ISMP Medication Safety Alert!®

A federally certified Patient Safety Organization

Nurse Advise-ERR®

Educating the healthcare community about safe medication practices

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Smart pumps are not smart on their own

Infusion-related medication errors expose patients to a high risk of harm. Smart infusion pumps with dose-checking technology are available to help avoid these potentially harmful errors. The role of the smart pump is to "remember" the large number of "rules" (hospital-defined dosing limits and other clinical advisories) entered into the drug library, and to apply those "rules" during pump programming to warn clinicians about potentially unsafe drug therapy.[1] Equally important, the clinician must USE the technology consistently to take full advantage of its error-prevention potential. As with other technologies, clinicians have sometimes bypassed its use, only to realize its true value after a serious error has occurred. The following describes one such instance.

Compliance with the technology should be measured and any barriers should be identified and removed.

A 19-year-old obese woman who had recently undergone C-section delivery of a baby presented in the emergency department (ED) with dyspnea. Believing the patient had developed a pulmonary embolism, the physician prescribed heparin 5,000 units IV bolus followed by heparin 1,000 units/hour IV infusion. After administering the bolus dose, a nurse started the heparin infusion but misprogrammed the pump to run at 1,000 **mL**/hour, not 1,000 **units**/hour (20 mL/hour). By the time the error was discovered, the patient had received more than 17,000 units (5,000 unit loading dose and about 12,000 units from the infusion) in less than an hour since arrival in the ED.

A smart pump with dosing limits for heparin had been used. Thus, the programming error should have been recognized before the infusion was started. However, the nurse had elected to bypass the dose-checking technology and used the pump in its standard rate-based mode. It was fortunate the patient did not experience adverse bleeding, as her aPTT values reached 240 seconds when initially measured and remained elevated at 148 seconds 2 hours later.

Further investigation of this event uncovered that, like the nurse involved in this error, most nurses in this hospital were bypassing the dose-checking technology available with the smart pumps! Although the reasons for not using the technology were not specified in this error report, studies have provided some common answers about why clinicians have chosen to bypass the dose-checking technology with smart pumps:[1-4]

- Falsely low perceptions of risk
- Failure of the organization to make adjustments in the drug library when alerts are not credible
- Extra steps to use the technology
- Time pressures
- Clinical emergencies

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Sidebar 1: Definition of a safety culture*

Safety culture is the enduring value and priority placed on worker and public safety by everyone in every group at every level of an organization. It refers to the extent to which individuals and groups will commit to personal responsibility for safety, act to preserve, enhance and communicate safety concerns, strive to actively learn, adapt, and modify (both individual and organizational) behavior based on lessons learned from mistakes, and be rewarded in a manner consistent with these values.

**Source: Federal Aviation Administration Report 2002*[5]

ISMP gains PSO status

The Agency for Healthcare Research and Quality (AHRQ) has notified us that our request for certification as a Patient Safety Organization (PSO) has been approved, effective November 5, 2008. ISMP is among the first group of entities granted PSO status.

PSOs are organizations in which improvement of patient safety and quality comprise its primary mission and activities. They are being established under the Patient Safety and Quality Improvement Act of 2005. In the past, healthcare professionals and organizations have sometimes been reluctant to participate in external error-reporting programs and/or data sharing for safety and quality improvement purposes, for fear of legal liability.

Since 1975 when our error-reporting program began, ISMP has never identified, or been forced to identify, any individual who has reported an error or an organization that has been involved in a reported error. Now, because reporting to a PSO confers both privilege and confidentiality to the information reported, ISMP's PSO status will afford an even higher level of protection when clinicians and organizations report to ISMP.

Under our PSO status, practitioners should continue to report medication errors to us as they have in the past, and patient safety and quality committees in healthcare organizations can work with ISMP to analyze events and aggregate data to help reduce risks and hazards associated with patient care. ISMP can also work with other PSOs to provide expert medication error analysis on behalf of services offered to their clients. For information, call (215-947-7797) or send an email mmandrack@ismp.org).

to the point

You teach best what you most need to learn.

---Richard Bach

Baxter *Supported by educational grants from Baxter Healthcare and McKesson* McKESSON Empowering Healthcare

Smart pumps continued from page 1

- A culture that inadvertently sup ports at-risk behaviors, including technology work-arounds.

