

Nurse AdviseERR®

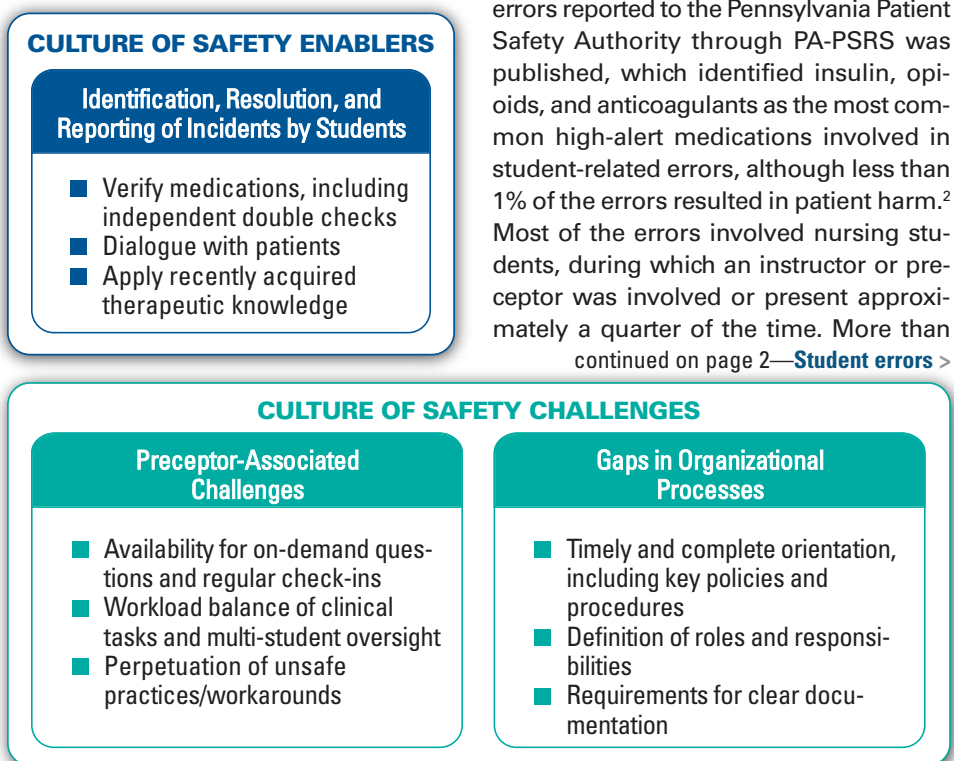
Educating the Healthcare Community About Safe Medication Practices

Students have a key role in a culture of safety: Analysis of student-associated medication incidents

Undergraduate and postgraduate students in healthcare are attempting to develop the skills required to deliver safe and effective patient care as future practitioners. As part of their education, most students are exposed to a variety of practice environments and direct patient care experiences to help prepare them for their eventual careers. This hands-on experience places students in a position to be involved in medication errors, or to catch and prevent errors before they reach patients.

More than a decade ago, ISMP published an analysis of medication errors involving student nurses that had been reported to the ISMP National Medication Errors Reporting Program (ISMP MERP) and the Pennsylvania Patient Safety Reporting System (PA-PSRS).¹ Based on that analysis, some student-related errors were similar in origin to those that seasoned licensed healthcare professionals make, such as misidentifying medications due to look-alike labels and packages, or making a mental slip when distracted. Other errors stemmed from system problems and practice issues that were unique to environments where students and hospital staff are simultaneously caring for patients. Staff and students assigned to the same patient is a prime example of how errors can happen. While dual assignments are necessary, communication breakdowns regarding who will administer the prescribed medications to patients, what medications have been administered, and which medications should be held, have resulted in dose omissions and extra doses.

