2024–2025

ISMP Targeted Medication Safety Best Practices for Hospitals

ISMP
Institute for Safe Medication Practices
An ECRI Affiliate

www.ismp.org

The purpose of the ISMP ***Targeted Medication Safety Best Practices for Hospitals*** is to identify, inspire, and mobilize widespread, adoption of consensus-based *Best Practices* for specific medication safety issues that continue to cause fatal and harmful errors in patients, despite repeated warnings in ISMP publications. Hospitals and health systems can focus their medication safety efforts over the next 2 years on these *Best Practices*, which are realistic and have been successfully adopted by numerous organizations. While targeted for the hospital-based setting, some *Best Practices* are applicable to other healthcare settings. The ISMP *Targeted Medication Safety Best Practices for Hospitals* have been reviewed by an external Expert Advisory Panel and approved by the ISMP Board of Directors. Related issues (bolded dates indicate those that are the main article) of the ***ISMP Medication Safety Alert!***® are referenced after each *Best Practice*.

ISMP encourages hospitals that have not implemented the ISMP *Targeted Medication Safety Best Practices for Hospitals* to do so as a priority, while implementing the new *Best Practices* for 2024-2025. Related documents include ISMP *Targeted Medication Safety Best Practices for Hospitals* Frequently Asked Questions (FAQs), ISMP *Targeted Medication Safety Best Practices for Hospitals* implementation worksheet, and ISMP *Targeted Medication Safety Best Practices for Community Pharmacy*.

BEST PRACTICE 1:

Dispense vinCRIS**tine and other vinca alkaloids in a minibag of a compatible solution and not in a syringe.**

Rationale:

The goal of this *Best Practice* is to ensure that vinca alkaloids are only administered by the intravenous route. Vinca alkaloids (e.g., vin**BLAS**tine, vinorelbine, vin**CRIS**tine, vin**CRIS**tine liposomal) can cause fatal neurological effects if given via the intrathecal route instead of intravenously. Vin**CRIS**tine is particularly problematic and the most frequently reported vinca alkaloid associated with inadvertent intrathecal administration. Deaths have been reported throughout the world when the drug was dispensed in a syringe and given into spinal fluid instead of intravenously. For example, more than 130 cases have been reported worldwide with vin**CRIS**tine given via the wrong route. This often happens when a syringe of vin**CRIS**tine is mistakenly used instead of a syringe of cytarabine, hydrocortisone, or methotrexate, which are supposed to be given into spinal fluid to the same patient. When vinca alkaloids are injected intrathecally, destruction of the central nervous system occurs, radiating out from the injection site. The few survivors of this medication error have experienced devastating neurological damage. Despite repeated warnings by various national and international safety agencies, deaths from this type of error still occur. The product labeling of all currently marketed vinca alkaloids also carry a special warning ("**For Intravenous Use Only—Fatal If Given by Other Routes**").

An effective prevention strategy that reduces the risk of inadvertently administering vinca alkaloids via the intrathecal route is to dilute the drug in a minibag that contains a volume that is too large for intrathecal administration (e.g., 25 mL for pediatric patients and 50 mL for adult patients). Many organizations have successfully switched to preparing vinca alkaloids in minibags, including pediatric hospitals and health systems, overcoming concerns of extravasation and other complications. There have been no reported cases of accidental administration of a vinca alkaloid by the intrathecal route when dispensed in a minibag. This *Best Practice* is supported by The Joint Commission (TJC),[1] the American Society of Clinical Oncology (ASCO),[2] the Oncology Nursing Society (ONS),[2,3] the National Comprehensive Cancer Network (NCCN), and the World Health Organization.[4]

In 2019, the International Medication Safety Network (IMSN) introduced *Global Targeted Medication Safety Best Practice 2 - Prepare and dispense vinca alkaloids in a minibag, never in a syringe* aimed at preventing fatalities due to medication errors with the inadvertent intraspinal injection of vin**CRIS**tine.

In 2020, the US Food and Drug Administration (FDA) also changed the prescribing information (package insert) to call for dilution in a minibag only (www.ismp.org/node/18548). The labeling for vin**CRIS**tine now states: To reduce the potential for fatal medication errors due to incorrect route of administration, vin**CRIS**tine sulfate injection should be diluted in a flexible plastic container and prominently labeled as indicated "**FOR INTRAVENOUS USE ONLY— FATAL IF GIVEN BY OTHER ROUTES**." Preparation and administration of the drug in a syringe has been removed from the package insert.

Reference:

1. The Joint Commission. Eliminating vincristine administration events. *Quick Safety*. 2017;37:1-3. (www.ismp.org/ext/348)
2. Neuss MN, Gilmore TR, Belderson KM, et al. 2016 Updated American Society of Clinical Oncology/Oncology Nursing Society Chemotherapy Administration Safety Standards, including Standards for Pediatric Oncology. *J Oncol Pract*. 2016;12(12):1262-71.
3. Schulmeister L. Preventing vincristine administration errors: does evidence support minibag infusions? *Clin J Oncol Nurs*. 2006;10(2):271-3.
4. World Health Organization. Vincristine (and other vinca alkaloids) should only be given intravenously via a minibag. *Information Exchange System*, Alert No. 115, July 18, 2007. (www.ismp.org/ext/232)

Best Practice 1 First Introduced:

2014-2015

Related *ISMP Medication Safety Alerts!:*

December 17, 2020; July 2, 2020; April 11, 2019; **March 14, 2019**; **September 5, 2013**; May 20, 2010; August 14, 2008; July 26, 2007; May 18, 2006; **February 23, 2006**; **December 1, 2005**; May 1, 2003; February 6, 2003; **April 5, 2000**; November 4, 1998; **September 23, 1998**; June 18, 1997.

BEST PRACTICE 2:

a) Use a weekly dosage regimen default for oral methotrexate in electronic systems when medication orders are entered.

b) Require a hard stop verification of an appropriate oncologic indication for all daily oral methotrexate orders.

- For manual systems and electronic order entry systems that cannot provide a hard stop, clarify all daily orders for methotrexate when the patient does not have a documented oncologic diagnosis.
- Hospitals should work with their software vendors and information technology departments to ensure that this hard stop is available. Software vendors need to ensure that their order entry systems are capable of this hard stop as an important patient safety component of their systems.

c) Provide specific patient and/or family education for all oral methotrexate discharge orders.

- Double-check all printed medication lists and discharge instructions to ensure that they indicate the correct dosage regimen for oral methotrexate prior to providing them to the patient.
- Ensure that the process for providing discharge instructions for oral methotrexate includes clear written instructions AND clear verbal instructions that specifically review the dosing schedule, emphasize the danger with taking extra doses, and specify that the medication should not be taken "as needed" for symptom control.
- Require the patient to repeat back the instructions to validate that the patient understands the dosing schedule and toxicities of the medication if taken more frequently than prescribed.
- Provide all patients with a copy of the ISMP high-alert medication consumer leaflet on oral methotrexate (found at: www.ismp.org/ext/221).

Rationale:

The goal of this *Best Practice* is to prevent errors involving inadvertent daily dosing of oral methotrexate both in the inpatient setting and after discharge. Since early 1996, harmful and fatal errors have been reported to ISMP involving the accidental daily dosing of oral methotrexate that was intended for weekly administration.

Methotrexate is a folate antimetabolite used to treat different types of cancers. Since the drug's introduction, its labeled indications have expanded to include non-oncologic uses. It is now used to treat a variety of autoimmune diseases (e.g., psoriasis, severe rheumatoid arthritis, lupus) and other disorders. When used for immunomodulation to treat disorders such as rheumatoid arthritis, the drug is administered once a week.

Prescribing errors occur when physicians or other providers, who are familiar with prescribing many medications for daily administration, erroneously prescribe this medication daily instead of weekly. Dispensing errors occur in much the same way when pharmacy technicians and pharmacists inadvertently select/approve daily instead of weekly administration during order entry or verification. Patient errors have occurred when complex directions were misunderstood. While patient harm and fatalities have occurred during hospitalization, many have occurred after discharge.

