurately track their progress in improving the very common and important problem of pressure ulcers.

Please see the accompanying article "Pressure Ulcer Resources."

Pressure Ulcer Resources

Prevention of hospital-acquired pressure ulcers is the goal of every acute care facility and nursing department. Recognized risk scales by the National Pressure Ulcer Advisory Panel (NPUAP) are the Braden, Norton and Gosnell Scales.¹ Each scale provides for assessing and calculating a patient's risk. Based on the determined risk score, appropriate preventative interventions are implemented. The selection and use of support surfaces are frequently associated with the calculated risk status of the patient. Any change in the patient's condition necessitates a reassessment. The Braden Scale for Predicting Pressure Ulcer Risk is "the most widely used tool for predicting the development of pressure ulcers."² This scale is available in a [Chart](#) or a [Narrative Format](#).

Upon admission, skin integrity is routinely assessed, with attention to bony prominences and any other areas subject to pressure, friction or shearing. If tissue injury is identified, the wound is described and typically staged between I and IV.

The current practice of staging pressure ulcers is under review by the NPUAP. A survey of clinicians comparing current and proposed definitions of the stages of pressure ulcers was conducted by the NPUAP on their website and closed May 31, 2006. This survey was the result of an early 2005 consensus conference that discussed deep tissue injury and limitations of the current staging system.³

The currently accepted definitions for the four stages of pressure ulcers can be found on the [NPUAP web site](#):

- Stage 1 - pressure ulcer is an observable pressure-related alteration of intact skin whose indicators as compared to the adjacent or opposite area on the body may include changes in one or more of the following: skin temperature (warmth or coolness), tissue consistency (firm or boggy feel) and/or sensation (pain, itching).

The ulcer appears as a defined area of persistent redness in lightly pigmented skin, whereas in darker skin tones, the ulcer may appear with persistent red, blue, or purple hues.

- Stage 2 - partial thickness skin loss involving epidermis, dermis, or both. The ulcer is superficial and presents clinically as an abrasion, blister, or shallow crater.

- Stage 3 – full thickness skin loss involving damage to, or necrosis of, subcutaneous tissue that may extend down to, but not through, underlying fascia. The ulcer presents clinically as a deep crater with or without undermining of adjacent tissue.
- Stage 4 – full thickness skin loss with extensive destruction, tissue necrosis, or damage to muscle, bone, or supporting structures (e.g., tendon, joint capsule). Undermining and sinus tracts also may be associated with Stage 4 pressure ulcers.

Early preventative interventions mitigate the threat of pressure ulcer formation in patients identified to be at-risk. Both intrinsic and extrinsic etiologic factors contribute to pressure ulcer development. Assessing patient characteristics, improving tissue tolerance and protecting skin from the damaging effects of pressure, shear and friction are the cornerstones of a skin integrity plan of care. An NPUAP fact sheet, "[Pressure Ulcer Prevention Points](#)" summarizes key points and is available at the NPUAP web site.

A number of clinical practice guidelines have been developed in the area of pressure ulcer prevention and treatment. Summaries of many of these guidelines are available at the National Guideline Clearinghouse (www.guideline.gov), including:

American Medical Directors Association. [Pressure ulcer therapy companion](#). Columbia (MD): American Medical Directors Association; 1999. 35 p.

American Medical Directors Association (AMDA). [Pressure ulcers](#). Columbia (MD): American Medical Directors Association; 1996. 16 p.

Ayello EA. [Preventing pressure ulcers and skin tears](#) In: Mezey M, Fulmer T, Abraham I, Zwicker DA, editor(s). Geriatric nursing protocols for best practice. 2nd ed. New York (NY): Springer Publishing Company, Inc.; 2003. p. 165-84.

Wound, Ostomy, and Continence Nurses Society (WOCN). [Guideline for prevention and management of pressure ulcers](#). Glenview (IL): Wound, Ostomy, and Continence Nurses Society (WOCN); 2003. 52 p. (WOCN clinical practice guideline; no. 2).

Pressure Ulcer Resources (Continued)

Folkedahl BA, Frantz R. [Treatment of pressure ulcers](#). Iowa City (IA): University of Iowa Gerontological Nursing Interventions Research Center, Research Dissemination Core; 2002 Aug. 30 p.

Folkedahl BA, Frantz R. [Prevention of pressure ulcers](#). Iowa City (IA): University of Iowa Gerontological Nursing Interventions Research Center, Research Dissemination Core; 2002 May. 21 p.

National Collaborating Centre for Nursing and Supportive Care. Pressure ulcer prevention. [Pressure ulcer risk assessment and prevention, including the use of pressure-relieving devices \(beds, mattresses and overlays\) for the prevention of pressure ulcers in primary and secondary care](#). London (UK): National Institute for Clinical Excellence (NICE); 2003 Oct. 167 p.

