



## ISMP 2007 survey on HIGH-ALERT medications

### Differences between nursing and pharmacy perspectives still prevalent

ISMP extends sincere thanks to the 779 practitioners (366 nurses) who completed our survey on high-alert medications between February and April 2007! High-alert medications are those that bear a heightened risk of causing significant harm when they are used in error. Although mistakes may not be more common with these drugs, the consequences of an error are clearly more devastating to patients. Those who participated in our survey will help shape our decisions as we update the ISMP list of high-alert medications. A discussion of the survey highlights follows.

**Practitioners' views.** Tables 1 and 2 show which drugs, based on our current list of high-alert medications and

three new drugs for consideration, were most and least frequently considered high-alert medications by our survey respondents. These findings were similar to responses we received during our 2003 survey on high-alert medications ([www.ismp.org/Newsletters/acute-care/articles/20031016.asp](http://www.ismp.org/Newsletters/acute-care/articles/20031016.asp)), with a few notable exceptions:

■ Epidural and intrathecal medications, added to ISMP's high-alert drug list after the 2003 survey, joined the top ten drugs that practitioners felt should be considered high-alert medications.

■ Three additional drugs added after the 2003 survey—colchicine injection, IV radiocontrast media, and oral

continued on pg 2

Table 1. Medications MOST FREQUENTLY considered high-alert (N=779)	Medications considered high-alert at practice sites	Table 2. Medications LEAST FREQUENTLY considered high-alert (N=779)	Medications considered high-alert at practice sites
Chemotherapeutic agents, parenteral	97%	Hypoglycemics, oral	21%
Neuromuscular blocking agents	94%	Colchicine injection	29%
IV insulin	93%	IV radiocontrast agents	43%
Epidural/intrathecal drugs	93%	Methotrexate, oral, non-oncologic use	45%
Potassium chloride for injection concentrate	93%	Total parenteral nutrition	50%
Potassium phosphates injection	87%	Liposomal forms of drugs	44%
Anesthetic agents	86%	IV adrenergic antagonists	41%
IV unfractionated heparin	85%	Dialysis solutions, peritoneal/hemodialysis	39%
IV adrenergic agonists	84%	Epoprostenol (Flolan)*	39%
Thrombolytics/fibrinolytics	83%	Oxytocin*	42%
Sodium chloride injection, more than 0.9% strength	83%	IV promethazine injection*	42%
Narcotics and opiates, IV, transdermal, oral	79%	Heparin, low molecular weight	54%
Moderate sedation agents, oral, for children	78%	Glycoprotein IIb, IIIa inhibitors	51%
Chemotherapeutic agents, oral	78%	Inotropic medications, IV (e.g., digoxin, milrinone)	50%
Subcutaneous insulin	77%	Warfarin	54%

\*New in 2007

### safetywires

**⚡ 6 units for a BS of 0?** When sliding scale insulin coverage is prescribed, misinterpretations are possible if the order is not clearly

*BS q.d.; for BS 0-180 give qnl 6.  
- 181-210: 7 units; 211-280: 8 units  
Give q units, 301-400: 10 units*

communicated. Depending on how one interprets the order above, a patient might receive a dose of insulin even if they are experiencing significant hypoglycemia. The order calls for 6 units of insulin for a blood sugar of 0-180. Thus, a hypoglycemic patient might receive insulin, worsening the condition. Many organizations have either eliminated the use of sliding scale insulin coverage, or adopted a standardized sliding scale and preprinted orders to reduce variation in the insulin scales prescribed and to improve the accuracy of communicating orders. In this case, the physician certainly did not intend for the patient to receive insulin when hypoglycemic, and most nurses would not be inclined to administer insulin to a hypoglycemic patient. However, a rushed and distracted nurse could make a mental slip and give the insulin exactly as prescribed.

**⚡ Why the abbreviation "PCN" should be avoided.** A nurse entered "PCN" for penicillin into the computer in the field designated for allergies. However, the pharmacy computer translated "PCN" as a substance called PCN-200, a supplement comprising grapefruit seed extract. Consequently, the pharmacy computer was screening all drug orders for allergies to the grapefruit seed extract, not penicillin. The pharmacy staff, unaware of the actual ingredients in PCN-200,

continued on pg 2

**HIGH-ALERT survey** cont'd from pg 1  
methotrexate for non-oncologic use—are among the drugs least frequently considered high-alert medications; however, close to half of all respondents considered them to be high-alert drugs.

■ Three new drugs added to the 2007 survey—epoprostenol, oxytocin, and promethazine IV—are among the medications least frequently considered high-alert drugs; however, again, well more than half of all respondents felt they should be high-alert drugs.

■ There was an increase in respondents who felt general anesthetics should be high-alert drugs (77% in 2003, 86% in 2007). Perhaps use of propofol outside of the anesthesia suite may have added to this increase.

■ There was a decrease between 2003 and 2007 in respondents who believed hypertonic sodium chloride (91% to 83%) be considered a high-alert medication.