Ongoing errors with oral methotrexate for non-oncologic use suggest that more needs to be done to reduce the risk of patient harm. It is important for hospitals not only to ensure that the proper dosage regimen is administered during hospitalization, but also to implement effective, proactive strategies so that the proper dosage regimen is maintained after discharge. While all hospitals routinely provide discharge instructions to patients and/or families about the patients' medication use after discharge, extra attention is important with oral methotrexate so that the patient and/or family understands both the proper dosage regimen and potential toxicities when taking more than prescribed.

In 2019, the International Medication Safety Network (IMSN) introduced *Global Targeted Medication Safety Best Practice 3 - Prevent inadvertent daily dosing of oral methotrexate for non-oncologic conditions* aimed at preventing accidental daily instead of weekly dosing of methotrexate.

BEST PRACTICE 2 — *continued on page 5*

Best Practice 2 First Introduced:

2014-2015

Related *ISMP Medication Safety Alerts!:*

July 30, 2020; April 6, 2017; **September 19, 2013**; March 26, 2009; December 13, 2007; November 4, 2004; **December 3, 2002**; **April 3, 2002**.

BEST PRACTICE 2 — *continued from page 4*

In 2020, the FDA revised the labeling for methotrexate removing the option of administering weekly doses of the medication in divided doses given every 12 hours for 3 doses. ISMP has received reports about fatal errors in which patients misunderstood those directions on their prescription container and took, for example, methotrexate 2.5 mg every 12 hours over several consecutive days instead of 2.5 mg every 12 hours for 3 doses each week.

BEST PRACTICE 3:

a) Weigh each patient as soon as possible on admission and during each appropriate* outpatient or emergency department encounter. Avoid the use of a stated, estimated, or historical weight.

- Have metric scales available in all areas where patients are admitted or encountered. Ensure the metric weight is documented in the medical record.
- Do not rely on a patient's stated weight, a healthcare provider's estimated weight, or a documented weight from a previous encounter.

* Appropriate encounters include all encounters where the patient is being seen by a licensed independent practitioner, excluding life-threatening situations where the delay involved in weighing the patient could lead to serious harm (e.g., major trauma). Encounters that involve laboratory and other services where medications are not prescribed or administered would be considered an exclusion to this definition.

b) Measure and document patient weights in metric units only.

- If scales can measure in both pounds/ounces and kilograms/grams, modify the scale to lock out the ability to weigh in pounds/ounces.
- If purchasing or replacing scales, buy new scales that measure in, or can be locked to measure in, metric units only.
- Have charts that convert from kilograms (or grams for pediatrics) to pounds available near all scales, so that patients/caregivers/parents can be told the weight in pounds, if requested.
- Ensure that electronic health record screen views, medication device screens (e.g., infusion pumps), printed patient information documents, and printed order and/or communication forms, list, or prompt for the patient's weight in metric units only.
- Document the patient's weight in metric units only in all electronic and written formats.

Rationale:

The first goal of this *Best Practice* is to ensure, as much as possible, that the patient's actual weight is obtained upon each admission or appropriate encounter. Many medication doses are based on the patient's weight. Relying on a stated, estimated, or historical weight can cause inaccurate dosing (both under- and overdosing).

The second goal of the *Best Practice* is to standardize the measurement and communication of a patient's weight using only metric units of measure (grams [g] and kilograms [kg]). Official product labeling for medications provides weight-based dosing using only the metric system (e.g., mg/kg, units/kg). Significant medication errors have occurred when the patient's weight was communicated and/or documented in non-metric units of measure (pounds and ounces) and was confused with kilograms or grams. Numerous mistakes have been reported in which practitioners converted a weight from one measurement system to another, or weighed a patient in pounds, but accidentally documented the weight value as kilograms in the medical record, resulting in more than a two-fold dosing error.

Best Practice 3 First Introduced:

2014-2015

Related *ISMP Medication Safety Alerts!:*

December 1, 2011; **August 26, 2010**; January 15, 2009; November 17, 1999.

BEST PRACTICE 4 (ARCHIVED)

ARCHIVED Best Practice

See page 21

Ensure that all oral liquid medications that are not commercially available in unit dose packaging are dispensed by the pharmacy in an oral syringe or an enteral syringe that meets the International Organization for Standardization (ISO) 80369 standard, such as ENFit.

BEST PRACTICE 5 (ARCHIVED)

ARCHIVED Best Practice

See page 22

Purchase oral liquid dosing devices (oral syringes/cups/droppers) that only display the metric scale.

BEST PRACTICE 6 (ARCHIVED)

ARCHIVED Best Practice

See page 23

Eliminate glacial acetic acid from all areas of the hospital.

BEST PRACTICE 7:

Segregate, sequester, and differentiate all neuromuscular blocking agents (NMBs) from other medications, wherever they are stored in the organization.

- Eliminate the storage of NMBs in areas of your organization where they are not routinely needed.
- In patient care areas where they are needed (e.g., intensive care unit), place NMBs in a sealed box or, preferably, in a rapid sequence intubation (RSI) kit.
- Limit availability in automated dispensing cabinets (ADCs) to areas where they are needed such as perioperative, labor and delivery, critical care, and emergency department (ED) settings; in these areas, store them in an RSI kit, or locked-lidded ADC pockets/drawers.
- Segregate NMBs from all other medications in the pharmacy by placing them in separate lidded containers in the refrigerator or other secure, isolated storage area.
- Place auxiliary labels on all storage bins (both refrigerated and non-refrigerated) and/or ADC pockets and drawers that contain NMBs as well as all final medication containers of NMBs (e.g., syringes, intravenous [IV] bags) that state: "**WARNING: CAUSES RESPIRATORY ARREST – PATIENT MUST BE VENTILATED**" or "**WARNING: PARALYZING AGENT – CAUSES RESPIRATORY ARREST**" or "**WARNING: CAUSES RESPIRATORY PARALYSIS – PATIENT MUST BE VENTILATED**" to clearly communicate that respiratory paralysis will occur and ventilation is required.*
- Configure interactive ADC alerts that require users to enter or select clinically relevant information (e.g., the purpose for removing the drug [a code situation], whether the patient is ventilated) prior to removal.

Exception: The auxiliary label practice excludes anesthesia-prepared syringes of NMBs.

* Other acceptable alternatives to labeling storage bins and/or ADC pockets are to affix an auxiliary warning label (in addition to the manufacturer's warning on the caps and ferrules) directly on all vials and/or other containers stocked in storage locations, or by displaying a warning on the ADC screen, (e.g., "Patient must be intubated to receive this medication") that interrupts all attempts to remove a neuromuscular blocker via a patient's profile or on override. The warning should require the user to enter or select the purpose of the medication removal ("other" should not be a choice) and verify that the patient is (or will be) manually or mechanically ventilated.

Rationale:

The goal of this *Best Practice* is to prevent errors related to accidental administration of NMBs to patients, especially those not receiving proper ventilator assistance. Because the respiratory muscles are paralyzed by these agents, errors in the compounding, dispensing, and administration of these medications instead of other drugs have resulted in death or serious, permanent injury. Even with patients requiring ventilator assistance, severe psychological trauma can occur if the NMB is accidentally administered prior to sedation.

ISMP has received well over 100 reports concerning accidental administration of NMBs and has been discussing the hazards of these agents since 1996. Most errors with the use of these agents have been the result of using or compounding a NMB in error instead of the intended drug. In 2014, a widely publicized death caused by compounding a NMB solution instead of a fosphenytoin solution received national attention. A few years later, in 2017, due to several system failures, the accidental administration of a NMB in place of midazolam resulted in another patient's death. Inadequate labeling or unsafe storage has been the root cause of most of these errors. Segregation in storage areas and the use of proper warning labels can be an effective means of preventing mix-ups with NMBs.