Figure 1. Main themes and subthemes



In 2016, an analysis of healthcare student errors reported to the Pennsylvania Patient Safety Authority through PA-PSRS was published, which identified insulin, opioids, and anticoagulants as the most common high-alert medications involved in student-related errors, although less than 1% of the errors resulted in patient harm.² Most of the errors involved nursing students, during which an instructor or preceptor was involved or present approximately a quarter of the time. More than continued on page 2—**Student errors** >

SAFETY wires

ISMP List of High-Alert Medications recently updated. Between June and July 2018, ISMP conducted a survey on high-alert medications in acute care settings to update our longstanding list. High-alert medications are an essential component of drug therapy, but these medications carry a significant risk of causing serious injuries or even death if used in error. Of the 296 practitioners who completed the survey, 10% were nurses. Based on the results of our survey, review of the literature and error reporting databases, and input from an expert advisory group, a few changes were made to our list. Some of the major changes include the following:

- Examples of antithrombotic agents were expanded to include direct oral anticoagulants
- The category of oral moderate sedation agents for children was revised to include minimal sedation agents, and additional examples were provided
- The category of oral hypoglycemics was narrowed and changed to oral sulfonylurea hypoglycemics, and examples were provided
- IV radiocontrast media was removed from the list given the low support for its continued inclusion and a lack of reported adverse events for these drugs in our error databases
- IV promethazine was changed to promethazine injection to expand the high-alert status of this drug to administration by any parenteral route

To access the updated *ISMP List of High-Alert Medications in Acute Care Settings*, go to: www.ismp.org/node/103.

continued on page 2—**SAFETY wires** >

> **Student errors**—continued from page 1
two-thirds of the errors occurred during peak academic periods—February through April and September through November.

Earlier this year, a lack of Canadian literature describing the impact of healthcare students on medication safety prompted our sister organization, ISMP Canada, to analyze 616 student-associated medication incidents reported to three of its medication incident reporting databases and the Canadian National System for Incident Reporting (NSIR) between April 2013 and March 2017.³ The following describes the main themes identified in the analysis, along with examples illustrating the students' role in a culture of safety.

Qualitative Findings

Student-associated medication incidents involved multiple disciplines and occurred in a wide variety of healthcare settings. When examining the events from a culture of safety perspective, analysts identified both safety enablers and challenges (**Figure 1**). Within these two groups, there were three main themes, each with multiple subthemes.

CULTURE OF SAFETY ENABLERS

THEME: Identification, Resolution, and Reporting of Incidents by Students

Students were active in recognizing, resolving, and reporting medication incidents made by other members of the team. In 263 (43%) of the 616 reports, students identified and reported the error. The current practice of teaching medication safety principles to healthcare students supports a culture of safety, which may have provided a basis for students to identify and report incidents. Two key activities that enabled students to identify incidents were participation in medication verification and dialogue with patients.

Incident Example 1:

DEPO-MEDROL (methylPREDNISolone acetate) labeled "For IM, Intrasyovial and SoftTissue Injection Only, Not for IV Use" was mistakenly dispensed instead of **SOLU-MEDROL** (methylPREDNISolone sodium succinate) intended for intravenous (IV) administration. Following the correct procedure for medication checks, a nursing student recognized the error and brought it to the preceptor's attention before it was given.

Incident Example 2:

A prescription for **VALTRESX** (valACYclovir) 500 mg twice daily for 6 days was received and processed at a community pharmacy. During patient counseling, a pharmacy student learned that the medication had been prescribed to treat a cold sore. The recommended regimen for this indication (Valtrex 2 g every 12 hours for 1 day) was suggested to, and accepted by, the prescriber.

PRACTICE TIP #1:

Students bring a new perspective to the medication-use system and should be encouraged to question, identify, and report errors/gaps.

