2024–2025

ISMP Targeted Medication Safety Best Practices for Hospitals

FREQUENTLY ASKED QUESTIONS

ISMP
Institute for Safe Medication Practices
An ECRI Affiliate

www.ismp.org

GENERAL QUESTION:

1. **Question:** With the ISMP ***Targeted Medication Safety Best Practices for Hospitals***, does "for Hospitals" mean that the practices apply to inpatients only? For example, does the *Best Practice* for vin**CRIS**tine apply to outpatient oncology clinics too?

   Answer: Overall, the ISMP ***Targeted Medication Safety Best Practices for Hospitals*** may appear to focus on inpatient services, but most of the *Best Practices* also extend to all patient care settings associated with a hospital, including outpatient clinics. For example, the *Best Practice #1* related to vin**CRIS**tine should be implemented in whatever patient care setting this treatment is provided.

   Rev. 3/26/2014

BEST PRACTICE 1:

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

1. **Question:** We are trying to implement *Best Practice #1* to dispense vin**CRIS**tine and other vinca alkaloids in a minibag. However, we have concerns about the excessive loss of drug that remains in the intravenous (IV) tubing after administration. The loss of drug in the tubing exceeds the 5% dose variability acceptable for our chemotherapy doses per our hospital policy. The tubing contains 7 mL of volume and that is more than 10% of the 50 mL for an adult dose. For pediatrics, if we dispense vin**CRIS**tine in a minibag with 25 mL, losing 7 mL of the 25 mL dose is not acceptable either. What are other facilities doing to avoid excessive drug loss in the tubing?

   Answer: To prevent excessive drug loss, some organizations are utilizing a "back flushing" method to infuse the volume of drug that may remain in the IV tubing. A similar sized bag for the back flushing, such as a 25 mL bag of 0.9% sodium chloride is used for both adults and pediatric patients.

   If the patient does not have a central line, vin**CRIS**tine administration and the back flushing method are done by gravity when administered through a peripheral line. (An infusion pump is not recommended by the Oncology Nursing Society [ONS] to administer vin**CRIS**tine in this situation.[1]) The administration of vin**CRIS**tine includes connecting the bag of 0.9% sodium chloride to a long infusion set as the primary line. The minibag of vin**CRIS**tine, using a shorter infusion set, is connected to the Y-site closest to the patient. (Closed system transfer devices are also utilized to ensure the vin**CRIS**tine does not leak out of the system.) The vin**CRIS**tine is infused via gravity through the peripheral line. Once the infusion is complete, the short set is dropped to backfill the line with sodium chloride and then the remaining drug is infused.

Reference

1. Olsen MM, LeFebvre KB, Brassil KJ. Administration considerations. In: Olsen MM, LeFebvre KB, Brassil KJ, eds. *Chemotherapy and Immunotherapy Guidelines and Recommendations for Practice*. Oncology Nursing Society; 2019:193-233.

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2. **Question:** Will administering vin**CRIS**tine in a minibag increase the risk of extravasation?

   Answer: Some practitioners have expressed concern that administering diluted intravenous (IV) vin**CRIS**tine via a minibag might increase the risk of extravasation and subsequent tissue injury. However, data suggests that the risk of extravasation is low, regardless of the method used to administer the drug. A study in Australia involving 68 cancer centers that evaluated more than 44,000 doses of vinca alkaloids administered via syringe or minibag to adult and pediatric patients, found that the extravasation rates were similar and low—0.03% with syringes and 0.04% with minibags.[1] Preliminary data from another study conducted in children and adults found no cases of extravasation during administration via minibags.[2] The risk of extravasation injury doesn't compare to the risk of severe neurological injury and near certain death resulting from the intrathecal administration of vinca alkaloids. Also, dilution of the vinca alkaloid likely reduces the impact of any extravasation that might occur.

   The Oncology Nursing Society[3] recommends administering IV vin**CRIS**tine and other vinca alkaloids via a minibag to prevent errors with intrathecal chemotherapy administration. The organization also recommends a multidisciplinary review of the process regarding the preparation and administration of vin**CRIS**tine in each practice setting.