Smart pumps that turn on in a "no dose-checking" standard mode or default to this mode can also discourage compliance as it takes extra effort to switch the pump to the dose-checking mode and to access the library. Smart pumps that require extra effort to work in the "no dose-checking" standard mode are more desirable.[4]

Healthcare providers can compare smart pump technology to a seatbelt. Unlike airbags, which are safety features that are usually *not optional* and *not* subject to being bypassed, seatbelts are an *optional* safety feature. They can be bypassed, just like dose-checking technology. Thus, it is not enough to purchase smart pumps, program the library to enable the technology, distribute the pumps, educate users, and hope the dose-checking feature will always be used. A culture of safety must exist that drives clinicians to avoid bypassing such a safety feature, or to report conditions that encourage work-arounds so they can be remedied. (See Sidebar 1 on page 1) A culture of safety also promotes the critical thinking necessary to evaluate pump alerts from a clinical and safety perspective, significantly limiting overrides to situations that have been fully appraised. Thus, a culture of safety is foundational to compliance with using the smart pump technology as well as heeding the alerts that may arise.

Additional measures that can nurture compliance with smart pump technology and attention to the alerts include:

- Analyzing pump logs and making necessary adjustments to the drug library (see Sidebar 2)
- Evaluating all overrides
- Publicizing "good catches" by the technology
- Conducting nursing focus groups and satisfaction surveys to solicit feedback.

Healthcare clinicians should not view the dose-checking feature of smart pumps as an option that can be turned on or off. Nor should the alerts that arise from the system be bypassed without serious consideration. Compliance with the technology should be measured, and any barriers should be identified and removed. Much like other technologies, part of the planning process for smart pumps should include a readiness assessment with particular attention to the organizational culture. For every error like the one described above, there are many more that have been prevented because smart pump technology has been employed. There is little doubt that smart pumps can save lives if properly designed AND used. In fact, in the future, failure to use this technology will likely be considered sub-optimal care.

Sidebar 2. Example of a drug library adjustment

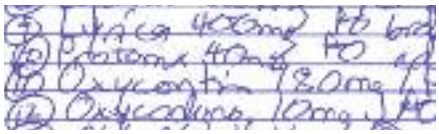
A pharmacist at a mid-sized hospital provided the following example of a necessary drug library adjustment recognized during analysis of alerts and nursing feedback.

During the first 4 months of using smart pumps, more than 600 error messages were generated for cefazolin. Investigation revealed while the IV label stated to give the drug over 30 minutes, the drug library had been programmed to infuse the drug over 1 hour or more. The 600 error messages comprised 13% of all alerts, and about 66% of all alerts when evaluating the top ten drugs for which alerts occurred. Nurses also reported the error messages for cefazolin did not make sense and, thus, reduced the credibility of the alert system. Compliance with using the dose-checking technology continues to improve as necessary changes in the drug library are identified and made.

References: 1) Keohane CA, Hayes J, Saniuk C, et al. Intravenous medication safety and smart infusion systems. *J of Infusion Nursing* 2005; 28(5):321-28. 2) Fields M, Peterman J. Intravenous medication safety system averts high-risk medication errors and provides actionable data. *Nursing Admin Quarterly* 2005; 29(1):78-87. 3) Rothschild JM, Keohane CA, Cook EF, et al. A controlled trial of smart infusion pumps to improve medication safety in critically ill patients. *Critical Care Medicine* 2005; 33(3):533-540. 4) Leape LL. "Smart" pumps: a cautionary tale of human factors engineering. *Critical Care Medicine* 2005; 33(3):679-680. 5) Weigmann DA, Zhang H, von Thaden TL, et al. A synthesis of safety culture and safety climate research. Technical Report ARL-01-3/FAA-02-2, June 2002. Prepared for the Federal Aviation Administration. Contract DTFA 01-G-015.

All is not as it seems...