Best Practice 7 First Introduced:

2016-2017

Related *ISMP Medication Safety Alerts!:*

June 4, 2020; **January 17, 2019**; **June 16, 2016**; December 18, 2014; September 25, 2014; January 30, 2014; November 15, 2012; January 14, 2010; December 4, 2008; May 30, 2007; **September 22, 2005**; April 4, 2003; January 9, 2003; December 18, 2002; May 1, 2002; August 25, 1999; October 7, 1998; May 20, 1998; April 9, 1997; October 23, 1996; June 5, 1996.

BEST PRACTICE 8:

a) Administer all* medication and hydration infusions via a programmable infusion pump utilizing dose error-reduction systems.†

b) Maintain a compliance rate of greater than 95% for the use of dose error-reduction systems.

c) Monitor compliance with use of smart pump dose error-reduction software on a monthly basis.

d) If your organization allows for the administration of an intravenous (IV) bolus or a loading dose from a continuous medication infusion, use a smart pump that allows programming of the bolus (or loading dose) and continuous infusion rate with separate limits for each.

e) Further, implement bi-directional (e.g., auto-programming and auto-documentation‡) smart infusion pump interoperability with the electronic health record and establish organizational expectations (e.g., compliance goals) for the use of auto-programming and documentation for medication and hydration infusions.

- Allocate resources for ongoing maintenance, updating, and testing of the software, drug library, and interoperability for all smart infusion pumps.
- Ensure drug library content is consistent with the drug information and nomenclature (e.g., drug name, dosing units, dosing rate) in the electronic health record.

This *Best Practice* applies to all hospital settings, both inpatient and outpatient (e.g., magnetic resonance imaging [MRI] department, emergency department, outpatient infusion clinics), and to all situations in which medications are infused by the IV or epidural route, including anesthesia use and patient-controlled analgesia (PCA). The only exception is for small volume vesicant infusions (i.e., chemotherapy vesicants) which, when administered via the peripheral route, should only be infused by gravity and NOT by an infusion/syringe pump.

* Unless the rate of the infusion exceeds the delivery limits of the infusion pump.

† **Dose error-reduction systems (DERS)**: Refers to the integral computer software in smart infusion pumps intended to aid in prevention of infusion programming-related errors and warn users of potential over- or under-delivery of a medication or fluid by checking programmed doses/rates against facility configurable preset limits specific to a medication, fluid, and to a clinical application (e.g., epidural administration) and/or location (e.g., neonatal intensive care unit, medical/surgical unit).

‡ **Auto-programming**: Automatic-programming of infusion parameters from the electronic health record system to the smart infusion pump (which are then verified, and the infusion is started manually by the practitioner) after use of the barcode medication administration system to associate the patient, fluid container (e.g., bag, bottle, syringe), and pump channel. **Auto-documentation** (also known as auto-charting or infusion documentation): Sending infusion information such as intake data, dose/rate changes, and infusion stop time, to the electronic health record system for manual clinician confirmation to enable accurate recording of this information to the patient's record after the infusion is started.

Rationale:

The goal of this *Best Practice* is to ensure the use of dose error-reduction technology to prevent infusion-related medication errors, which can cause harm to patients. Infusion-related medication errors expose patients to a higher risk of harm. Programmable infusion pumps with DERS help to avert these potentially harmful errors by "remembering" the large number of "rules" (hospital-defined dosing limits and other clinical advisories) entered into the drug library and applying those "rules" during pump programming to warn clinicians about potentially unsafe drug therapy. Implementation of bi-directional interoperability connecting the smart infusion pump and the electronic health record will further reduce the risk of programming errors and provide a mechanism for more accurate documentation of infusing medications.

Best Practice 8 First Introduced:

2016-2017

Related *ISMP Medication Safety Alerts!:*

June 29, 2023; **May 18, 2023**; **October 20, 2022**; **July 28, 2022**; **May 7, 2020**; **July 12, 2018**; **May 31, 2018**; **April 5, 2018**; April 9, 2015; February 23, 2012; May 5, 2011; October 7, 2010; April 8, 2010; August 28, 2008; September 20, 2007; **August 23, 2007**; June 14, 2007; **April 19, 2007**; May 6, 2004; April 7, 2005; September 18, 2002.

See also: ISMP ***Guidelines for Optimizing Safe Implementation and Use of Smart Infusion Pumps*** (2020) (www.ismp.org/node/972)

BEST PRACTICE 9:

Ensure all appropriate antidotes, reversal agents, and rescue agents are readily available. Have standardized protocols and/or coupled order sets in place that permit the emergency administration of all appropriate antidotes, reversal agents, and rescue agents used in the facility. Have directions for use/administration readily available in all clinical areas where the antidotes, reversal agents, and rescue agents are used.

- Identify which antidotes, reversal agents, and rescue agents can be administered immediately in emergency situations to prevent patient harm.
- Use this list to develop appropriate protocols or coupled order sets to ensure that the above *Best Practice* is met.

Rationale:

The goal of this *Best Practice* is to ensure that when an antidote, reversal agent, or rescue agent is known for a drug that has a high potential to cause an adverse reaction, or if a toxic dose is inadvertently administered, the agent is readily available and can be administered without delay. Some medications have a high potential to cause an adverse reaction even when the appropriate dose is administered (e.g., iron dextran). Adverse effects can also occur if an overdose of a medication is accidentally administered. In both cases, the reaction can be life-threatening, and sometimes immediate intervention is needed. For some drugs, an antidote, reversal agent, or rescue agent may exist to counteract the reaction. For example, naloxone counteracts the effects of opioids, flumazenil counteracts benzodiazepines, lipid emulsions counteract the cardiotoxic effects of local anesthetics, and uridine triacetate counteracts the toxic effects of fluorouracil.

ISMP has received reports of death and serious harm because there was a delay in the administration of the appropriate antidote, reversal agent, or rescue agent (e.g., **EPINEPH**rine for anaphylaxis). Known antidotes, reversal agents, and rescue agents must be routinely available and, in certain situations, stored in areas where these high-risk medications are administered. In addition, it is important to have standardized protocols or coupled order sets so qualified staff can treat the reaction/overdose without waiting for an order from the prescriber. Also, the directions for use should be available near where these agents are stored to avoid a delay or improper use and administration of the agent.

Best Practice 9 First Introduced:

2016-2017

Related *ISMP Medication Safety Alerts!:*

January 27, 2022; **June 18, 2015**; July 1, 2010; April 8, 2010; March 11, 2010; February 22, 2007; January 11, 2007; December 14, 2006; November 3, 1999; September 10, 1999.

BEST PRACTICE 10 (ARCHIVED)

ARCHIVED Best Practice

See page 24

Eliminate all 1,000 mL bags of sterile water (labeled for "injection," "irrigation," or "inhalation") from all areas outside of the pharmacy.

BEST PRACTICE 11:

When compounding sterile preparations, utilize workflow management systems.

- Minimize sterile compounding outside a pharmacy environment.
- Follow safe pharmacy processes for use of technology.*
- Identify safety gaps specific to each technology and create an action plan to avoid errors.
- If you are not currently using workflow management systems, create an implementation plan.
- Before implementing compounding technology, perform a failure mode and effects analysis of the new system and workflow process.

* See ISMP ***Guidelines for Sterile Compounding and the Safe Use of Sterile Compounding Technology*** (2022) www.ismp.org/node/31362

Rationale:

The goal of this *Best Practice* is to prevent medication errors during sterile compounding of drugs. ISMP has reported multiple serious compounding errors that caused patient harm or death mostly due to preparation of the wrong concentration/strength or using the wrong product or diluent. Unfortunately, such errors are exceedingly difficult to detect for those who administer the preparations. Consequently, drug compounding errors that are not caught before the preparation leaves the pharmacy or not caught by the person preparing a product outside a pharmacy setting, have a high likelihood of reaching the patient. Many of these errors would have been identified if dispensing technology had been utilized. ISMP surveys have shown that practitioners who practice sterile compounding are aware or have personally experienced errors when preparing sterile preparations, including those caught and corrected prior to administration as well as those that have reached a patient. The use of technology can help reduce medication errors associated with preparing, verifying, tracking, and documenting the compounding of sterile preparations.