   When the institution implements the use of minibags to administer vin**CRIS**tine, the following nursing guidelines should be followed to further reduce the risk of harm from extravasation.

- If using a peripheral vein, allow the infusion to flow via gravity. Use of an infusion pump is discouraged because it increases the amount of pressure on the vein, which raises the risk of extravasation.
- Watch for signs of extravasation; stay with the patient and verify blood return every 5 to 10 minutes.
- Use a central venous catheter or implanted device for continuous vesicant infusions or for any vesicant infusion lasting longer than 30 minutes. Monitor for extravasation according to hospital policy.

References

1. Gilbar PJ, Carrington CV. The incidence of extravasation of vinca alkaloids supplied in syringes or mini-bags. *J Oncol Pharm Pract*. 2006;12(2):113-8.
2. Nurgat ZA, Smythe M, Al-Jedai A, et al. Introduction of vincristine mini-bags and an assessment of the subsequent risk of extravasation. *J Oncol Pharm Pract*. 2015;21(5):339-47.
3. Olsen MM, LeFebvre KB, Brassil KJ. Administration considerations. In: Olsen MM, LeFebvre KB, Brassil KJ, eds. *Chemotherapy and Immunotherapy Guidelines and Recommendations for Practice*. Oncology Nursing Society; 2019:193-233.

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3. **Question:** Is the dilution of vin**CRIS**tine in a minibag stable?

   Answer: Yes, the product is stable and should be dispensed in a minibag. According to the manufacturer, solutions diluted in 0.9% sodium chloride at concentrations from 0.0015 mg/mL to 0.08 mg/mL and stored at 25°C (77°F) are stable for up to 24 hours when protected from light or 8 hours at normal light conditions. Solutions diluted for infusion in 0.9% sodium chloride or dextrose 5% in water (20 mcg/mL concentration) are reported to be stable for up to 21 days at 4°C (39.2°F) and 25°C (77°F) if protected from light (Beijnen 1989), although the vin**CRIS**tine formulation may have changed since this stability study was conducted. Follow USP <797> recommendations for beyond use dates based on the level of risk for preparation.[1]

   The Hospira brand of vin**CRIS**tine sulfate injection, USP (preservative-free) 1 mg/mL vial prescribing information[2] states:

   > ***Preparation for flexible plastic container***
   >
   > *Vin**CRIS**tine sulfate injection, USP when diluted with 0.9% sodium chloride injection in concentrations from 0.0015 mg/mL to 0.08 mg/mL is stable for up to 24 hours when protected from light or 8 hours under normal light at 25°C.*

References

1. Lexicomp: Wolters Kluwer. 2024. Updated January 3, 2024. Accessed January 17, 2024.
2. Vin**CRIS**tine sulfate. Prescribing information. Hospira; 2023. Accessed January 12, 2024.

Rev. 1/12/2024

4. **Question:** Our pediatric department is reluctant to administer vin**CRIS**tine via a minibag through a peripheral IV line since many of our patients do not have a peripherally inserted central catheter (PICC) or central venous access device. What do you recommend?

   Answer: For those patients who do not have a PICC or central venous access device, a peripheral IV line can still be used to administer vin**CRIS**tine in a minibag. The practice of monitoring the administration of vin**CRIS**tine and other vinca alkaloids in a minibag to avoid extravasation via a peripheral IV is essentially the same as if it was administered IV push. Please refer to FAQ Question #1 and the ONS guidelines[1] for special considerations for vesicant administration through a peripheral IV site.

Reference

1. Olsen MM, LeFebvre KB, Brassil KJ. Administration considerations. In: Olsen MM, LeFebvre KB, Brassil KJ, eds. *Chemotherapy and Immunotherapy Guidelines and Recommendations for Practice*. Oncology Nursing Society; 2019:193-233.