Misread handwritten order. A prescriber wrote orders for scheduled doses of **OXYCONTIN** (oxy**CODONE**) along with PRN doses of oxy**CODONE** for breakthrough pain (see orders 11 and 12 below). The pharmacist read the orders as Oxy**CONTIN** 180 mg PO TID and oxy**CODONE** 10 mg PO q4 PRN. Realizing that 180 mg of Oxy**CONTIN** was a high dose, the pharmacist



reviewed the patient's medication list from home before filling the order. She noted the patient historically required high doses of narcotics to treat pain. Since there was also an order for oxy**CODONE** for breakthrough pain, the pharmacist thought 180 mg of Oxy**CONTIN,** although high, was appropriate. After the patient received the first dose, she became lethargic. During rounds, her physician noticed her oxygen saturation ranged between 86-90%. The physician reviewed the patient's medication administration record and found the error. He had prescribed 80 mg of Oxy**CONTIN**, not 180 mg. The tail of the letter "g" from "mg" in the order above for Protonix 40 mg appeared as a number "1" in the order below, allowing the pharmacist to misinterpret the dose of Oxy**CONTIN** as 180 mg. The patient only received the incorrect dose once, so no medical interventions were needed. Subsequent pulse oximetry readings quickly rose. Over the years, we have featured many handwritten orders that were legible but still misinterpreted. The above example clearly represents why healthcare facilities need to move in the direction of adopting electronic prescribing and electronic medical records.

Special Announcements

ISMP teleconference. Join ISMP on **February 19** for ***Adverse Drug Events: Medication Error or Adverse Drug Reaction?*** Learn about the relationship between preventable and non-preventable adverse drug events and how to identify and analyze adverse drug reactions and reduce their occurrence. For details, visit: www.ismp.org/educational/teleconferences.asp.

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And the survey says…Nurse Advise-ERR impacts safety

We want to thank the many readers who completed our October-November 2008 survey on practice site distribution of *Nurse Advise-ERR*. Based on the data provided by 417 readers and information in our subscriber database, a conservative estimate of 2.3 million nurses receive the newsletter after redistribution by primary subscribers! This is an increase in 1 million readers since our last survey in mid-2007!

Nearly all respondents (98%) stated the newsletter increased their understanding of the causes and prevention of medication errors. More than 97% reported the information in the newsletter has been relevant to either their own practice or the practice of individuals to whom they send the newsletter. Approximately 88% of respondents redistribute the newsletter to others in their organizations, with 75% sending every issue to a distinct group of staff. The primary recipients of the newsletter in smaller hospitals (200 beds or less) were more likely to redistribute the newsletter (97%) to others than the primary recipients in larger hospitals (81%). Most respondents who redistribute the newsletter told us they employ multiple modalities to distribute the newsletter, including: 1) emailing it to others, 2) posting it on bulletin boards, and 3) copying it for others.

About 80% of all respondents reported they made changes in their *individual* practices based on information provided in *Nurse Advise-ERR*; 16% were uncertain and just 4% felt they made no changes. However, when asked if information from the newsletter had been used to make *system* changes in their facility or on their unit, differences were noted among the nursing levels. Only 63% of staff nurses and nurse managers felt newsletter information had influenced system change, while 83% of nurse administrators reported corresponding system changes. These differences might be explained by variances in the sphere of influence between these levels of nursing, suggesting that nurse administrators play a significant role in influencing system-level changes.

Many respondents provided suggestions of topics they would like to see in the 2009 issues of *Nurse Advise-ERR*. We plan to incorporate as many suggestions as possible this year. The topics are too numerous to list, but a few of the commonly repeated themes include: medication safety within specific populations of patients (e.g., geriatrics, pediatrics, oncology, perinatal); specialty inpatient (e.g., critical care, behavioral health) and outpatient (e.g., long-term care, home care, camp/school) settings; and specific types of drugs (e.g., those with black box warnings, contrast agents, high-alert medications). Various topics surrounding technology, change, and patient safety goals were also requested.

Please remember, we can only write about events and near misses when we hear from YOU! Please send your stories to us at: www.ismp.org/orderforms/reporterrortoISMP.asp. Your name is optional, but if supplied, rest assured no reporter or location will be divulged. (We are legally bound to the highest level of confidentiality as a federally certified patient safety organization—see the right column on page 2). We also respect the wishes of the reporter regarding the level of detail included in contextually blinded "stories" published in ISMP publications.

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Report medication errors to ISMP at 1-800-FAIL-SAF(E).