Registered Nurses Association of Ontario (RNAO). [Risk assessment & prevention of pressure ulcers](#). Toronto (ON): Registered Nurses Association of Ontario (RNAO); 2005 Mar. 80 p.

Registered Nurses Association of Ontario (RNAO). [Assessment and management of stage I to IV pressure ulcers](#). Toronto (ON): Registered Nurses Association of Ontario (RNAO); 2002 Aug. 104 p.

Royal College of Nursing. [Pressure ulcer risk assessment and prevention](#). London: Royal College of Nursing; 2001 Apr. 36 p.

Singapore Ministry of Health. [Prediction and prevention of pressure ulcers in adults](#). Singapore: Singapore Ministry of Health; 2001 Mar. 51 p.

Singapore Ministry of Health. [Nursing management of pressure ulcers in adults](#). Singapore: Singapore Ministry of Health; 2001 Dec. 27 p.

The NPUAP provides two competency-based curricula to educate registered nurses "with the minimum competencies" for pressure ulcer prevention and treatment. Both curricula ([Prevention](#) and [Treatment](#)) provide case studies followed by questions and answers and are available from the Advisory Panel.

Notes

1. National Pressure Ulcer Advisory Panel (NPUAP). Statement on Pressure Ulcer Prevention. 1992 [cited 2006 May 31]. Available from Internet: <http://www.npuap.org/positn1.html>
2. Ayello E, Braden B. How and why to do pressure ulcer risk assessment. *Adv Skin Wound Care*. May/June 2002; 15(3):125-32.
3. Doughty D, Ramundo J, Bonham P. Issues and challenges in staging of pressure ulcers. *J Wound Ostomy Continence Nurs*. Mar/Apr 2006;33(2):125-30.

Upcoming Audioconferences for 100K Lives Campaign Interventions

Pennsylvania's Node partners for the "100,000 Lives" Campaign are committed to furthering this successful initiative by sharing best practices from hospitals who have implemented one or more of the six core interventions. For its part, the Patient Safety Authority is underwriting several audio teleconferences on specific interventions, in partnership with other Node partners, during the coming months:

September 27, 2006: 9:30-11:00 am. "Lessons Learned on Implementing Central Line Bundles." Information and registration is available by calling Jeannette Bortner at the Hospital and Healthsystem Association of Pennsylvania at (717) 561-5214 or by emailing her at jbortner@haponline.org.

November 15, 2006: 10:00-11:00 am. "The Expanded Infection Module." Registration is available at WebEx at <https://ifmcevents.webex.com>. For additional information, contact LaVerne Hudnell at Quality Insights of Pennsylvania at 1-877-346-6180, ext. 7687.

January 18, 2007: 10:00-11:30 am. "Improving AMI Care." Registration is available at WebEx at <https://ifmcevents.webex.com>. For additional information, contact LaVerne Hudnell at Quality Insights of Pennsylvania at 1-877-346-6180, ext. 7687.

Rethinking the Routine: Aspiration of Oral Contrast Solution with Bowel Obstruction

A patient with a history of multiple abdominal operations came to the emergency department with abdominal pain, nausea, vomiting and abdominal distension. The working diagnosis was bowel obstruction.

Intravenous fluids were started and dilaudid was given for pain control. An obstructive series was read as a bowel obstruction without evidence of free intra-peritoneal air. Following the results of the obstructive series, the surgical service was consulted for admission to the hospital. The surgeon on call requested, by phone, a CT scan of the abdomen and pelvis. A naso-gastric tube was inserted and approximately 800 ml. of oral CT contrast solution was infused into the stomach over approximately one-half hour, after which the tube was clamped to prevent siphoning of the solution. The CT scan was done about an hour after the end of the infusion.

While having the CT of the abdomen and pelvis, the patient began gurgling and vomited. The patient was turned and physicians were called. This required one of the two attendants to leave the patient's bedside. On the physicians' assessment, the patient was poorly responsive. When the pulse ox monitor became available, the oxygen saturation was about 85%. The resuscitation was done, with the help of suction that had been brought into the room. A follow-up chest radiograph showed bilateral lower lobe infiltrates. The clinical diagnosis was aspiration of gastric contents into the lungs with hypoxia.