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5. **Question:** What is the recommendation for verifying blood return when administering vin**CRIS**tine in a minibag?

   Answer: According to the Oncology Nursing Society,[1] the easiest way to check for a blood return is to use gravity by lowering the minibag below the IV site. Another option is to aspirate with a syringe via the lowest Y-site and clamp off fluid from the minibag. Do not pinch the IV administration tubing because this can cause the vein to rupture.

Reference

1. Olsen MM, LeFebvre KB, Brassil KJ. Administration considerations. In: Olsen MM, LeFebvre KB, Brassil KJ, eds. *Chemotherapy and Immunotherapy Guidelines and Recommendations for Practice*. Oncology Nursing Society; 2019:193-233.

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6. **Question:** Is it just as safe to prepare vin**CRIS**tine in a large volume (30-50 mL) syringe as in a minibag?

   Answer: ISMP does not recommend the use of large volume syringes as an acceptable alternative to the minibag. Errors have still been reported with the use of large volume syringes, although usually with 10 or 20 mL syringes.[1]

Reference

1. Gilbar P. Inadvertent intrathecal administration of vincristine: has anything changed? *J Oncol Pharm Pract*. 2012;18(1):155-7.

Rev. 3/10/2014

7. **Question:** Would the administration of vin**CRIS**tine IV push using a syringe be much shorter in duration and with less chance of extravasation than administration using a minibag?

   Answer:

   In regard to duration of administration: It is true that the process of administering a vinca alkaloid via a syringe is probably of shorter duration when compared to administering via a minibag. This decision must be weighed in light of the increased risk of certain death if the drug is administered via the wrong route. Having practitioners spend a few additional minutes during the administration process using a minibag is the only safe choice to be made to prevent harm.

   In regard to the risk of extravasation: There have been studies comparing extravasation rates between these two administration techniques, which have similar results.[1,2] Recognize that when a vinca alkaloid is prepared in a minibag, it is likely more dilute than in a syringe, and thus the impact of tissue injury is even less if extravasation should occur. Most importantly, organizations must weigh the risk of possible extravasation versus near certain death from the accidental administration of vin**CRIS**tine via the wrong route when making decisions about changing practice.

References

1. Gilbar PJ, Carrington CV. The incidence of extravasation of vinca alkaloids supplied in syringes or mini-bags. *J Oncol Pharm Pract*. 2006;12(2):113-8.
2. Gilbar P, Chambers CR, Larizza M. Medication safety and the administration of intravenous vincristine: International survey of oncology patients. *J Oncol Pharm Pract*. 2015;21(1):10-8.

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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.

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

1. **Question:** Does the *Best Practice* of a weekly frequency default for oral methotrexate apply to a specialty cancer hospital?

   Answer: The intent of this *Best Practice* is to reduce errors when methotrexate is prescribed as a weekly regimen for non-oncologic or oncologic indications. Even when used for oncologic purposes, oral methotrexate is sometimes prescribed as a weekly regimen, not daily. Thus, this *Best Practice* applies to all patient care settings, including specialty cancer hospitals.

   Rev. 3/26/2014

2. **Question:** We want to put a safety mechanism in place to prevent "daily" as a frequency for oral methotrexate. We have a weekly regimen default and an alert in place when the medication is ordered to remind the provider to not use "daily" but the *Best Practice* #2b requires a "hard stop" which prevents the provider from ordering it, unless an oncologic indication is chosen. We are not aware of any way to restrict a provider from ordering a medication with a specific frequency. Have you found a way to address this requirement?

   Answer: One solution would be to remove the daily frequency as one of the available choices for the prescriber to select for all methotrexate oral products. This recommendation would require the prescriber to contact the pharmacy if the medication is needed at a frequency other than one of the available choices (e.g., daily for oncologic use).

   Rev. 8/29/2016

3. **Question:** We have been unsuccessful in implementing this *Best Practice* in our hospital-based retail pharmacies because many of the prescriptions are generated by outside electronic prescribing systems that we have no control over, so we cannot impact the dosage regimen default or implement a prescribing hard stop for these systems. What do you recommend?