Announcements continued

Free webinar. Please join us **February 12** for our webinar, the ***Future of Acute-Care Delivery in Light of Changing Reimbursement***, based on proceedings from our 2008 Nursing Leadership Congress (NLC) (www.nursingleadershipcongress.com/Proceedings.asp). **Cathi Whelchel** from McKesson and **Tina Jury** from AnMed Health, will discuss implications of the recent CMS reimbursement changes and explore how a visioning roundtable at the NLC addressed MRSA in the hospital setting. With an overview of a "future care scenario," you will be inspired to take action. For details, please visit: www.nursingleadershipcongress.com/Webinars.asp.

safetywire

Look-alike names. An outpatient surgical center expressed concern about the brand name of a warfarin product, **JANTOVEN,** because it has the potential for confusion with the antidiabetics **JANUVIA** (sita**GLIP**tin) and **JANUMET** (sita**GLIP**tin and met**FORMIN**). Fortunately, product strengths differ greatly. Sita**GLIP**tin is available in 25 mg, 50 mg, and 100 mg strengths, which is outside of warfarin's dosage range. Still, a mix-up is possible, particularly if a decimal point is overlooked when Jantoven is prescribed as 2.5 mg, or a 5.0 mg or 10.0 mg using dangerous trailing zeros. Confirming the diagnosis for patients on diabetic drugs or warfarin can reduce the risk of misreading prescriptions. For more on preventing name mix-ups, see: www.ismp.org/Newsletters/acutecare/articles/20070809.asp.

On the "do not use" list. An order for **DDAVP** (desmopressin) that was supposed to be given intranasally was given IV in error. The

order was written below another drug that was to be given IV. The abbreviation "IN" is on our list of abbreviations that should not be used. In addition to being mistaken as IV, "IN" has been miread as IM. To prevent errors, use intranasal, nasally, or NAS.

Learn Work Grow

Now accepting applications for the 2009-2010 ISMP Safe Medication Management Fellowship

*The **Institute for Safe Medication Practices Safe Medication Management Fellowship** is sponsored by*

Cardinal Health Foundation

Location and Term: The 12-month Fellowship commences summer 2009 at the Pennsylvania (near Philadelphia) office of the Institute for Safe Medication Practices (ISMP). Relocation to the area is required.

Fellowship Description: Because of the Institute's years of experience and solid reputation within the medication safety field, the ISMP Safe Medication Management Fellowship offers an experienced healthcare provider an unparalleled opportunity to learn from and work with some of the nation's experts in medication safety. Now in its 17th year, the Fellowship allows the candidate to work collaboratively with practitioners in every kind of healthcare setting in developing and implementing interdisciplinary medication error-prevention strategies. The Fellow also works on broad-based communication about medication errors and their prevention, and education initiatives that reach healthcare professionals and the public with crucial information. Graduates of the program have been sought for employment in medication safety positions in healthcare systems, regulatory agencies, the pharmaceutical industry, and ISMP.

Fellowship Opportunities: As part of his/her year at ISMP, the Safe Medication Management Fellow:

- Gains valuable experience through site visits to various healthcare delivery settings and extensive networking within the nation's pharmaceutical, healthcare, and legislative and regulatory communities
- Assists in investigating medication errors reported to national and state error-reporting programs
- Helps provide follow-up to product manufacturers and regulatory authorities after learning about medication safety hazards
- Gains exposure to medication-system problems and error-prevention program development in countries around the globe
- Participates in original research and surveys on medication errors and prevention
- Learns and applies the techniques of failure mode and effects analysis while assisting Med-ERRS, a subsidiary of ISMP, in evaluating new medical products for safety
- Develops verbal and writing skills while collaborating with ISMP staff on educational events and publication of newsletters and journal columns.

Candidate Qualifications and Compensation: Pharmacists and physicians who have completed a residency program, and nurses with risk management, quality improvement, or patient safety experience, may apply. A generous stipend, 2 weeks vacation, and full health benefits are provided.

How to Apply: Information and application can be found at: www.ismp.org/profdevelopment/managementfellowship.asp. Applications can also be requested by calling 215-947-7797 or via fellowship@ismp.org. All applications must be received by **March 31, 2009**.

Prospective Fellows:

Please join us on **February 18, 2009**, at 1:00 p.m. ET for a special, live conference call about the Fellowship program. Current and past Fellows will describe their experiences during their Fellowship as well as their post-Fellowship careers. They will also be available to answer any questions you may have about the Fellowship. To attend, please send an email to Michelle Bell, the current ISMP Fellow, at: ismpinfo@ismp.org.