**Practice site adoption.** Tables 1 and 2 show the differences between practitioners' beliefs that a medication should be considered high-alert, and actual practice site adoption of safety precautions for the drug.

The three *most* common drugs/categories considered high-alert medications in practice sites included:

- parenteral chemotherapy (90%)
- IV insulin (88%)
- potassium chloride for injection concentrate (86%).

The three *least* common drugs/categories considered high-alert medications in practice sites included:

- oral hypoglycemics (21%)
- colchicine injection (29%)
- epoprostenol (**FLOLAN**) (39%) and dialysis solutions (39%).

Although the gap was sometimes large between respondents beliefs and practice site designation as a high-alert drug, safety precautions for many of the specific drugs/categories increased between 2003 and 2007.

**Differing views.** With only two exceptions—concentrated sodium chloride and subcutaneous insulin—nurses more frequently identified the drugs listed in the survey as high-alert medications than did pharmacists. See Table 3 for details. For certain medications, including two of the new drugs added in the 2007 survey, the differences were large:

■ 65% of nurses considered IV radiocontrast agents high-alert medications, compared to 35% of pharmacists.

■ 73% of nurses believed that oxytocin is a high-alert medication, but only 38% of pharmacists agreed.

■ 68% of nurses felt that epoprostenol is considered a high-alert medication, compared to 45% of pharmacists.


**Use of findings.** ISMP will compile an updated list of high-alert medications based on these survey findings, along with evidence from medication error reporting programs and opinions of safety experts. We will publish the updated list in this newsletter. Meanwhile, please use these survey findings (full results at: [www.ismp.org/survey/Survey200702R.asp](http://www.ismp.org/survey/Survey200702R.asp)) to stimulate discussions about high-alert medications in your organization.

Table 3. Differences between pharmacists [RPh] (n=211) and nurses (n=366)	RPh	Nurses
Oxytocin*	38%	73%
IV radiocontrast agents	35%	65%
IV adrenergic antagonists	38%	66%
Dialysis solutions, peritoneal/hemodialysis	41%	68%
Epoprostenol (FLOLAN)*	45%	68%
Nitroprusside, sodium, injection	60%	84%
IV moderate sedation agents	57%	79%
Liposomal forms of drugs	45%	64%
Anesthetic agents	74%	93%
IV amiodarone	59%	77%
Dextrose, 20% or greater	59%	76%
IV lidocaine	58%	76%
Cardioplegic solutions	65%	83%
Moderate sedation agents, oral, for children	70%	84%
Sodium chloride injection, more than 0.9% strength	91%	77%
Subcutaneous insulin	84%	75%

\*New in 2007

## safetywires cont'd from pg 1

incorrectly assumed that it was penicillin and that medication orders were being screened appropriately for patients with penicillin allergies. No adverse events were reported. This problem has been reported with several different pharmacy software systems and drug information databases. To avoid misunderstandings, drug names should never be abbreviated.

 **Pen or pump?** Patients have mistakenly misrepresented insulin pen devices as “insulin pumps.” In a recent report, a patient with diabetes who presented to the ED with a blood glucose of 36 told the triage nurse that she used some kind of “insulin pump,” which was documented on the patient’s medication reconciliation form. Upon further questioning, the patient produced a pre-filled **NOVOLIN** InnoLet injector with 70/30 insulin (70% NPH, human insulin isophane suspension and 30% regular, human insulin [rDNA origin]), as well as a **NOVOLOG** FlexPen (human insulin aspart [rDNA origin]). She thought these devices were called “insulin pumps.” When educating patients about pen devices, stress that an insulin pen should not be referred to as a “pump.” If a patient states that he or she uses an insulin “pump,” clarify whether the device has been implanted or if the patient is actually referring to an insulin pen.

 **Names too much alike.** A nurse discovered a dispensing error in which a **TROPHAMINE** (10% amino acid solution) label was applied, in error, to a bottle of tromethamine (**THAM**), used to treat metabolic acidosis. Both are packaged in 500 mL glass bottles and the pharmacy accidentally stored tromethamine by brand name, right next to the amino acid product, Trophamine. Fortunately, the error was discovered before the patient received the wrong medication. The pharmacy now stores these items apart, by generic names.

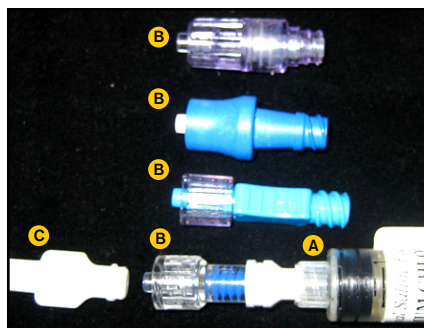
## Dangerous disconnect when unscrewing syringe from IV port

Many hospitals use Luer-access mechanical valve connectors to facilitate needleless injections through IV catheters or tubing (see figure). These valve connectors have an internal mechanism that is actuated when a standard male Luer-lock syringe tip or IV administration set is attached, opening the fluid path. We have found that it is possible to accidentally dislodge the connector from the catheter hub when unscrewing a syringe, thus leaving the catheter end entirely exposed to air.

