



IV tubing misconnected to tracheostomy balloon inflation port

While changing a patient's gown, a nursing staff member accidentally connected IV tubing from an insulin infusion to the balloon inflation port of a tracheostomy tube. Since a parenteral syringe is typically used for inflation of the cuff, the port has a Luer connector, which is compatible with IV tubing.

Normally, in this hospital, patients wore gowns with sleeves that snapped closed. However, on the day of the error, this patient happened to be wearing a gown without snaps. In order to remove the gown, the staff member disconnected the patient's IV insulin infusion. When reconnecting the tubing, the nursing staff member connected the IV line to the Luer connection on the tracheostomy inflation port. In low, overhead lighting during the night, the tracheostomy inflation port had been mistaken as a triple lumen catheter port, especially since the unsecured triple lumen catheter tubing hung down at the same level as the tracheostomy tubing. Fluid began to further inflate the tracheostomy balloon, constricting the lumen of the tube itself. The error was noticed when the patient began to decompensate and became cyanotic. The IV line was immediately disconnected from the tracheostomy balloon inflation port, and approximately 30 mL of fluid was removed. Fortunately, the patient suffered no permanent harm.

Although the size of the tracheostomy inflation port line is distinctly thinner than regular IV tubing, triple lumen tubing is similarly thin like the tracheostomy inflation port tubing. Furthermore, the connection ports on needleless tubing can appear very similar to the tracheos-

tomy inflation port line—an interesting example of how safety innovations, such as a needleless system, can contribute to new, unexpected problems.

ISMP previously received a report about a similar error in which an IV solution had been accidentally infused into the balloon inflation port of a tracheostomy tube. As in the more recent event, hyperinflation of the balloon led to an airway obstruction. These high-volume, low-pressure balloons are designed to lower the long-term risk of tracheal injury, so they are compliant enough to accept large volumes of air—or fluid, in these events. The patient's roommate alerted a nurse to his respiratory distress, after which a code was called. The error was noticed when the code team was unable to inflate the lungs. The fluid was removed from the balloon, but resuscitation efforts were unsuccessful, and the patient died.

ISMP has received reports of numerous other inadvertent misconnections to balloon ports of various catheters and tubing, including:

- Accidental injection of drugs into an endotracheal tube balloon inflation port during resuscitation efforts
- Drugs inadvertently delivered into the balloon inflation ports of Foley catheters and gastrostomy tubes.

These adverse events can be grouped into a larger class of errors labeled as "wrong tube, wrong hole, wrong connector." Ideally, inflation and infusion ports should be incompatible, and interconnectivity should be impossible through product redesign. Until this occurs, consider the recommendations found in **check it out!** to reduce the risk of tubing misconnections.

check it out! ✓✓✓✓

To reduce the risk of medical tubing misconnections:

- ✓ **Use reminders.** Affix identification labels on tubing near insertion sites if the patient has more than one port of entry into the body (e.g., IV, arterial, umbilical, enteral, epidural, bladder, tracheostomy).
- ✓ **Trace lines.** Trace tubing from the source to the connection port to verify attachments before connecting or reconnecting tubing, and/or administering drugs or solutions. This action is particularly important, as awareness of each tube's location and insertion site is easily lost if tubing is obscured by bedclothes and sheets. Adjust lights as needed; use flashlights if necessary.
- ✓ **Limit access.** Limit staff who connect or disconnect medical tubing to licensed healthcare professionals who are knowledgeable about the serious risks with misconnections. During orientation, include prohibitions to connecting/disconnecting medical tubing so all hospital staff are aware of the mandate.
- ✓ **Limit disconnections.** Limit the frequency of disconnecting tubing (particularly IV tubing) to reduce the risk of misconnections (and blood stream infections).
- ✓ **FMEA.** Identify the potential for misconnections by conducting a failure mode and effects analysis on new and existing tubing and connectors you use.
- ✓ **Education.** Provide education to nurses (and others as appropriate) before using new tubes and connectors. Include discussion about possible sources of errors uncovered during failure mode and effects analysis and steps to avoid these errors. Also use tubing misconnections in simulation training during orientation and annual safety competencies.