Answer: This *Best Practice* was designed for hospital inpatient and outpatient systems with computerized prescriber order entry (CPOE). We realize that this can be a challenge for retail pharmacies, who accept prescriptions from outside their CPOE system. For printed and faxed prescriptions that must be entered by the pharmacy or are received electronically from an outside prescriber, we believe that the weekly regimen default and hard stop verification should be implemented in the pharmacy computer system. This would require the pharmacist to clarify all daily orders for methotrexate if the patient does not have a documented oncologic diagnosis. If your pharmacy system cannot accommodate a "hard stop," then an alert to the pharmacist to clarify the order would be the next best option. However, there are additional safeguards that you can implement.

- In addition to alerting the pharmacist to clarify all daily orders for oral methotrexate if the patient does not have a documented oncologic diagnosis, the alert should also inform the pharmacist that patient counseling is mandatory for this drug.
- Ensure that patient counseling includes clear written instructions AND clear verbal instructions that specifically reviews the dosing schedule, emphasizes the danger with taking extra doses, and specifies 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 (available at no charge here).
- Conduct a periodic audit of all daily orders for methotrexate dispensed to ensure that clarification was received, or the patient has an appropriate oncologic diagnosis.

Rev. 8/29/2016

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.*

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

** 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.*

1. **Question:** Our hospital system is looking at scales and hoping to make changes to weigh patients in kilograms only. However, a question has arisen about self-reported weights; patients will know how much they weigh in pounds, not kilograms. If a field for pounds is locked out in the system, and kilograms is the only choice, the value in pounds may accidentally be entered in the kilograms field, leading to possible overdose of medications. Of course, we will strive to minimize self-reported weights, but if a bed scale does not work, and the patient can't be moved, we may rely on a self-reported weight until the patient can be moved. Besides staff awareness and education, does ISMP have any other recommendations?

   Answer: As part of this *Best Practice*, we recommend that staff always obtain the actual patient's weight using scales that measure in the metric system. Numerous errors have been reported to ISMP that were caused by using inaccurate self-reported weights, historical weights in the medical record, and estimated weights. In rare circumstances that a measured weight cannot be obtained, determine the best approach to obtain the most accurate weight possible until the patient can be weighed (e.g., moved to bed with a working bed scale). If the interim weight is in non-metric units, staff will need to convert it to metric units prior to entry into the system. In these cases, pound to kilogram conversion charts at scales will help. We realize this won't prevent all incorrect entries, especially if the conversion chart isn't readily available or used. However, we believe there will be fewer errors if all patients are weighed on scales that weigh in metric units only. Also, hospital staff need to be engaged in finding ways to overcome barriers that may occur, such as broken bed scales, patients that shouldn't be moved, and other issues that may arise.

   The goal is to ensure that actual patient weights, not stated or estimated weights, are used, and that all patients are weighed in metric units when they enter a healthcare environment. Having scales that measure only in the metric scale is a key factor in achieving success.

   Rev. 3/26/2014

2. **Question:** Our computer system allows entry of a patient's weight in either pounds or kilograms, but the final weight is displayed in kilograms. Is this acceptable?

   Answer: ISMP continues to receive reports of medication errors that occurred because the patient's weight had been entered incorrectly into the electronic health record (e.g., a pound weight entered as kilograms, and vice versa). Subsequently, wrong doses were calculated, ordered, dispensed, and administered. ISMP believes it is crucial to measure and document weights using only metric units (g or kg).

   Rev. 3/26/2014

3. **Question:** What do you do when patients (especially heart failure patients or parents of newborns) want to know their weight in pounds?

   Answer: Conversion charts should be available for nurses and other healthcare personnel to use when discussing measured weights with the patient and family. Having patients ask for their weight in pounds should not be a barrier to collecting or documenting the information in the metric units.

   Rev. 3/26/2014

BEST PRACTICE 4 (ARCHIVED):

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.