To support safer sterile compounding and avoid the potential for patient harm from improperly compounded sterile medications, it is imperative that pharmacies implement measures to minimize opportunities for human error in the sterile compounding process. It is equally important that sterile compounding outside a pharmacy be minimized, and that safe processes for the use of technology are followed, including identifying and creating action plans for safety gaps with each technology.

Best Practice 11 First Introduced:

2016-2017

Related *ISMP Medication Safety Alerts!:*

January 28, 2021; **August 13, 2020**; March 12, 2015; January 15, 2015; December 18, 2014; October 9, 2014; July 11, 2013; October 18, 2012; June 2, 2011; April 21, 2011; July 1, 2010; April 23, 2009; August 23, 2000.

BEST PRACTICE 12: (INCORPORATED INTO BEST PRACTICE 15)

See page 13

Eliminate the prescribing of fentaNYL patches for opioid-naïve patients and/or patients with acute pain.

BEST PRACTICE 13:

Eliminate injectable promethazine from the formulary.

- Remove injectable promethazine from all areas of the organization including the pharmacy.
- Classify injectable promethazine as a non-stocked, non-formulary medication.
- Implement a medical staff-approved automatic therapeutic substitution policy to convert all injectable promethazine orders to another antiemetic.
- Remove injectable promethazine from all medication order screens, and from all order sets and protocols.

This *Best Practice* includes not using intramuscular administration of promethazine because this can also cause tissue damage if accidentally injected intraarterially.

Rationale:

The goal of this *Best Practice* is to eliminate the risk of serious tissue injuries and amputations from the inadvertent arterial injection or intravenous (IV) extravasation of injectable promethazine. ISMP brought attention to this serious issue in August 2006 and conducted a survey to determine the prevalence of the issue. Of the nearly 1,000 responses to the survey, 1 in 5 reported awareness of such an occurrence in their facility during the prior 5 years. Injectable promethazine has been included on the ***ISMP List of High-Alert Medications in Acute Care Settings*** (www.ismp.org/node/103) since 2007.

In 2009, ISMP recommended removal of injectable promethazine from an organization's formulary, if possible, and use of safer alternatives such as 5-HT 3 antagonists (e.g., ondansetron). However, these products were significantly higher in cost at the time. Since then, these alternative injectable antiemetics have become available as generic products and are significantly less costly. Thus, injectable promethazine has been used less frequently, and for safety, should now be removed from all formularies.

In 2023, the American Society of Health-System Pharmacists (ASHP) House of Delegates, Council on Therapeutics approved the following: To advocate that injectable promethazine be removed from hospital formularies; further, to encourage regulatory and safety bodies to review patient safety data and conduct research on adverse events related to administration of injectable promethazine; further, to encourage manufacturers to produce injectable promethazine in package sizes and concentrations that reduce risk.

In 2023, the US Food and Drug Administration (FDA) began requiring manufacturers to add administration recommendations to prescribing information as well as on carton and container labels (www.ismp.org/ext/1288). FDA recommends injection via deep intramuscular administration instead of IV administration. If it must be administered IV, they are alerting practitioners to follow the updated labeling information to dilute promethazine injection and administer by IV infusion to reduce the risk of severe tissue injury. Although the labeling changes are a step in the right direction, we believe stronger action is needed.

Best Practice 13 First Introduced:

2018-2019

Related *ISMP Medication Safety Alerts!:*

January 11, 2024; July 29, 2021; June 27, 2013; October 8, 2009; September 24, 2009; October 9, 2008; November 2, 2006; **August 10, 2006**.

BEST PRACTICE 14:

Seek out and use information about medication safety risks and errors that have occurred outside your facility, in other organizations, and take action to prevent similar errors.

- Appoint a single healthcare professional (preferably a medication safety officer) to be responsible for oversight of this entire activity in the hospital.
- Identify reputable resources (e.g., ISMP, The Joint Commission, ECRI, patient safety organizations, state agencies) to learn about risks and errors that have occurred externally.
- Establish a formal process for monthly review of medication risks and errors reported by external organizations, with a new or existing interdisciplinary team or committee responsible for medication safety. The process should include a review of the hospital's current medication-use systems (both manual and automated) and other data such as internal medication safety reports to determine any potential risk points that would allow a similar risk or error to occur within the hospital.
- Determine appropriate actions to be taken to minimize the risk of these types of errors occurring in the hospital.
- Document the decisions reached and gain approval for required resources as necessary.
- Share the external stories of risk and errors with all staff, along with any changes that will be made in the hospital to minimize their occurrence, and then begin implementation.
- Once implemented, periodically monitor the actions selected to ensure they are still being implemented and are effective in achieving the desired risk reduction. Widely share the results and lessons learned within the facility.

Rationale:

One of the most important ways to prevent medication errors is to learn from errors that have occurred in other organizations and to use that information to identify potential risk points or practices within your organization to prevent similar errors. Experience has shown that a medication error reported in one organization is also likely to occur in another. Seeking out external sources of risks and errors prompts the evaluation of similar risks within the organization that may otherwise be hidden, lying dormant for years before they cause an adverse outcome.

Because there is a natural human tendency to "normalize" errors that happen elsewhere, believing they will never happen within the organization, leaders must convey that these external risks and errors offer valuable and necessary learning opportunities and must be sought out and reviewed regularly. They must convey that the organization is vulnerable to errors, and that they consider external errors to be a "clear and present danger" in their organization for which steps must be taken to prevent a similar occurrence.

To establish a process for learning from external risks and errors, organization leaders must identify reliable sources of information, establish a systematic way to review this information, assess the organization's vulnerability to similar events, and determine a workable action plan to address any vulnerabilities. To facilitate such a process, ISMP publishes the ***ISMP Medication Safety Alert! Acute Care – Action Agenda*** in January, April, July, and October to summarize important topics published in the *ISMP Medication Safety Alert! Acute Care* newsletters during the previous 3 months. The *Action Agenda* is prepared for leadership to use at an interdisciplinary committee meeting and with frontline staff to stimulate discussion and action to reduce the risk of medication errors. Each *Action Agenda* item includes a brief description of the medication safety problem, recommendations to reduce the risk of errors, and the issue number to locate additional information.

Other credible sources of information about risks and errors that can be used to proactively address known medication safety issues that could otherwise lead to harmful patient outcomes include the following: The Joint Commission Sentinel Event Alert, advisories from the US Food and Drug Administration (FDA), the Centers for Medicare & Medicaid Services (CMS), patient safety organization publications, peer-reviewed journals, and newsletters. It should be noted

BEST PRACTICE 14 — *continued on page 13*

Best Practice 14 First Introduced:

2018-2019

Related *ISMP Medication Safety Alerts!:*

February 9, 2023; March 23, 2017; February 9, 2017; November 6, 2008; November 29, 2007; January 13, 2005; February 25, 1998.

See also: ISMP ***White Paper: The Case for Medicaiton Safety Officers (MSO)*** (2018) www.ismp.org/node/1132

BEST PRACTICE 14 — *continued from page 12*

that CMS states that "Medication errors are a substantial source of morbidity and mortality risk in the hospitalized setting. Therefore, hospitals must take steps to prevent, identify, and minimize these errors. These steps must be based on accepted professional principles. This includes not only ensuring that the pharmacy processes conform to accepted standards of pharmacy practice but also proactively identifying and reviewing Adverse Drug Events (ADE) that occur. Pharmacies also need to be aware of external alerts to real or potential pharmacy-related problems in hospitals."[1]

Reference:

1. Centers for Medicare and Medicaid Services. Revised Hospital Guidance for Pharmaceutical Services and Expanded Guidance Related to Compounding of Medications. S&C 16-01-Hospital. October 30, 2015.

