

This is the premier issue of *Safety First*, a publication of the Massachusetts Coalition for the Prevention of Medical Errors - a unique partnership of providers, clinicians, and regulators - formed in 1997 to improve patient safety and reduce medical errors. *Safety First* will be published periodically to alert the health care community to strategies for preventing errors known to have occurred in Massachusetts and across the country. For further information, contact Leslie Kirle, 781-272-8000, ext. 124; fax 781-270-3521; email:lkirle@mhalink.org.

Wrong-Route Errors

There have been a number of incidents reported in which medications have been administered via a route different than the intended route. These incidents can result in adverse patient outcomes, including death. Listed below are brief summaries of the events and recommendations for system changes to minimize the opportunity for these errors to occur.

Enteral formulas given parenterally

Intravenous administration of enteral formulas has been reported a number of times.

In reviewing these cases, several break points in the system have been found. The incidents have usually involved a patient who has multiple lines (tubing). The tubing in use did not prohibit a health care worker from attaching enteral feeds to an IV line. Another break point has been the use of the same type of pump to deliver parenterals and enterals.

What can you do to minimize the opportunity for error in your institution?

- Do not interchange enteral tubing and IV tubing.
- Use tubing and bags designed for enteral feed administration only. Manufacturers make tubing connections that prevent connecting enteral lines to intravenous lines. This forcing function* is the primary means of preventing this type of error.
- Ensure that pumps used to deliver IV medications are different from pumps used to deliver enteral feeds.

* Forcing function refers to a physical constraint that prevents an error from occurring.

Oral medications given intravenously

Other reported wrong route errors have involved the administration of oral medications intravenously.

What can you do to minimize the opportunity for error in your institution?

- Never give oral medications intravenously.
- Review dosage forms and route of administration with all staff involved in administering medications.
- Review medication administration competencies and discuss the implications of this kind of error with staff. Root cause analysis reveals that these errors result from problems with staff knowledge and competency.

Intravenous medication administered intrathecally

This is another route mix-up error that has been reported in the literature. There are medications that can be given via either route of administration; however, the final dose of each medication is different. Whenever a patient is on multiple drug therapy, one of which is to be administered intrathecally and one intravenously, there is an opportunity for confusion and an error.

What can you do to minimize the opportunity for error in your institution?

- Facilitate proper identification and proper route of administration by the end user with special packaging of all medications intended for intrathecal administration. This may involve packaging the product in specially designated plastic bags, applying appropriate labeling, attaching specific tubing to be used, and using warning labels.
- Provide medications in a ready-to-administer form, which minimizes the opportunity for error by ensuring that one volume is too large to be administered intrathecally. In cases where nurses are required to further dilute a product, the original volume may be small enough that the health care worker may administer it intrathecally.
- Prepare and administer intravenous and intrathecal medications in different locations when possible.

Intramuscular preparations administered intravenously

Administration of intramuscular preparations intravenously has been reported. In one documented example, a newborn in a neonatal unit was ordered to receive benzathine G penicillin intramuscularly. The case revealed a number of system errors. An error in dispensing resulted in a dose which was ten times the ordered dose. Not realizing this error, the nurses attempted to minimize the number of injection sites for the patient and searched for an alternate

route of administration. Reading the available drug information, the nurses misinterpreted the literature and assumed that the product could be given intravenously. Further complicating the situation, the product was a non-formulary and the staff had no familiarity with the product.

The nurses also worked under another false assumption: the benzathine product is a ‘milky liquid’ and nurses had administered ‘milky fluids’ (IV fats) intravenously previously.

What can you do to minimize the opportunity for error in your institution?

- Make information about medications clear, current and readily available to all staff. In this case, the information was available, however it was not clear and was misinterpreted.
- Alert staff to additional drug information and warnings for all non-formulary and/or infrequently used medications.
- Have pharmacy attach auxiliary labels indicating that the drug is to be administered via the intramuscular route only.
- Make all staff aware of policies regarding IM administration and consult with pharmacy when the final volume is greater than the allowed volume to be administered via this route.
- Question orders for non-formulary medications and recommend a formulary alternative. In this manner, the staff would be using medications with which they are most familiar.

Epidural and intravenous lines mix-up

In one reported case, IV lipids were administered to a patient via an epidural line. This again is a case in which a patient had multiple IV lines. In preparing to administer the product, the wrong line was chosen.

What can you do to minimize the opportunity for error in your institution?

- Label each line at the connecting end. In this manner, there will be less difficulty in identifying the appropriate line.

Using IV syringes to measure doses of oral medications

Another source of error occurs when a health care provider uses IV syringes to measure doses of oral medications. This is a set up for a wrong-route error. If a provider is distracted or interrupted before administering the dose, it’s possible for the individual to use the IV syringe to administer the oral medicine parenterally.

What can you do to minimize the opportunity for error in your institution?

- Use an oral syringe for measuring when administering oral medications. In some cases, 1mL IV syringes are used to measure oral liquids and 1mL oral syringes may not have the appropriate calibrations to measure very small doses. One oral syringe manufacturer has made

available 0.5mL syringes, which can be used to measure low doses.

- Test oral syringes in use to ensure that they are designed with a tip that prevents connecting the syringe to the needleless IV sets.

Using intravenous medications orally

There may be instances when an IV preparation may be used to provide a dose of oral medication. This may be because there is not a commercially available product that meets this patient's needs or that the only means of providing the ordered dose requires the use of the available IV product.

What can you do to minimize the opportunity for error in your institution?

- Have pharmacy prepare all oral doses when IV medications must be used.
- Repackage the medication in an amber bottle or oral syringes. This minimizes the opportunity for mix-up during preparation and administration.
- Do not send vials to the patient care area.
- Examine labels generated by the pharmacy to ensure that they do not continue to list this as an IV product. Depending on the computer application, there may be a default route printed on the label, which may be "IV" when the intent is to deliver this medication orally. Be sure that the printed route reflects the desired route of administration.
- Attach appropriate labels such as FOR ORAL USE ONLY.
- Have the dose changed whenever possible so that commercially available oral products can be used.

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The Massachusetts Coalition for the Prevention of Medical Errors was established to develop and implement a statewide initiative to improve patient safety and minimize medical errors. The goals of the coalition are:

- to establish a mechanism to identify and implement best practices to minimize medical errors;
- to increase awareness of error prevention strategies through public and professional education;
- to identify areas of mutual interest and minimize duplication of regulatory and Joint Commission for the Accreditation of Healthcare Organizations (JCAHO) requirements so that efforts are focused on initiatives that can best improve patient care.

List of Participating Member Organizations

- AARP
- American College of Physicians
- Boston University School of Medicine Center for Primary Care
- Harvard Risk Management Foundation
- Health Care Financing Administration Regional Office
- Harvard School of Public Health
- Institute for Healthcare Improvement
- Joint Commission on Accreditation of Healthcare Organizations
- Massachusetts Association of Behavioral Health Systems
- Massachusetts Board of Registration in Nursing
- Massachusetts Board of Registration in Pharmacy
- Massachusetts Board of Registration in Medicine
- Massachusetts Department of Public Health
- Massachusetts Extended Care Federation
- Massachusetts Hospital Association
- Massachusetts Medical Society
- Massachusetts Nurses Association
- Massachusetts Organization of Nurse Executives
- Massachusetts Peer Review Organization
- Professional Liability Foundation
- PRO Mutual Group