Double Trouble **Don't grab the wrong "mab"**

If you administer **REMICADE** (infliximab) or **RITUXAN** (rituximab) on your unit, please be advised that we've received reports from inpatient and outpatient locations of mix-ups between these drugs due to generic name similarities. Both drugs are monoclonal antibodies, and doses could possibly be similar. Remicade is used to treat a variety of autoimmune disorders, including rheumatoid arthritis and Crohn's disease, while Rituxan is used to treat non-Hodgkin's lymphoma. Each can cause serious adverse effects, including fatalities, if an error occurs.

In one reported mix-up, an order for infliximab 500 mg IV every 6 weeks was received for a clinic patient, and the first dose was administered. Six weeks later, the patient returned to the clinic for his second dose. When the pharmacist retrieved his hand-

written notes about the patient's orders, he noticed that, although his notes had been written correctly, rituximab had been dispensed. The nurse who administered the drug had not noticed the error. Fortunately, the patient had not experienced a serious reaction, but the lack of treatment for his condition could have had a negative effect on his health.

To avoid errors, include both the brand and generic names of these drugs on medication administration records. Encourage prescribers to do the same, along with listing the drug's indication with orders. Both brand and generic names should also appear on pharmacy applied product labels. Preprinted order sets that include each product's indication might also prevent errors. If feasible, ask a colleague to double-check the infusion before administering it.

Sodium bicarbonate extravasation

Repeated doses of undiluted IV sodium bicarbonate administered to an elderly man with statin-induced rhabdomyolysis resulted in a serious infiltration at the peripheral IV site. On admission to the emergency department, the patient's potassium level was 8.2 mEq/L. His hyperkalemia was treated with regular insulin, 50% glucose, and 50 mEq of sodium bicarbonate slow IV push. Once in ICU, he received three additional doses of 50 mEq of sodium bicarbonate, each 2 hours apart, slow IV push into an IV site through which normal saline had been infusing at 125 mL/hour. During the final dose, the patient complained of pain at the IV site on his left hand, which was swollen and beginning to turn purple. However, the nurse continued to administer this dose into the existing IV site and, afterwards, changed the site to the right hand. Unfortunately, the patient's left hand continued to swell and became a dusky purple for 2 more days, after which healing was very slow.

Extravasation of hypertonic solutions of sodium bicarbonate causes chemical cellulitis due to the drug's alkalinity. This can subsequently result in tissue necrosis, ulceration, and/or sloughing at the site of the injection.

Although no longer recommended during cardiopulmonary resuscitation, sodium bicarbonate is still sometimes given slow IV push if other efforts per advanced cardiovascular life support (ACLS) guidelines are ineffective. However, in nonurgent situations, pharmacy should dilute the drug to a 1:1 concentration with sterile water for injection, and the nurse should administer the infusion over 1 to 8 hours. This can reduce the risk of serious harm in the event of extravasation. Some nurses also try to avoid administering the drug using an IV access site in the hand or wrist. Review your guidelines for administration of sodium bicarbonate IV and make any necessary changes to avoid the risk of harm from extravasation.

safetywire



A million abbreviations.

ISMP is frequently asked whether it is safer to express large doses using numbers alone (e.g., 1,000,000), or numbers and words together (e.g., 1 million), especially when entering doses in computer systems, on medication administration records, and on pharmacy applied labels. The short answer is that it is safest to express large doses using a combination of numbers and words. The words "million" and "thousand" carry nearly the same number of digits as their corresponding numbers, but they are less prone to confusion. That's because the words "million" and "thousand" exhibit different and more distinguishable characters, while 100,000 and 1,000,000, or 100000 and 1000000, are obviously very similar, especially when commas are omitted or misplaced. As for ways to abbreviate "million" or "thousand," it's best to avoid abbreviations. We have seen the Roman numeral MM used to abbreviate million (1,000 x 1,000), but everyone may not understand the meaning. The letter M has been used for millions (or MU for "million units"), and the letter K (kilo) is also popular as an abbreviation for thousand (as in 10K race). However M is the Roman numeral for 1,000 and could easily be misunderstood to represent this quantity if used as an abbreviation for million. To be safe, use numbers and whole words (e.g., 50 thousand, 1 million) when expressing large numbers.

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Look What's New at ISMP!

Recognition

2007 ISMP Safety Contest Winners. In June and July, ISMP invited readers to celebrate **Healthcare Risk Management Week** by participating in a safety contest. The following health systems submitted winning entries:



First Place: Bayhealth Medical Center (Dover, DE). This health system developed a comprehensive medication safety competency program that uses a variety of methods to teach and test staff, including presentations, a *Medication Jeopardy* game, root cause analysis discussion, and a post test.