1. **Question:** Is the emphasis of this *Best Practice* on preparing oral doses in oral syringes in the pharmacy, or preparing oral doses in an oral syringe in unit dose amounts versus a bulk bottle?

   Answer: The goal of this *Best Practice* is to avoid having nurses and other healthcare practitioners draw oral solutions into syringes on the patient care unit, where they might use a parenteral syringe. While the emphasis is on providing patient-specific doses in oral or enteral syringes, organizations should consider these additional safety strategies:

   - Bulk oral solutions should not be stocked in or dispensed to patient care units.
   - If an oral solution is available only in a bulk size, or the patient-specific dose is less than the unit dose amount (e.g., dose is 3 mL when the unit dose oral product is 5 mL), the pharmacy should prepare and dispense the patient-specific dose in an oral or enteral syringe (or cup). Nurses and other healthcare practitioners should not be required to prepare a patient's dose from a unit dose oral or enteral syringe or cup that holds more than the patient-specific dose.

   In the event that a nurse or other healthcare practitioner needs to draw an oral solution into a syringe for enteral administration to a patient, ISMP recommends placing oral and/or enteral syringes on patient care units, and educating nurses and other practitioners about their purpose and medication safety value.

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2. **Question:** For oral or enteral syringes, is there is a recommendation to use clear vs. amber syringes? The clear syringes allow the contents to be seen more easily, but the amber ones visually look different than clear parenteral syringes.

   Answer: ISMP does not specify whether clear or amber oral (or enteral) syringes should be used.

   Rev. 3/26/2014

BEST PRACTICE 5 (ARCHIVED):

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

1. **Question:** Are there any commercially available oral syringes and other liquid dose measuring devices that only display in the metric scale?

   Answer: Yes, commercially available dosing cups, oral syringes, and oral dispensers that display measurements only in the metric scale are available. Device manufacturers Baxter, BD, Comar, Medtronic (formerly Covidien), and NeoMed have metric only oral syringes or dispensers. Comar also has metric only medication cups. In addition, at least two healthcare product companies, Health Care Logistics and Medi-Dose/EPS sell a variety of metric only dosing cups, oral syringes, and oral dispensers. ISMP recommends that organizations consider using dosage cups that have a printed scale as they are more readable and thus less prone to error than those with an embossed scale.

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2. **Question:** Why did you select mL for the only markings on the oral liquid dosage containers – aren't there concerns from patients regarding their understanding of mL only measurement?

   Answer: When patients or caregivers administer liquid medications, the dosing designations on the medication container labels and accompanying dosing devices should be consistent. The use of multiple volumetric units (e.g., teaspoons, tablespoons, dropperfuls) and multiple abbreviations for the same volumetric unit (e.g., mL, cc; tsp, TSP) increases the risk of dosing errors by healthcare professionals, patients, and caregivers. For example, patients and caregivers have confused teaspoons and tablespoons, resulting in three-fold dosing errors. In addition, the use of teaspoons and tablespoons as units of measure on container and prescription labels may encourage the public to believe they can use non-calibrated household spoons for dosing medications.

   Although prescribers and pharmacists may assume that parents and other caregivers cannot administer liquid medications accurately using mL, a recent study indicates this is a false assumption. The study showed that parents who reported their dose in mL were not only more likely to use a standardized dosing device, but also were half as likely to make a dosing error.[1]

   Organizations such as the American Academy of Pediatrics,[2-4] Consumer Healthcare Products Association,[5] and USP[6] recommend the use of metric units and/or metrically marked dosing devices for the measurement and administration of oral liquid medications. Also, a key focus of the PROTECT Initiative, a public-private partnership, has been to encourage the adoption of an mL-based dosing standard. Efforts have targeted provider prescribing behaviors, the use of information technology systems to support mL dosing, as well as pharmacy dispensing.