Vomiting and aspirating are not per se patient safety events. However, for a patient at risk for vomiting and aspirating, prevention and/or mitigation of at least the aspiration should be part of safe medical care. This patient had three commonly accepted indicators for being at greater than normal risk for aspiration of emesis: bowel obstruction with a full stomach, sedation from narcotics, and confinement in the supine position (during the CT scan). Facilities should be prepared to identify and respond to patients at risk for aspiration because of vomiting (or other risk factors, such as bleeding into the airway). For instance, if endotracheal intubation or monitoring or nursing accompaniment is not appropriate for an individual patient getting

Physicians may receive continuing medical education (CME) credits related to this article through a partnership with the Pennsylvania Medical Society. See page 27 for details.

a CT scan with oral contrast, it might still be appropriate to:

1. Have a video monitor, as many CT scan rooms do, to display in the control room the parts of the patient not directly visible to the CT tech.
2. Have an emergency button available to providers within reach of the patient's head.
3. Have suction constantly available in the room near the CT scanner.
4. Train the CT technicians to identify and do emergency treatment for aspiration.

Of particular interest in this report is the "routine" use of oral contrast for a diagnostic CT scan of the abdomen and pelvis in a patient with prior clinical and radiographic diagnosis of bowel obstruction.

The American College of Radiology Committee on Appropriateness convened an Expert Panel on Gastrointestinal Imaging that developed Appropriate Criteria for Suspected Small Bowel Obstruction¹. The criteria for this clinical condition were revised in 2005. The document is an excellent review of the subject that provides invaluable information to anyone considering imaging studies for such a patient. This guide states that "Patients with suspected high grade obstruction do not require additional oral contrast medium since the fluid in the bowel provides adequate contrast." On a scale of 1 (least) to 9 (most appropriate), the highest appropriate rating was given for CT of the abdomen and pelvis without oral contrast but with IV contrast (a rating of 8), followed by supine and upright abdominal x-ray (a rating of 7), then CT of the abdomen and pelvis with oral contrast and with IV contrast (a rating of 5). (One of the benefits of the patient not having a clamped naso-gastric tube during the CT is that the gastro-esophageal sphincter is not held open in a supine patient with a full stomach.) The literature, primarily from Indiana University, recommends that patients with signs of bowel obstruction on plain radiographs of the abdomen (air-fluid levels at differential heights in the same loop of bowel and mean air-fluid widths of at least 25 mm on upright abdominal radiographs) should not have oral contrast for clarifying CT scans of the abdomen and pelvis.^{2,3}

Facilities may wish to review their protocols for diagnostic imaging studies for patients with suspected small bowel obstruction in light of the recently revised Appropriateness Criteria from the American College

Rethinking the Routine: Aspiration of Oral Contrast Solution with Bowel Obstruction (Continued)

of Radiology. They may also wish to review their ability to prevent and mitigate aspiration in all areas of their facilities where patients are at risk for this complication.

Notes

1. Ros PR, Huprich JE, Bree RL, et al. ACR appropriateness criteria: suspected small bowel obstruction. American College of

Radiology [online.] 2005 Available from Internet: <https://webapps.acr.org/ACRAC/ProceduresList.aspx?tid=30275&vid=3017379>

2. Lappas JC, Reyes BL, Maglinte DDT. Abdominal radiographic findings in small-bowel obstruction: relevance to triage for additional diagnostic testing. AJR 2001;176:167-74.

3. Maglinte DDT, et al. The role of radiology in the diagnosis of small-bowel obstruction. AJR 1997;168:1171-80.

Disruptive Behavior and Clinical Outcomes: Perceptions of Nurses and Physicians

Editor's Note: This article was abstracted from: Rosenstein A, O'Daniel, M. Disruptive Behavior and Clinical Outcomes: Perceptions of Nurses and Physicians. Nursing Management 2005; 18-29.

Disruptive behavior from nurses, physicians and hospital administrators in clinical settings can put patients at risk. In a recent survey conducted by Rosenstein and O'Daniel, 1,509 healthcare workers gave their perceptions of disruptive behavior in nurse-physician relationships and negative effects on patient care. Surveys were distributed to 50 Veterans Health Administration member hospitals across the country, ranging from large teaching hospitals to small community hospitals.

Seventeen percent (17%) of the survey respondents knew of an adverse event that occurred as a result of disruptive behavior, and most of them (78%) thought the event could have been prevented. The study defined disruptive behavior as any inappropriate behavior, confrontation, or conflict whether it is verbal, sexual or physical.

The survey found the following:

- Several variables were measured such as: stress, frustration, loss of concentration, and reduced communication. Depending on which variable was measured, between 83% and 94% of healthcare workers indicated that disruptive behavior has an effect on these psychological and behavioral variables.
- Between 53% and 75% of healthcare workers saw a strong link between disruptive behavioral variables and negative effects on patient safety, the quality of

care, and patient satisfaction. One in four respondents saw a link between disruptive behavior and patient mortality.

- On average, respondents said that nurse disruptive behavior occurs at their hospital 1 to 2 times per month, while disruptive behavior from physicians occurs between 1 and 5 times a year.
- Most respondents reported that disruptive behavior had a significant negative impact on levels of stress, frustration and concentration, team collaboration, information transfer, communication and nurse-physician relationships.