BEST PRACTICE 15:

Verify and document a patient's opioid status (naïve versus tolerant*) and type of pain (acute versus chronic) before prescribing and dispensing extended-release and long-acting opioids.

- Default order entry systems to the lowest initial starting dose and frequency when initiating orders for extended-release and long-acting opioids.
- Alert practitioners when extended-release and long-acting opioid dose adjustments are required due to age, renal or liver impairment, or when patients are prescribed other sedating medications.
- Eliminate the prescribing of fenta**NYL** patches for opioid-naïve patients and/or patients with acute pain.
- Eliminate the storage of fenta**NYL** patches in automated dispensing cabinets or as unit stock in clinical locations where acute pain is primarily treated (e.g., in the emergency department, operating room, postanesthesia care unit, procedural areas).

Fenta**NYL** patches are intended for opioid-tolerant patients for the management of pain, severe enough to require daily, around-the-clock, long-term opioid treatment and for which alternative treatment options are inadequate.

Extended-release formulations of opioids are for the management of pain severe enough to require daily, around-the-clock, long-term opioid treatment and for which alternative treatment options are inadequate.

* **Adult opioid-tolerant patient:** Opioid tolerance is defined by the following markers: Patients receiving, for 1 week or longer, at least: 60 mg oral morphine/day; 25 mcg transdermal fenta**NYL**/hour; 30 mg oral oxy**CODONE**/day; 8 mg oral **HYDRO**morphone/day; 25 mg oral oxy**MOR**phone/day; 60 mg oral **HYDRO**codone/day; or an equianalgesic dose of another opioid, including heroin and/or non-prescribed opioids.

Rationale:

The goal of this *Best Practice* is to support appropriate prescribing of extended-release and long-acting opioid medications and prevent death and serious patient harm from inappropriate use of these medications. A secondary goal is to specifically prevent the inappropriate use of fenta**NYL** patches to treat acute pain in patients who are opioid-naïve. *Fenta**NYL** patches were the highest-ranking drug involved in serious adverse drug events (ADEs) reported to the US Food and Drug Administration (FDA) from 2008 through 2010*. ISMP continues to receive reports, including fatalities, due to the prescribing, dispensing, and administration of fenta**NYL** patches to treat acute pain in opioid-naïve patients.

Best Practice 15 First Introduced:

2020-2021

Related *ISMP Medication Safety Alerts!:*

March 11, 2021; **January 28, 2021**; July 2, 2020; January 26, 2017; October 20, 2016; November 6, 2014; October 9, 2014; October 17, 2013; **May 30, 2013**; June 17, 2010; May 20, 2010; February 11, 2010; October 8, 2009; November 6, 2008; July 12, 2007; **June 28, 2007**; August 11, 2005; May 20, 2004; April 18, 2001.

BEST PRACTICE 16:

a) Limit the variety of medications that can be removed from an automated dispensing cabinet (ADC) using the override function.

b) Require a medication order (e.g., electronic, written, telephone, verbal) prior to removing any medication from an ADC, including those removed using the override function.

c) Monitor ADC overrides to verify appropriateness, transcription of orders, and documentation of administration.

d) Periodically review for appropriateness the list of medications available using the override function.

- *Restrict medications available using override to those that would be needed emergently (as defined by the organization) such as antidotes, rescue and reversal agents, life-sustaining drugs, and comfort measure medications such as those used to manage acute pain or intractable nausea and vomiting.*

Rationale:

The goal of this *Best Practice* is to minimize risks associated with the removal of medications from an ADC using the "override" feature. One of the biggest challenges to the safe use of ADCs is the ease with which medications can be removed upon override, many times unnecessarily and with a lack of perceived risk. Practitioners often view the override process as a routine, rather than a risky step, and fail to recognize that use of the feature should be situation dependent and justifiable, and not based merely on an approved list of medications that can be obtained via override. Removing medications using the override feature should be limited to emergent circumstances when waiting for a pharmacist to review an order could adversely impact the patient's condition, and approved overridable medications should be limited to those that fit this intended use.*

Sometimes, practitioners will obtain medication from an ADC without a specific verbal, telephone, written, or electronic order. This may be incorrectly referred to as an "override;" however, all true overrides should begin with an order (or protocol) and end with a decision not to wait for a pharmacist review before obtaining the medication from the cabinet.

Another "override" safety concern involves the process that should be in place for pharmacists and nurse managers to retrospectively review medications removed using the override feature. Too often this step is absent or inadequate, or important findings never reach nurse leaders who have oversight of nursing practice.†

ISMP has repeatedly received reports of harmful and fatal medication errors that involved practitioners removing medications using the override feature of an ADC.

* When selecting medications to be accessible using the override feature, avoid multiple use containers and limit the number of drug concentrations and the quantity of vials/ampules/tablets available.

† When monitoring override activity, specifically look for situations where more than one dose or one dosing unit was removed, the practitioner or practitioner type who is performing the override, and use this and other organization-specific data when periodically reviewing the appropriateness of the list of medications available.

Best Practice 16 First Introduced:

2016-2017

Related *ISMP Medication Safety Alerts!:*

December 19, 2019; **October 24, 2019**; **August 1, 2019**; **March 14, 2019**; **February 28, 2019**; **February 14, 2019**; **January 17, 2019**; February 22, 2018; January 11, 2018; June 2, 2016; March 10, 2011; January 13, 2011; September 9, 2010; November 19, 2009; January 17, 2008; May 31, 2007; February 22, 2007.

See also: ISMP ***Guidelines for the Safe Use of Automated Dispensing Cabinets*** (2019) www.ismp.org/node/1372

BEST PRACTICE 17:

Safeguard against errors with oxytocin use.

a) Require the use of standard order sets for prescribing oxytocin antepartum and postpartum that reflect a standard clinical approach in your organization for labor induction/augmentation and to control postpartum bleeding.

b) Standardize to a single concentration and bag size for both antepartum and postpartum oxytocin infusions (e.g., 30 units of oxytocin in 500 mL Lactated Ringer's solution).

c) Standardize how oxytocin doses, concentration, and rates are expressed. Communicate orders for oxytocin infusions in terms of the dose rate (e.g., dosage/time) and not by volume rate (volume/time) and align with the smart infusion pump dose error-reduction system (DERS).

d) Provide oxytocin in a standard ready-to-administer form. Boldly label both sides of the infusion bag to differentiate oxytocin bags from plain hydrating solutions and magnesium sulfate infusions.

e) Avoid bringing oxytocin infusion bags to the patient's bedside until it is prescribed and needed.

Rationale:

The goal of this *Best Practice* is to prevent errors associated with oxytocin use. Intravenous (IV) oxytocin is used antepartum to induce labor in patients with a medical indication, to stimulate or reinforce labor in selected cases of uterine inertia, and as an adjunct in the management of an incomplete, inevitable, or elective abortion. Used postpartum, IV oxytocin is indicated to produce uterine contractions during expulsion of the placenta and to control postpartum bleeding or hemorrhage. However, improper administration of oxytocin can cause hyperstimulation of the uterus, which in turn can result in fetal distress, the need for an emergency cesarean section, or uterine rupture. A few maternal, fetal, and neonatal deaths have been reported because of oxytocin errors.

Since the mid-1990s, ISMP has been publishing safety alerts related to errors with oxytocin use. In February 2020, ISMP analyzed voluntary error reports submitted to the ***ISMP National Medication Errors Reporting Program*** *(ISMP MERP)* between 1999 and 2019. During that time, 52 reports involved oxytocin. About 10% of the reports described more than one oxytocin error that had occurred. About 44% of the reported events originated during dispensing, about a quarter (23%) originated during administration, and 13% during prescribing. A quarter (25%) of all events resulted in maternal, fetal, or neonatal harm. Analysis of these reports identified five event themes: prescribing errors, look-alike drug packaging and names, preparation challenges, administration-associated errors, and communication gaps; therefore, a *Best Practice* recommendation has been created for each of these five event themes.