   Healthcare practitioners, including prescribers, should:[7]

   - Prescribe/order doses for oral liquids using only metric weight or volume (e.g., mg or mL)—never household measures, which also measure volume inaccurately.
   - Cease use of prescription orders and patient instructions that use "teaspoonful" and other non-metric measurements, including any listed in pharmacy and e-prescribing computer systems. This should include mnemonics, speed codes, or any defaults used to generate prescriptions and labels.
   - Establish policies and procedures that standardize measurement systems to the metric system and eliminate the use of English and apothecary measurements (e.g., patient education material).
   - Take steps to ensure patients have an appropriate device to measure oral liquid volumes in mL.
   - Coach patients on how to use and clean measuring devices; use the "teach back" approach and ask patients or caregivers to demonstrate their understanding.

References

1. Yin HS, Dreyer BP, Ugboaja DC, et al. Unit of measurement used and parent medication dosing errors. *Pediatrics*. 2014;134(2):e354-61.
2. Paul IM, Yin HS. Out with teaspoons, in with metric units: pediatricians urged to prescribe liquid medications in mLs only. *AAP News*. 2012;33(3):10.
3. Johnson KB, Lehmann CU, Council on Clinical Information Technology of the American Academy of Pediatrics. Electronic prescribing in pediatrics: toward safer and more effective medication management. *Pediatrics*. 2013;131(4):e1350-6.
4. Yin HS, Kressly SJ. Antidote for medication overdoses: use metric dosing, educate parents. *AAP News*. 2013;34(12):4.
5. Johnson A, Meyers R. Evaluation of measuring devices packaged with prescription oral liquid medications. *J Pediatr Pharmacol Ther*. 2016;21(1):75-80.
6. USP. USP General Notices and Requirements <32> *Applying to standards, tests, assays, and other specifications of the United States Pharmacopeia*. North Bethesda, MD. Accessed: January 12, 2024.
7. ISMP. Safety standards needed for expressing/measuring doses of liquid medications. *ISMP Medication Safety Alert! Community/Ambulatory.* 2011;10(6):1-3.

Rev. 1/12/2024

BEST PRACTICE 6 (ARCHIVED):

Eliminate glacial acetic acid from all areas of the hospital.

1. **Question:** Our laboratory and pathology departments use small quantities of glacial acetic acid to prepare tissue fixatives, such as "Clarke's Solution" (75 mL of absolute ethanol, with 25 mL of glacial acetic acid to be prepared immediately before use). We are not aware of a substitute that can be used for this purpose. The laboratory also uses a dilute acetic acid for urinalysis and electrophoresis. What are your recommendations for this *Best Practice* in light of this information?

   Answer: A footnote with this *Best Practice* notes that laboratory use is excluded if the lab purchases the product directly from an external source. This provision is provided because there may be instances in which laboratories or research areas need extremely toxic chemicals. In such cases, it is critical to store and use these products, including glacial acetic acid, only in these areas. Take precautions to ensure that glacial acetic acid is never available in patient care areas of the hospital or in the pharmacy.

   If glacial acetic acid must be used in the laboratory or research area, follow these recommendations:

   - The laboratory/research area must order the product directly and store it exclusively in the laboratory/research area.
   - Glacial acetic acid should be purchased in the smallest quantity and container size that will meet the needs of the laboratory/research area, and the product should be stored according to Occupational Safety and Health Administration (OSHA)/National Institute of Occupational Safety & Health (NIOSH) recommendations.
   - Access to storage locations should be limited to only those personnel who have a legitimate need for the chemical. In addition, reminders at storage locations and other appropriate places should direct employees to never provide glacial acetic acid to another department.
   - If the laboratory/research area must use central supply/materials management to order glacial acetic acid and cannot order it directly, the order entry screen in the purchasing system should include a warning: "For Laboratory Only–Do Not Provide to Other Areas." Once the product is received in central supply/materials management, it should be delivered immediately. All glacial acetic acid should be stocked in the laboratory/research area and not in central supply/materials management. The pharmacy should never order, stock, or distribute glacial acetic acid.