Some strategies the authors suggested to help mitigate disruptive behavior included:

- Conducting organizational self-assessments to determine the extent of the problem and identify areas where attention is needed.
- Improving staff relations by creating a culture in which respect is valued and unacceptable behavior is not tolerated.
- Increasing staff awareness by informing them of the severity of the issue.

Courses focusing on communication, team building, phone etiquette, and conflict management have also helped improve relationships among co-workers.

Self-Assessment Questions

Patient Safety Officers told us in a recent PA-PSRS user survey that it would be helpful to have sample questions about selected *Advisory* articles that they could use for internal education and assessment. You may want to use the following examples or come up with your own.

The Patient Safety Authority works with the Pennsylvania Medical Society to offer *AMA PRA Category 1 Credits™* for selected portions of the *Patient Safety Advisory* through the online publication *Studies in Patient Safety: Online CME Cases*. Go to www.pamedsoc.org/studies to find out more about this patient safety CME opportunity.

Looking Beyond the Obvious Causes of Error

- Latent failures can be described as:
 - weaknesses in the design and structure of an organization
 - weaknesses in individual practitioners
 - mistakes by practitioners
 - none of the above
- Most medication errors occur due to:
 - individuals not paying attention to tasks
 - violations of rules or policy
 - faulty medication system design
 - individual incompetence
- Examples of punitive actions taken by organizations in response to an error include:
 - using information about the error during performance evaluations
 - accumulation of demerits or points for each error reported
 - requiring individuals involved in errors to obtain special education
 - all of the above
- Contributing factors that led to the medication error in this article include:
 - The list of medications that appeared on the ADC screen listed "every type of morphine sulfate available" instead of only those stocked in the ADC.
 - The description of the oral solution as "morphine sulfate 2 mg/mL" on the ADC screen did not indicate that this medication was an oral solution.
 - The ADC was stocked with a multi-dose bottle of the oral morphine solution, instead of unit-dose cups.
 - There was no pharmacy review of the order prior to administration of the medication.
 - There was no independent double check of this high-alert medication while it was in the syringe to verify the correct dose prior to administration.
 - All of the above

Rethinking the Routine: Aspiration of Oral Contrast Solution with Bowel Obstruction

- According to the American College of Radiology, the generally most appropriate imaging study for patients with suspected high grade small bowel obstruction is:
 - CT of the abdomen and pelvis with oral and IV contrast
 - supine and upright abdominal x-ray
 - CT of the abdomen and pelvis without oral contrast but with IV contrast
 - MRI of the abdomen
 - ultrasound of the abdomen
- A radiographic finding strongly associated with a high grade obstruction of the small bowel is:
 - gas or feces in the colon
 - a mean air-fluid level width greater than 25 mm on upright radiographs
 - cecal width greater than 20 mm
 - gastric distension (in the absence of a nasogastric tube)
 - fluid in the cecum

Let's Stop this "Epi"demio!—Preventing Errors with Epinephrine

- Expression of concentration as a ratio strength is error prone because:
 - Practitioners may not recognize the difference between dose concentrations, such as 1:1,000 or 1 mg/mL and 1:10,000 or 0.1 mg/mL.
 - It is easy to confuse numbers in the thousands because there are so many zeros (i.e., 1,000 looks like 10,000).
 - A only
 - A and B
 - Neither A nor B
- Contributing factors to the errors involving epinephrine cited in this article include:
 - Individuals did not pay attention to their tasks
 - Use of ratio strength expression
 - Look-alike name confusion
 - All of the above
 - B and C
- Strategies to prevent the inadvertent IV administration of undiluted epinephrine include:
 - Store a single concentration wherever possible
 - Create a dose conversion chart and post on emergency carts and in other areas where these medications may be prepared.
 - Avoid storing epinephrine and ephedrine side-by-side
 - To the extent possible, use prefilled syringes and limit storage of concentrated epinephrine to crash carts (except in the ED and OR)
 - All of the above



An Independent Agency of the Commonwealth of Pennsylvania

The 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, as contractor for the PA-PSRS program, is issuing this newsletter to advise medical facilities of immediate changes that can be instituted to reduce serious events and incidents. For more information about the PA-PSRS program or the Patient Safety Authority, see the Authority's website at www.psa.state.pa.us.



ECRI is an independent, nonprofit health services research agency dedicated to improving the safety, efficacy and cost-effectiveness of healthcare. ECRI's focus is healthcare technology, healthcare risk and quality management and healthcare environmental management. ECRI provides information services and technical assistance to more than 5,000 hospitals, healthcare organizations, ministries of health, government and planning agencies, and other organizations worldwide.



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 non-punitive approach and systems-based solutions.