Best Practice 17 First Introduced:

2022-2023

Related *ISMP Medication Safety Alerts!:*

June 1, 2023; January 28, 2021; November 5, 2020; **February 13, 2020**; January 30, 2020; July 26, 2018; April 19, 2018; August 9, 2012; September 9, 2010; June 3, 2010; June 18, 2009; September 11, 2008; June 15, 2006; March 23, 2006; November 3, 2005; October 20, 2005; July 14, 1999; June 30, 1999.

BEST PRACTICE 18:

Maximize the use of barcode verification prior to medication and vaccine administration by expanding use beyond inpatient care areas.

a) Specifically target clinical areas with an increased likelihood of a short or limited patient stay (e.g., emergency department, perioperative areas, infusion clinics, dialysis centers, radiology, labor and delivery areas, catheterization laboratory, outpatient areas).

b) Regularly review compliance and other metric data to assess utilization and effectiveness of this safety technology (e.g., scanning compliance rates, bypassed or acknowledged alerts).

Rationale:

The goal of this *Best Practice* is to expand the utilization of barcode verification to care areas beyond inpatient care units. Implementation of barcode medication administration is a well proven error prevention strategy. Errors due to look-alike packages and labels are commonly reported to the ***ISMP National Medication Errors Reporting Program*** *(ISMP MERP)*. Contributing factors in these events include the use of highly stylized label graphics and similar cap and label colors. Products that have similar names and dosages, are used in the same setting, and/or are stored near one another, adds to the risk for mis-selection. Wrong patient errors have also been reported to *ISMP MERP*. Barcode medication administration systems are designed to catch medication errors at the point of administration. Although this safeguard is commonly utilized in inpatient care areas, adoption tends to lag in procedural settings and other clinical areas where there is short or limited patient encounter. ISMP has received numerous error reports where barcoding prior to medication administration could have alerted practitioners to the wrong drug, wrong dose, or wrong patient, thus preventing the error. Therefore, implementing barcode verification prior to medication and vaccine administration in care areas beyond the inpatient setting will help deliver the maximum medication safety benefit to patients.

Best Practice 18 First Introduced:

2022-2023

Related *ISMP Medication Safety Alerts!:*

September 21, 2023; **August 11, 2022**; April 11, 2019; November 29, 2018; February 22, 2018; **June 16, 2016**; **November 5, 2015**; June 5, 2015.

BEST PRACTICE 19:

Layer numerous strategies throughout the medication-use process to improve safety with high-alert medications.

a) For each medication on the facility's high-alert medication list, outline a robust set of processes for managing risk, impacting as many steps of the medication-use process as feasible.

b) Ensure that the strategies address system vulnerabilities in each stage of the medication-use process (i.e., prescribing, dispensing, administering, and monitoring) and apply to prescribers, pharmacists, nurses, and other practitioners involved in the medication-use process.

c) Avoid reliance only on low-leverage risk-reduction strategies (e.g., applying high-alert medication labels on pharmacy storage bins, providing education) to prevent errors, and instead bundle these with mid- and high-leverage strategies.

d) Limit the use of independent double checks to select high-alert medications with the greatest risk for error within the organization. (e.g., chemotherapy, opioid infusions, intravenous [IV] insulin, heparin infusions).

e) Engage patients and family members to improve safe use of high-alert medications by providing targeted education to those receiving select, defined high-alert medications.

f) Include strategies to address health equity and literacy issues.

g) Establish criteria to trigger an automatic consultation with a pharmacist or patient educator, diabetes educator, social services, or home care. Specific drugs to consider for targeted education: insulin, U-500 insulin, methotrexate, oral (and injectable) chemotherapy, opioids, investigational medications, anticoagulants, any medication that has an administration device (inhalers, pens, ambulatory infusion pumps), medications that require dose sequencing or 'titration.'

h) Regularly assess for risk in the systems and practices used to support the safe use of medications by using information from internal and external sources (e.g., The Joint Commission, ISMP, the US Food and Drug Administration [FDA]).

i) Establish outcome and process measures to monitor safety and routinely collect data to determine the effectiveness of risk-reduction strategies.

Rationale:

Events continue to happen in hospitals with medications that are on the hospital's list of high-alert medications. High-alert medications are drugs that bear a heightened risk of causing significant patient harm when they are used in error. Although mistakes may or may not be more common with these drugs, the consequences of an error with these medications are clearly more devastating to patients. This is repeatedly borne out in the literature and by reports submitted to the ***ISMP National Medication Errors Reporting Program*** *(ISMP MERP)*. High-alert medications top the list of drugs involved in moderate to severe patient outcomes when an error happens. Most facilities have defined a list of high-alert medications, but some hospitals have neither a well-reasoned list of high-alert medications nor a robust set of processes for managing the high-alert medications on their list. Organizations' attempts to prevent errors may be limited to low-leverage risk-reduction strategies, rely on staff vigilance to keep patients safe, or focus on a single step or a single practitioner in the medication-use process. The goal of this *Best Practice* is to engage hospitals to reassess their current list of high-alert medications, enact robust error-prevention strategies throughout the medication-use process, and monitor outcomes to reduce the risk of harm with these drugs.

Best Practice 19 First Introduced:

2022-2023

Related *ISMP Medication Safety Alerts!:*

June 4, 2020; June 6, 2019; August 23, 2018; October 23, 2014; September 19, 2013; September 5, 2013; **April 4, 2013**; April 8, 2010; January 11, 2007.

NEW BEST PRACTICE 20:

Safeguard against wrong-route errors with tranexamic acid.

a) Utilize point-of-care barcode-assisted medication safety checks prior to administering medications in surgical and obstetrical areas.

b) When appropriate, use premixed intravenous (IV) bags of tranexamic acid, which are less likely to result in mix-ups than vials of tranexamic acid.

c) If possible, do not store tranexamic acid in an anesthesia tray.

- **Separate or sequester tranexamic acid in storage locations (e.g., pharmacy, clinical areas) and avoid storing local anesthetics and tranexamic acid near one another.**

d) To prevent misidentifying medications by viewing only the vial caps, avoid storing injectable medication vials in an upright position, especially when stored in a bin or drawer below eye level. Store them in a way that always keeps their labels visible.

e) Conduct a review to identify any look-alike ampules or vials (including caps) and determine if the risk of a mix-up will be reduced by purchasing them from different manufacturers. If so, purchase them from different manufacturers.

f) Consider labeling vial caps with a label that states, "Contains Tranexamic Acid."

Rationale:

The goal of this *Best Practice* is to prevent errors associated with wrong route administration of tranexamic acid. Tranexamic acid is an antifibrinolytic that is used perioperatively or off-label for a variety of hemorrhagic conditions to control bleeding, including postpartum hemorrhage. When accidentally administered intrathecally, tranexamic acid injection is a potent neurotoxin with a mortality rate of about 50% and is almost always harmful to the patient. Survivors of intraspinal tranexamic acid often experience seizures, permanent neurological injury, and paraplegia.

ISMP has published several safety alerts related to wrong route errors with tranexamic acid. It was initially introduced in November 2015 and again in May 2019 when ISMP received cases of accidental intraspinal injection of tranexamic acid involving container mix-ups. A ***National Alert Network (NAN)*** warning was then published in September 2020. At this time in the United States, other local anesthetics such as **BUP**ivacaine and **ROP**ivacaine were packaged in vials with the same blue color cap as tranexamic acid. In December 2020, the US Food and Drug Administration (FDA) released a warning about tranexamic acid errors and took action to revise its container and carton labels, as well as to include the risk of incorrect administration route in the prescribing information. While label colors and vial sizes are now different, mix-ups related to cap color can still happen when the vials are stored upright near each other. Tranexamic acid and local anesthetics are also available in ampules outside the United States which contain labels on clear glass that are difficult to read and can be mistaken. In addition, these drugs are often found in areas where barcode scanning may not have been implemented or is not routinely utilized (e.g., perioperative areas, labor and delivery, emergency department), so practitioners are less likely to detect mix-ups.