CULTURE OF SAFETY CHALLENGES

THEME: Preceptor-Associated Challenges

The value of effective oversight and support from preceptors during students' rotations cannot be overstated. The availability of preceptors for both on-demand questions and regular check-ins is a critical component of a safe training environment. Factors contributing to inadequate oversight include high preceptor workload (e.g., preceptorship of multiple students, preceptorship of students in multiple locations, concurrent clinical demands) and lack of engagement on the part of the preceptor. Lack of preceptor oversight has previously been cited as a contributing factor associated with medication errors.⁴

continued on page 3—**Student errors** >

> SAFETY wires continued from page 1



Warning! Dilute sertraline oral concentrate. Sertraline is a selective serotonin reuptake inhibitor antidepressant. The drug is available in an oral liquid concentrate (20 mg per mL). The solution **must** be diluted before use to make the preparation more palatable. Direct administration of the undiluted, concentrated solution is harsh tasting and may numb the tongue and mouth for at least a day, even if the mouth is rinsed extensively.

We received a report of a young child who received the undiluted concentrate. The pharmacy label did not include instructions to dilute the solution before administration. The child experienced discomfort and numbness of the mouth, and became very upset about these untoward effects.



Figure 1. The warning to dilute before use is more prominent on Pfizer's **ZOLOFT** (sertraline) label (top) than other manufacturers' labels (middle and bottom).

It appears that most of the commercially available sertraline products include a warning to dilute before use on the main panel of the manufacturer's carton and bottle (**Figure 1**). The manufacturer cartons and container labels also include mixing instructions on side panels. However, an informal poll of healthcare practitioners found that many were not familiar with the product or the need to dilute it before administration. Prescribers who are unaware of the need to dilute the medication may only provide dosing instructions for the mg or mL amount of sertraline oral concentrate.

continued on page 3—**SAFETY wires** >

> **Student errors**—continued from page 2

Incident Example 3:

A nursing student contacted the instructor to observe measurement and administration of insulin. They realized that only a small amount of insulin remained in the vial, which was not enough for the patient's dose. The instructor asked the student to find another vial, then left to help other students. The instructor did not return. The student eventually had to ask other nursing staff for assistance, and the insulin was administered late.

PRACTICE TIP #2:

Be sure that the preceptor's workload accounts for the level of supervision each student needs to optimize his/her learning in a safe environment.

THEME: Gaps in Organizational Processes

Incident reports highlighted situations in which tasks were delegated to students before they were adequately oriented and prepared to perform them. As in other studies,^{1,2} error-prone processes such as simultaneous preparation of medications for multiple patients contributed to several incidents. Other reports described students not following organizational policies and procedures, noting that the students may not have been aware of them and/or staff may not have been following them to set a good example.

Incident Example 4:

A healthcare practitioner asked a medical student to retrieve a syringe of midazolam to administer IV in preparation for an epidural injection, while pointing to the supply area where the syringe was lying. The student handed the practitioner an unlabeled syringe containing the neuromuscular blocking agent, rocuronium, instead. The drug was administered, and the patient became paralyzed and required intubation.

Incident Example 5:

In an outpatient pharmacy, a pharmacy student was asked to refill the metFORMIN bin in a robotic prescription dispensing system, a process which involved selecting and scanning the bottle label prior to pouring the tablets into the machine. With the aim of improving efficiency, the student picked up 4 bottles of medication but scanned the label of only 1 bottle 4 times instead of scanning each individually. The scanned bottle contained metFORMIN, but one of the other bottles selected contained acetaminophen with codeine tablets; both products were round, white tablets. As a result, two different medications were added to the same compartment of the robotic prescription dispensing system.

PRACTICE TIP #3:

Review organizational challenges impacting students at your facility to identify opportunities to improve the culture of safety.

Conclusion

The themes identified in this analysis illustrate the positive contribution students can make to medication safety, the importance of preceptor oversight, and the need for robust organizational processes that are followed by students and staff. While the inexperience of students has been described as a factor contributing to medication incidents,^{1,2} there are also positive aspects to having students in real-world healthcare settings. For example, they bring a unique perspective and question processes that could allow opportunities for error. Students can play a key role in a culture of safety if organizational processes and educational programs focus on optimizing that role. It is paramount that future practitioners are trained in environments that support safe medication use and that allow them to utilize their knowledge to reduce opportunities for errors.