Three ISMP health professionals were able to independently recreate this condition without using undue force when attaching or removing the valve and syringe. This is more likely to happen if the catheter hub flange, not the valve connector, is held when removing the syringe or administration set. Depending on the position of the patient and whether a manual catheter clamp is engaged, bleeding or air embolism may result, as well as infection.

This appears to be a human factors design issue more than a problem easily amenable to correction by telling staff to hold the valve connector when removing syringes or administration sets. The design of catheter hubs and connectors may invite holding the flange on catheters, not the connectors themselves, although one connector in our possession has a ribbed concave area that seems easier to hold. The hospital that sent us this report claims to have had this happen several times, resulting in one case of air embolism that required emergency treatment. Fortunately, the patient survived.

In the past, events with medical devices like this might have been mischaracterized as solely a user problem. Today, it's clear that device design often plays a significant role when errors happen. Thus, it is incumbent upon the medical industry to improve the design of valve connectors to prevent this potentially fatal problem. We recommend that you test your connectors for this potential problem, and alert nurses to this risk.



Syringe (A) can retain a valve connector (B), dislodging it from the vascular access catheter (C). Note flange near catheter hub.

### Special Announcement

**ISMP teleconference.** Join us for our next teleconference, *The Joint Commission (TJC) Update: 2007-2008 Requirements Related to Medication Use*, to be held on **July 18**, and repeated on **August 2**. Guest speaker **Darryl Rich**, PharmD, a surveyor for TJC, will present information regarding the Medication Management (MM) standards (including MM.4.10, regarding review of orders in the emergency department) and the **2008 National Patient Safety Goals (NPSG)**. Current MM standards and NPSGs that have proven difficult for hospitals during 2006 and 2007 will also be discussed, along with strategies for improved compliance. For details, visit: [www.ismp.org/educational/teleconferences.asp](http://www.ismp.org/educational/teleconferences.asp).

### Textbook errata

An error has been reported in the dose of **REQUIP** (ropinirole), for Restless Legs Syndrome, listed in the *Mosby's Drug Guide for Nurses*, 7th Edition, Dosage and Routes heading. The dose currently reads: Adult: PO **25 mg** at bedtime, may increase until symptoms resolve. It should read: Adult: PO **0.25 mg** at bedtime, may increase until symptoms resolve. A book update, due this summer (*Mosby's Drug Guide for Nurses*, 7th Edition, with 2008 update), will list the correct dose. The publisher is also posting a notice on the *Mosby's Drug Guide for Nurses* website (<http://us.elsevierhealth.com>).

### ISMP Safety Contest

Help us celebrate **Healthcare Risk Management Week, June 18-22, 2007**, by participating in our **Patient Safety Contest**. This year, we're seeking entries responsive to the following:

**(1) Medication safety competencies.** Submit a description of how you have built, maintained, and measured medication safety competencies for medical, nursing, and pharmacy staff.

**(2) Dashboard reports.** Submit an example of a dashboard safety/quality report that you routinely provide to the board, organizational leadership, and/or patient safety committees. The report must include measures directly and/or indirectly related to medication safety.

**(3) Medication reconciliation.** Submit a description of successful strategies that have been used to provide the patient's discharge medication list to the next provider of care, including the patient's primary care physician.

**(4) Web-based consumer education.** Submit a description and the URL for a hospital-based website that has been created to help educate patients about their medications and safety.

**(5) Communicating "lessons learned."** Submit a description and examples of the vehicles used to communicate important safety "lessons learned" to staff.

Visit [www.ismp.org/contest](http://www.ismp.org/contest) for **required supporting documentation** and submission guidelines. All entries must be received by **July 27**. One first place winner will receive **\$500** to be used toward a patient safety project; second and third place winners will receive **\$250** for the same purpose.

**ISMP Medication Safety Alert! Nurse Advise-ERR** (ISSN 1550-6304) ©2007 Institute for Safe Medication Practices (ISMP). Permission is granted to subscribers to reproduce material for internal news letters or communications. Other reproduction is prohibited without written permission. Unless noted, published errors were received through the USP-ISMP Medication Errors Reporting Program. **Editors:** Judy Smetzer, RN, BSN; Charlotte Huber, RN, MSN; Michael R.Cohen, RPh, MS, ScD; Russell Jenkins, MD. **ISMP, 1800 Byberry Road, Suite 810, Huntingdon Valley, PA 19006.** Tel. 215-947-7797; Fax 215-914-1492; EMAIL: [nursing@ismp.org](mailto:nursing@ismp.org). **Report medication errors to ISMP at 1-800-FAIL-SAF(E).**