   Rev. 3/26/2014

2. **Question:** Intra-operative topical use of modified Carnoy's solution, which is prepared using glacial acetic acid, is used following resection of keratocystic odontogenic tumors.[1] The original Carnoy's formula is still available from a chemical supply manufacturer, but it contains chloroform. The US Food and Drug Administration (FDA) no longer allows the use of chloroform in any therapeutic agent. What do you suggest in this case?

   Answer: In rare circumstances when pharmacy needs to prepare a solution using glacial acetic acid, the pharmacy should obtain the needed amount of glacial acetic acid from the laboratory, prepare the needed amount of modified Carnoy's solution, and immediately return any remaining glacial acetic acid to the laboratory.

Reference

1. Progel MA. The keratocystic odotogenic tumor. *Oral Maxillofac Surg Clin North Am*. 2013;25(1):21-30.

Rev. 3/26/2014

BEST PRACTICE #7:

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

1. **Question:** You recommend placing NMBs in a sealed box with a breakaway lock or, preferably, in a rapid sequence intubation (RSI) kit; or if NMBs must be stored in automated dispensing cabinets (ADCs), keep them in lock-lidded pockets. Are there special recommendations for storage when NMBs are contained within an anesthesia cart?

   Answer: ISMP recommends that organizations arrange their anesthesia carts and trays to avoid having look-alike vials, syringes, or bags in close proximity to one another, and to display product labels so they are visible and can be easily read.

   Rev. 8/29/2016

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.

1. **Question:** I noticed that as an example of an antidote in *Best Practice* #9, flumazenil is recommended to counteract the effects of benzodiazepines. There is evidence in the literature that recommends against the use of flumazenil for the treatment of benzodiazepine overdose (Marraffa JM, Cohen V, Howland MA. Antidotes for toxicological emergencies: a practical review. *Am J HealthSyst Pharm*. 2012;69[3]:199-212). Why do you recommend it?

   Answer: Flumazenil is used only as an example, and it is the responsibility of each individual hospital to decide which antidotes should be made readily available for use. While there may be a limited role for flumazenil in acute overdose, it is still administered in select patients to reverse excessive sedation and respiratory depression as a result of benzodiazepine use during procedural sedation.[1-4] The American Society of Anesthesiologists still recommend that antidotes which reverse opioids and benzodiazepines be readily available during moderate and deep sedation.[3,4]

References:

1. ECC Committee, Subcommittees and Task Forces of the American Heart Association. 2005 American Heart Association guidelines for cardiopulmonary resuscitation and emergency cardiovascular care. *Circulation.* 2005;112(24 Suppl):IV1-203.
2. Marraffa JM, Cohen V, Howland MA. Antidotes for toxicological emergencies: a practical review. *Am J Health Syst Pharm.* 2012;69(3):199–212.
3. American Society of Anesthesiologists Task Force on Sedation and Analgesia by Non-Anesthesiologists. Practice guidelines for sedation and analgesia by non-anesthesiologists. *Anesthesiology.* 2002;96(4):1004-17.
4. Apfelbaum JL, Silverstein JH, Chung FF, et al. Practice guidelines for postanesthetic care: An updated report by the American Society of Anesthesiologists Task Force on Postanesthetic Care. *Anesthesiology.* 2013;118(2):291–307.

Rev. 8/18/2016

2. **Question:** We are struggling with what type of "emergency administration" we would want to sanction. How are people doing this?

   Answer: We are aware of organizations that are including rescue/reversal agent orders (with specific administration directions) in their standard order sets so that healthcare practitioners (e.g., nurses) have appropriate orders available should it be clinically necessary to emergently reverse the effects of certain medications. This prevents a practitioner from having to notify the prescriber or wait for a call back to obtain an order for the rescue agent when a patient may be experiencing an acute reaction. For example:

   - All medication order sets with opioids would have a standard set of naloxone orders provided in the event of respiratory depression.
   - All insulin order sets would have a hypoglycemia protocol available with associated medication orders.
   - All orders for topical benzocaine spray would have a standard set of orders for methylene blue (with mixing directions) administration in the case that methemoglobinemia would occur.
   - All order sets for medications that have a high incidence of infusion reactions (e.g., ri**TUX**imab [**RITUXAN**]) would have embedded orders for treatment of anaphylactic reactions (i.e., **EPINEPH**rine, steroids).