Second Place: Cortland Regional Medical Center (Cortland, NY). This medical center used the power of storytelling to bring the lessons learned from a tragic medication error to the organization via a video simulation of the event. The transparency of this organization's culture is evident in its willingness to share the most difficult of stories with its staff.



Third Place: Sharp Chula Vista Medical Center (San Diego, CA). This medical center, which is close to the US-Mexico border, established a medication reconciliation process in the emergency department using bilingual pharmacy technicians. The uniquely structured process significantly reduced medication omission errors.

To help fund safety projects, the First Place winner received \$500, and the Second and Third Place winners received \$250. For more information on the winning submissions, please visit www.ismp.org/safetycontest. Thanks to the many health systems that submitted entries. We salute your commitment to patient safety!

Fellowship

New 2007-2008 Fellow. **Barbara Olson**, RNC, MS, has joined ISMP as the 2007-2008 **ISMP Safe Medication Management Fellow**. Ms. Olson has an extensive background in perinatal nursing and clinical performance improvement, although she has practiced in a variety of healthcare settings. Ms. Olson received a BSN from Emory University (GA), a MS from Regis University (CO), and is certified in inpatient obstetrical nursing with a certificate of added qualification in electronic fetal monitoring. Ms. Olson will be working closely with ISMP staff and other patient safety organizations during the 12-month fellowship, which is funded through an unrestricted grant from Cardinal Health.

ISMP's **Safe Medication Management Fellowship** is a unique 12-month program beginning each July that educates a healthcare practitioner in error prevention and safe medication use methods. Ms. Olson is the third nurse accepted into the fellowship program in the past 10 years. For more information about the fellowship, please visit: www.ismp.org/profdevelopment/managementfellowship.asp. Applications for the July 2008-June 2009 fellowship are accepted throughout the year until March 31, 2008.

Education

Free CE programs on smart pumps. Nurses can earn free continuing education (CE) credits by reading ISMP's new educational monographs on effective approaches to implementation of smart pump technology and building and using data from patient controlled-analgesia drug libraries. To access electronic copies of the monographs and online CE tests, go to: www.ismp.org/profdevelopment/continuingeducation.asp.

Free FDA patient safety videos. The latest medication safety related videos, developed by FDA in cooperation with ISMP, are now available free for viewing or downloading on the ISMP website (www.ismp.org/Tools/fdavideos.asp). See below for the latest 2007 offerings.

September 2007	Caution on No-Name Drug Patches
	Preventing Patient Deaths from Fentanyl Patches
July 2007	Avoiding Dangerous Mix-ups between Insulin and Heparin
June 2007	Preventing Drug Mix-Ups: Bumetanide and Norepinephrine
March 2007	Possible Dose-Counter Errors with the Asmanex Twisthaler

ISMP-USP workshops. ISMP and USP are offering workshops on collecting, analyzing, and prioritizing adverse drug event data. The full-day programs, **Using Data Effectively to Manage the Risks to Medication Safety**, will be held in **Tampa, Chicago, Rockville, and Las Vegas**, between **September and December 2007**. Breakout sessions will offer participants an opportunity for hands-on practice working with safety data. For details, visit: www.ismp.org/educational/ismpuspworkshops.asp.

High-alert medication videos. ISMP offers two videos, **Building System Safeguards for the Safe Use of High-Alert Medications**, and **Patient Controlled Analgesia: Strategies for Patient Safety**, that spotlight safeguards with high-alert medications, including those that are targets in the Institute for Healthcare Improvement's **5 Million Lives Campaign**. For details, visit: <http://onlinestore.ismp.org/catalog.cfm?catid=3>.

Support

Medication safety program for rural hospitals. Small hospitals often face challenges managing safety priorities with limited resources and have difficulty finding educational programs that address their unique concerns. To help support those needs, ISMP offers a unique set of tools in a **Medication Safety Resource Kit** that includes:

- Three CD's of presentations by ISMP experts who share their experiences regarding medication safety in small and rural hospitals
- A comprehensive resource binder designed specifically to help small and rural hospitals improve medication safety.

For details, visit: www.ismp.org/Consult/ruralhospital/default.asp.