Best Practice 20 First Introduced:

2024-2025

Related *ISMP Medication Safety Alerts!:*

August 24, 2023; **January 28,2021**; December 17, 2020; September 10, 2020; **January 16, 2020**; August 15, 2019; August 1, 2019; **May 23, 2019**; October 18, 2018; **November 5, 2015**; July 16, 2015.

NEW BEST PRACTICE 21:

Implement strategies to prevent medication errors at transitions in the continuum of care.

a) Obtain the most accurate medication list possible upon admission to the organization before the first dose of medication is administered (except in emergency or urgent situations).

- **Include asking about allergies and associated reactions, prescription, and over-the-counter medications (including herbals and dietary supplements), and non-enteral medications.**
- **List the drug name, dose, route, frequency, indication, and time of last dose.**
- **Consider assigning dedicated practitioners to obtain medication histories.**

b) Ensure the medication and doses collected and subsequently ordered are correct therapy for that patient, given their current state of health.

c) Designate a provider to compare the prescribed medications to those on the medication history list and resolve any discrepancies. Have providers document reconciliation and modifications made to the current therapy upon admission, with each change in level of care, and at discharge.

Rationale:

The goal of this *Best Practice* is to eliminate medication errors during transitions in patient care. Inconsistent knowledge and documentation of medications is a known cause of medication errors and adverse drug events, which can negatively affect patient outcomes. Discrepancies in medication histories and incomplete or inaccurate medication reconciliation are common causes of errors during transitions in care. Drug omissions, wrong doses, wrong drugs, additional drugs, and drugs inappropriate for the patient's current level of care or care setting, have all been a result of errors at transitions in the continuum of patient care. Establishing expectations for conducting medication history collection, verification, and reconciliation, as well as designating the specific and appropriate individuals who should complete each process step are key to improving safe care handoffs for patients. These *Best Practice* strategies are intended to prevent medication errors by facilitating collection of the best possible, most complete medication list at the patient's entry to the care setting, ensuring the medication and doses are correct for that patient given their current state of health, and by having a provider reconcile the medication history list to prescribed therapy documenting modifications and resolving any discrepancies.

Best Practice 21 First Introduced:

2024-2025

Related *ISMP Medication Safety Alerts!:*

March, 23, 2023; November 17, 2022; July 14, 2022; June 16, 2022; June 2, 2022; March 24, 2022; February 11, 2021; December 19, 2019; July 18, 2019; June 20, 2019; May 9, 2019; June 14, 2018; March 22, 2018; May 18, 2017; January 12, 2017; June 18, 2015; October 31, 2013; September 5, 2013; August 8, 2013.

NEW BEST PRACTICE 22:

Safeguard against errors with vaccines administered in the inpatient and associated outpatient settings.

a) Utilize standard order sets to prescribe vaccines. Require an order prior to administration of any vaccine. Utilize the full generic name and brand name (if applicable) and avoid vaccine abbreviations.

b) Verify a patient's immunization status (in the electronic health record [EHR] as well as vaccine registries) prior to providing vaccines.

c) Provide patients and/or caregivers with vaccine information (e.g., Vaccine Information Statement [VIS]) in their primary language prior to vaccination.

d) Store vaccines in separate bins or containers based on type and formulation. Store two-component vaccines together.

e) Use prefilled syringes when available. If not available, prepare each vaccine dose immediately prior to administration and label with the vaccine name, dose, and if appropriate, the indicated age range.

f) If multiple adults and children are being vaccinated at the same time, separate them into distinct treatment areas; bring only one patient's vaccines into the treatment area at a time.

g) Verify the patient's identity using two unique identifiers.

h) Use barcode scanning technology to verify the correct vaccine and dose are being administered to the correct patient.

i) Document the vaccine's national drug code (NDC) number, lot number, and expiration date prior to administration; document administration in the EHR, and ensure information is sent to the local or state vaccine registry.

j) Provide vaccinators with ongoing education and competency assessment about vaccines and their appropriate storage, selection, administration, and monitoring.

Rationale:

Immunizations prevent diseases in children and adults; however, errors with vaccines can result in unintended and unrecognized vulnerability, leaving patients unprotected against serious diseases. ISMP (in cooperation with the California Department of Public Health) established the ***ISMP National Vaccine Errors Reporting Program*** *(ISMP VERP)* in 2012 to collect data about the types of errors occurring and their underlying causes. Analysis of reports submitted to *ISMP VERP* show that there are opportunities to reduce the risk of vaccine errors based on commonly identified contributing factors, such as errors with age-specific formulations, wrong patient errors due to confusion between siblings, invalid doses (given too soon) or missed opportunities to vaccinate, wrong route errors caused by unfamiliarity with the vaccine, errors with combination vaccines or vaccines with diluents, wrong vaccines related to vaccine nomenclature, wrong vaccine and dose errors related to labeling and packaging, errors related to unsafe vaccine storage, administration of expired vaccines, and failure to involve the patient in the verification process. The goal of this *Best Practice* is to draw attention to and call for the adoption of specific error-prevention strategies that will mitigate the risk of vaccine errors based on commonly identified contributing factors.

Best Practice 22 First Introduced:

2024-2025

Related *ISMP Medication Safety Alerts!:*

November 30, 2023; November 2, 2023; September 21, 2023; September 7, 2023; December 15, 2022; November 17, 2022; November 3, 2022; August 11, 2022; July 14, 2022; December 16, 2021; November 18, 2021; June 3, 2021; March 11, 2021; December 17, 2020; February 28, 2019; February 22, 2018; November 16, 2017; October 6, 2016; June 16, 2016; **May 5, 2016**; **March 26, 2015**; **December 4, 2014**; **October 9, 2014**; September 25, 2014; February 13, 2014; **November 28, 2013**; October 17, 2013; August 8, 2013.

ARCHIVED BEST PRACTICES

Reason for the change to archived status:

In 2020, ISMP created a new *Best Practice* designation of "archived." While still important as a *Best Practice*, compliance with recommendations for an archived *Best Practice* signal that focus can be directed toward new and other existing *Best Practices* with lower adoption rates. Archived *Best Practices* maintain their original *Best Practice* number but will be listed after the unarchived *Best Practices*.

BEST PRACTICE 4 (Moved to Archived Status in 2022)

ARCHIVED Best Practice

Ensure that all oral liquid medications that are not commercially available in unit dose packaging are dispensed by the pharmacy in an oral syringe or an enteral syringe that meets the International Organization for Standardization (ISO) 80369 standard, such as ENFit.

- Do not stock bulk oral solutions of medications on patient care units.
- Use only oral syringes that are distinctly marked "Oral Use Only."
- When ISO 80369 compliant syringes (e.g., ENFit) are used for administration of oral liquid medications, always highlight on the pharmacy label, or affix an auxiliary label, "For Oral Use Only" on the syringe.
- Ensure that the oral/enteral syringes used do not connect to any type of parenteral tubing used within the organization.

Exception: If the pharmacy is employing unit dose packaging automation that does not use oral syringes, unit dose cups/bottles may be provided in place of oral syringes. However, ensure that oral or ISO 80369 compliant syringes (e.g., ENFit) are available on nursing units in case patients cannot drink the medication from the cup or bottle.