   These strategies would also prevent a practitioner from removing a medication on override, without an order; looking up appropriate dosing/administration information; or delaying treatment.

Rev. 8/29/2016

BEST PRACTICE #10 (ARCHIVED):

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

1. **Question:** Our colleagues voiced some concerns about the ability to use a larger bag (2 liters) of sterile water for use in humidification with ventilators. The water bag hangs on the arm of the ventilator that is used to support and maneuver the circuit so that it's not resting on the patient. Even the weight of a 1-liter bag is at times too heavy for the arms, and in the past year we have had to replace 3-4 ventilator arms that have broken. The ventilator arms cannot support the weight of a 2-liter bag.

   Answer: Sterile water bags used for humidification (1 or 2 liter) were never intended to hang on the articulated arm of the ventilator, which is designed to support the lightweight circuit only. In fact, it would be dangerous to overload these arms. It is easy to understand how they would break, and possibly tug on the circuit and the patient's airway. Many ventilators come with their own attached pole which is sturdy enough to support a 2-liter sized bag of sterile water used for humidification, although it may be an "add-on" purchase. Other organizations have used IV poles to hang sterile water bags. Although less than ideal, if a separate IV pole is used, we recommend labeling the sterile water bag AND the end of the tubing that is closest to the patient with a label that says, "For Respiratory Equipment-Not for IV Use," or a similar warning to prevent accidental mix-ups.

   Organizations have selected to address this safety concern in a variety of ways. Many have made the transition to 2-liter sized bags, while others are using humidification systems that require hard-sided sterile water bottles instead of the flexible bags. Other organizations have opted (when appropriate) to use passive humidification systems such as heat moisturizer exchangers (HMEs) and HMEs with filters.

   Rev. 8/29/2016

BEST PRACTICE #20:

Safeguard against wrong-route errors with tranexamic acid.

1. **Question:** Why does this *Best Practice* say to avoid storing tranexamic acid next to local anesthetics? Is this specific to tranexamic acid or only when tranexamic is kept in an anesthesia tray or cart?

   Answer: In many of the error cases reported to ISMP, tranexamic acid was mistakenly given instead of a local anesthetic. ISMP recommends avoiding storing tranexamic acid in anesthesia trays, and separating or sequestering it in all storage locations (e.g., pharmacy, clinical areas) keeping it away from other local anesthetics.

   Rev. 1/10/24

BEST PRACTICE #21:

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

1. **Question:** Are pharmacy technicians included as practitioners to obtain medication histories?

   Answer: Yes, ISMP has seen successful medication reconciliation processes that involve the use of dedicated pharmacy technicians for collection of patients' medication histories.

2. **Question:** Does ISMP recommend pharmacy technicians ensure medications and doses ordered are correct therapy for that patient given their current state of health?

   Answer: No, ISMP would not recommend a pharmacy technician to ensure the appropriateness of medications and doses based on a patient's current state of health. We see this function being completed by a pharmacist, followed by the reconciliation completed and documented by a provider.

   Rev. 1/10/24

BEST PRACTICE #22:

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

1. **Question:** The *Best Practice* says to use barcode scanning to verify correct vaccine "and dose," how would scanning catch a wrong dose (e.g., if the wrong volume was measured)?

   Answer: Correct dose was included because there are situations where a scan could also verify the correct dose, such as when a syringe or vial contains the exact dose for a patient. ISMP recognizes that when practitioners need to remove a dose from a multi-dose vaccine vial or a vial that contains more than the patient-specific dose, a scan of the barcode will not be able to verify that the correct volume has been removed.

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