References appear on page 4—**Student errors** >

> **SAFETY wires** continued from page 2

▶ **Here's what you can do:** To administer sertraline oral concentrate safely, it must be diluted immediately before administration. Patients, caregivers, and healthcare practitioners should use the manufacturer-provided dropper to measure the required amount of solution. The solution should then be mixed with 4 ounces (½ cup or approximately 120 mL) of water, ginger ale, lemon/lime soda, lemonade, or orange juice only. Other liquids should not be used to dilute this medication. A slight haze may appear after mixing, which is normal. Directions for dilution should appear on the electronic medication administration record (MAR). Pharmacy should also place an auxiliary label on unit doses dispensed in oral syringes, instructing nurses to dilute the solution immediately prior to administration.

Prescribers, pharmacists, and nurses should use the teach-back method to educate patients and caregivers how to prepare and administer the medication at home. Ensure patients and caregivers have explicit instructions, beyond those found on the manufacturer labels, on how to properly dilute the oral concentrate including the acceptable diluents to use.

⚡ **Video on safety culture.** Cleveland Clinic Abu Dhabi has produced a medication safety video that depicts a medication error and touches upon the culture of safety. The video is freely available on YouTube at: www.ismp.org/ext/58.

⚡ **Influenza vaccine for healthcare workers.** The Centers for Disease Control and Prevention (CDC) and the Advisory Committee on Immunization Practices (ACIP) recommend that all healthcare professionals get an annual influenza (flu) vaccine. By getting vaccinated, you can help protect your family, your patients, and your co-workers from getting sick. Influenza outbreaks in hospitals and long-term care facilities have been attributed to low vaccination rates among healthcare professionals. One of the easiest ways to prevent outbreaks is by getting an annual flu vaccine.

If your employer does not offer the vaccine, contact your personal healthcare provider continued on page 4—**SAFETY wires** >

> **Student errors**—continued from page 3

References

- 1) ISMP. Error-prone conditions that lead to student nurse-related errors. *ISMP Medication Safety Alert!* 2007;12(21):1-2.
- 2) Hess L, Gaunt MJ, Grissinger M. Medication errors involving healthcare students. *Pa Patient Saf Advis.* 2016;13(1):18-23.
- 3) ISMP Canada. Students have a key role in a culture of safety: a multi-incident analysis of student-associated medication incidents. *ISMP Canada Safety Bulletin.* 2018;18(2):1-3.
- 4) Reid-Searl K, Moxham L, Happell B. Enhancing patient safety: the importance of direct supervision for avoiding medication errors and near misses by undergraduate nursing students. *Int J Nurs Pract.* 2010;16(3):225-32.

ISMP thanks ISMP Canada for sharing its analysis and report on this topic.³

Worth repeating...

Flushing IV tubing with unrecognized residual drug leads to adverse effects

Once again, we are reminded how residual drug in intravenous (IV) tubing can have severe effects if unrecognized when lines are flushed or other medications/infusions are administered through the same line, a subject we have covered in the past. We received a report about an elderly man hospitalized for prostate surgery. After the procedure, the patient complained of pain and was given **HYDRO**morphone IV in the post-anesthesia care unit (PACU). About a minute later, he developed slurred speech, body twitches, and a rapidly declining blood oxygen saturation level (SpO₂) before losing consciousness. The anesthesia care team was called, and two doses of naloxone were administered without effect. The team then realized that, during surgery, the same line had been used to administer rocuronium. They administered 100 mg of sugammadex to reverse the effects of the suspected residual neuromuscular blocking agent in the IV port and tubing that the patient apparently received when the **HYDRO**morphone was administered. In less than a minute the patient regained consciousness and began to breathe spontaneously, with an SpO₂ of 95%.