Rationale:

The goal of this *Best Practice* is to prevent the unintended administration of oral medications via the intravenous route. Reports in which patients were inadvertently given an oral liquid medication intravenously continue to be reported. This happens most often when an oral liquid is prepared extemporaneously or dispensed in a parenteral syringe that connects to vascular access lines. Such errors have resulted in patient death or major harm. Fatalities have also occurred when the contents of liquid-filled capsules (e.g., ni**MOD**ipine) were withdrawn into a parenteral syringe for oral administration via a nasogastric or other tube and then inadvertently administered intravenously. The oral and ISO 80369 compliant syringe tip is designed to be incompatible with vascular lines so it cannot be inadvertently attached.

Best Practice 4 First Introduced:

2014-2015

Archived:

2022

Related *ISMP Medication Safety Alerts!:*

September 20, 2018; May 30, 2013; **August 23, 2012**; August 12, 2010; May 31, 2007; July 27, 2006; June 15, 2006; **July 28, 2005**; May 6, 2004; November 27, 2002; August 25, 1999; January 13, 1999; March 12, 1997; August 14, 1996; May 8, 1996.

BEST PRACTICE 5 (Moved to Archived Status in 2022)

ARCHIVED Best Practice

Purchase oral liquid dosing devices (oral syringes/cups/droppers) that only display the metric scale.

- In addition, if patients are taking an oral liquid medication after discharge, educate patients to request appropriate oral dosing devices to measure oral liquid volumes in milliliters (mL) only.

Rationale:

The goal of this *Best Practice* is to use liquid medication dosing devices (specifically oral syringes, cups, and droppers) that only display volume using the metric scale. ISMP has received more than 50 reports of mix-ups between milliliters (mL) and household measures such as drops and teaspoonfuls, some leading to injuries requiring hospitalization. Oral syringes, dosing cups, droppers, and other measuring devices have been involved. Use of the apothecary system has also caused confusion with mix-ups between drams and mL and other non-metric measurements such as ounces and tablespoons. ISMP first reported confusion in the year 2000 and has continued to receive reports of medication errors because of mix-ups between metric and non-metric units of measure.

The purchase and use of the current commercially available oral syringes, cups, and droppers that only display volume using an easy-to-read printed (rather than embossed) metric scale will help prevent these types of errors.

Best Practice 5 First Introduced:

2014-2015

Archived:

2022

Related *ISMP Medication Safety Alerts!:*

November 1, 2012; September 20, 2012; June 14, 2012; December 1, 2011; September 22, 2011; March 22, 2007; March 6, 2003; **June 28, 2000**; February 26, 1997.

See also: *ISMP Statement on Use of Metric Measurements to Prevent Errors with Oral Liquids.* ISMP News Release. October 1, 2011. www.ismp.org/node/496

BEST PRACTICE 6
(Moved to Archived Status in 2020)

ARCHIVED Best Practice

Eliminate glacial acetic acid from all areas of the hospital.*

- Remove and safely discard this product from all clinical areas of the hospital (including the pharmacy, clinics, and physician office practices), and replace it with vinegar (5% solution) or commercially available, diluted acetic acid 0.25% (for irrigation) or 2% (for otic use).

* Laboratory use excluded if the laboratory purchases the product directly from an external source.

Rationale:

The goal of this *Best Practice* is to prevent harm from the use of glacial acetic acid applied directly to patients. The use of hazardous chemicals in pharmacy compounding or for special therapeutic procedures and diagnostics is common in many hospitals. Patient harm has occurred when toxic chemicals have been misidentified as oral products, or when a very concentrated form of a chemical has been erroneously used in treating patients.

Of particular concern is glacial acetic acid. Accidental topical application of "glacial" (greater than or equal to 99.5%) acetic acid has repeatedly resulted in serious patient harm, including severe pain and serious tissue damage, third-degree burns, and in one case, bilateral leg amputation. Often in these cases, this item was either accidentally purchased or used in place of a much more diluted form of acetic acid, such as vinegar or a commercially available 0.25% acetic acid solution.

Best Practice 6 First Introduced:

2014-2015

Archived:

2020

Related *ISMP Medication Safety Alerts!:*

January 24, 2013; September 20, 2012; June 30, 2005; May 5,2005.

BEST PRACTICE 10 (Moved to Archived Status in 2022)

ARCHIVED Best Practice

Eliminate all 1,000 mL bags of sterile water (labeled for "injection," "irrigation," or "inhalation") from all areas outside of the pharmacy.

- Use alternatives to avoid the storage and use of 1,000 mL (1 liter) bags of sterile water for injection, irrigation, or inhalation in patient care areas. For example, replace all 1,000 mL (1 liter) bags of sterile water for injection, irrigation, or inhalation with 2,000 mL (2 liter) bags of sterile water for injection, irrigation, or inhalation, or bottles of sterile water for irrigation or inhalation, or vials.
- Establish a policy that 1,000 mL bags of sterile water can only be ordered by the pharmacy.
- The pharmacy needs to work with respiratory therapy and other relevant departments of the hospital to establish guidelines regarding the safest way to provide large volumes of sterile water when needed for patient care.

Rationale:

The goal of this *Best Practice* is to prevent the accidental administration of an intravenous (IV) infusion of sterile water to a patient. Administering large quantities of hypotonic sterile water IV has resulted in patient harm, including death, from hemolysis. ISMP has received reports of mix-ups between the 1 liter bags of sterile water for injection, irrigation, and inhalation with 1 liter bags of dextrose 5% (D5W) and 0.9% sodium chloride (normal saline [NS]). These products look very similar in size, shape, and type of flexible plastic bag used for distribution.

Respiratory therapy staff may need to use bags of sterile water for inhalation in patient care units for humidification with ventilators or continuous positive airway pressure (CPAP) devices. In addition, due to the large volume of sterile water needed to reconstitute traditional dantrolene, sterile water bags for injection may need to be stored in malignant hyperthermia (MH) carts in the perioperative and procedural areas of the hospital. Unfortunately, if the sterile water bag is not used, it may be returned to the wrong storage area where IV bags are routinely kept (e.g., medication rooms, on IV poles). Therefore, when large volume bags of sterile water must be used outside of the pharmacy, the best approach is to use 2 liter bags, or bottles of sterile water, to prevent mix-ups because the larger volume or shape of the container will differentiate these products from 1 liter bags of D5W and NS. Also, use of the concentrated suspension of dantrolene, which can be reconstituted with a small amount of sterile water from vials, eliminates the need for large volume sterile water bags on the MH cart.

Best Practice 10 First Introduced:

2016-2017

Archived:

2022

Related *ISMP Medication Safety Alerts!:*

April 3, 2020; **September 11, 2014**; November 30, 2006; September 18, 2003.

2024–2025 EXPERT ADVISORY PANEL

ABOUT ISMP

The Institute for Safe Medication Practices (ISMP) is the only 501c (3) nonprofit organization devoted entirely to preventing medication errors. During its more than 30-year history, ISMP has helped make a difference in the lives of millions of patients and the healthcare professionals who care for them.

ISMP is known and respected as the gold standard for medication safety information. It also has served as a vital force for progress. ISMP's advocacy work alone has resulted in numerous necessary changes in clinical practice, public policy, and drug labeling and packaging.

Among its many initiatives, ISMP runs the only national voluntary practitioner medication error reporting program, publishes newsletters with real-time error information read and trusted throughout the global healthcare community, and offers a wide range of unique educational programs, tools, and guidelines.

In 2020, ISMP formally affiliated with ECRI to create one of the largest healthcare quality and safety entities in the world. The affiliation allows both organizations to work more closely together for the benefit of providers, patient advocates, governments, and most importantly, patients.

As an independent watchdog organization, ISMP receives no advertising revenue and depends entirely on charitable donations, educational grants, newsletter subscriptions, and volunteer efforts to pursue its life-saving work. For more information or to donate to protect patients worldwide from harmful medication errors, visit ISMP online at: www.ismp.org.

For more information about the ISMP ***Targeted Medication Safety Best Practices for Hospitals*** including Frequently Asked Questions, see: **www.ismp.org/guidelines/best-practices-hospitals**.

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