If IV lines are not flushed after administering an IV push medication, it is important to remember that the length of the IV tubing may contain 10 mL or more of uninfused medication. Additionally, needleless ports and stop-cocks also have dead space where the drug can accumulate.

In 2012, we published a nearly identical report in our acute care newsletter in which a patient also lost consciousness in the PACU after an IV push dose of **HYDRO**morphone (ISMP. Medication within IV tubing may be overlooked. *ISMP Medication Safety Alert!* 2012;17[16]:1-2). In that case, the patient's SpO₂ dropped to 40%. The patient had been receiving rocuronium by continuous infusion during a procedure. While the neuromuscular blocking agent had been stopped afterwards, the line had not been flushed. Anesthesia immediately responded, administering neostigmine for reversal, as they suspected the problem was caused by flushing residual rocuronium in the IV tubing into the patient when administering **HYDRO**morphone.

We are aware of similar events that have happened when IV lines were not flushed after patients received other high-alert drugs, including fenta**NYL** and oxytocin. In one case, the residual oxytocin left in an obstetrical patient's IV line caused hypertonic, tetanic uterine contractions leading to deceleration of fetal heart rate and fetal hypoxia. In pediatric patients, even small amounts of residual medications in IV lines could prove fatal. Thus, depending on the drug concentration, pharmacologic action, IV set volume, and point of injection, harmful unintended doses and overdoses are certainly possible.

When administering medications such as neuromuscular blocking agents, all residual drug must be flushed, or the IV line must be changed, before the patient is extubated, and the source container should be removed. This should be verified at the point of patient "handoff" or transfer of care (e.g., from the surgical suite to the PACU), as the receiving providers may not be aware of the medications that were administered in the previous patient care setting. In addition, all drugs administered IV should be flushed through the IV line to be sure they reach the patient for effect and do not linger in the IV line.

> **SAFETY wires** continued from page 3

or local pharmacy. You can also use a free, online service, *HealthMap Vaccine Finder*, to search for a location in your community that offers immunizations. Just enter your zipcode at: <https://vaccinefinder.org>.

Special Announcements

Free webinar: Global medication safety
Join ISMP on **September 26** for a **FREE** webinar, *Working Together to Address Global Drug Safety Issues with Packaging and Labeling*. Speakers will discuss drug product issues that contribute to medication errors around the world, and successful changes countries have made to reduce the risk of errors. For details, visit: www.ismp.org/node/1113.

Free ISMP programs on drug shortages
Attend one of ISMP's educational sessions on *Balancing Unpredictable Intravenous Medication Supply with the Demand for Safe Injection Practices*:

- **October 5** - California Society of Health-System Pharmacists Seminar in **San Diego**
- **October 7** - American Society for Health Care Risk Management Conference in **Nashville**
- **October 24** - American Nurses Credentialing Center National Magnet Conference in **Denver**

For details, visit: www.ismp.org/node/23.

To subscribe: www.ismp.org/node/138



ISMP Nurse AdviseERR
(ISSN 1550-6304) © 2018 Institute for Safe Medication Practices (ISMP). Subscribers are granted permission to re-

distribute the newsletter or reproduce its contents within their practice site or facility only. Other reproduction, including posting on a public-access website, is prohibited without written permission from ISMP. This is a peer reviewed publication.

Report medication and vaccine errors to ISMP:
Call 1-800-FAIL-SAFE, or visit www.ismp.org/MERP or www.ismp.org/VERP. ISMP guarantees the confidentiality of information received and respects the reporters' wishes regarding the level of detail included in publications.

Editors: Ann Shastay, MSN, RN, AOCN; Judy Smetzer, BSN, RN, FISMP; Michael Cohen, RPh, MS, ScD (hon), DPS (hon); Russell Jenkins, MD; Ronald S. Litman, DO. ISMP, 200 Lakeside Drive, Suite 200, Horsham, PA 19044. Email: ismpinfo@ismp.org; Tel: 215-947-7797; Fax: 215-914-1492.