Using multidose vials

**QUESTION:**
Can multidose vials be used on more than one patient, or is the intent that they be used multiple times for one patient and then discarded? How long can a multidose vial be used once it has been opened?

**ANSWER:**
Multidose vials should be used according to manufacturer’s directions for use; local, state, and federal regulations; professional association and accreditation organization standards; and health care organization policies. This allows variation from one setting to another regarding whether multidose vials are used for more than one patient, used for only one patient, or not used at all within a department or within the health care organization.

The Safe Injection Practices Coalition defines a multidose vial as “a vial of liquid medication intended for parenteral administration (injection or infusion) that contains more than one dose of medication.” The manufacturer’s label should indicate whether the medication is packaged as a multidose vial or a single-dose vial. Multidose vials usually have an antimicrobial preservative to help avert the growth of bacteria.

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The concerns regarding multidose vials are primarily related to the risk of cross contamination from potentially contaminated surfaces or from one patient to another and the risk of improperly labeling expiration dates on opened vials.\(^5\)\(^-\)\(^7\) To decrease the risk of contamination from potentially contaminated surfaces, multidose vials that are used for more than one patient should not be kept in the immediate patient treatment area.\(^1\)\(^,\)\(^8\) Cross contamination can occur from one patient to another because the preservative in multidose vials has no effect on viruses, and health care personnel may not comply with safe injection practices.\(^1\)\(^,\)\(^6\) Health care personnel also may be inconsistent in how they label a multidose vial after initially opening it (eg, date of opening versus expiration date 28 days from opening versus expiration date 30 days from opening). When health care organization policies allow multidose vials to be used for more than one patient, there should be related procedures for labeling the opened multidose vial to avoid the risk of inconsistent labeling. Multidose vials should be dated to indicate a beyond-use date that is within 28 days of opening or according to manufacturer’s recommendation, whichever is the shorter time period.\(^9\) To clarify the establishment of 28 days as the beyond-use date, Paula R. Katz, regulatory counsel for the Center for Drug Evaluation and Research/Office of Manufacturing and Product Quality, explains that

\textit{the United States Pharmacopeia [USP] Chapter <51> sets 28 days as the endpoint for measuring bacteriostatic effectiveness in injections and other parenterals, and the [US Food and Drug Administration] generally accepts this standard for all drugs, including those not in the USP. In order to avoid being deemed adulterated under the [Federal Food, Drug, and Cosmetic Act] then, an injectable drug would have to be tested for antimicrobial effectiveness only until 28 days after opening. Drugs that are dispensed as multidose must comply with the antimicrobial effectiveness testing procedures set forth in USP chapter <51>.} (e-mail communication, March 8, 2011).

Additional risks are involved whether a vial is designed to be multidose or single dose; these include

- improper disposal of unused medications,
- inconsistent documentation of waste,\(^10\) and
- inaccurate administration (eg, using too much medication by injecting the full amount of medication in the vial rather than a portion of it).

To avoid these risks, if perioperative team members notice that they consistently use only a portion of the medication in a vial in repetitive circumstances, they should collaborate with pharmacists to procure vials of medication that are consistent with the amount of medication most commonly used.\(^9\)

Because of the increased risk for medication errors and cross contamination related to multidose vials, perioperative administrators may implement policies to avoid their use. If this is not possible, then policies may be implemented to indicate that multidose vials should be dedicated to a single patient. Whatever policy decisions are made regarding multidose vials, health care personnel must comply with regulations and accreditation standards. Safe injection practices also should be part of the departmental quality assurance assessment to monitor for compliance and decrease the risk for cross contamination when multidose medication vials are used.\(^1\)\(^,\)\(^9\) Policies should also indicate that multidose medication containers that are used for more than one patient should be separated from single-dose vials in the storage area to avoid the risk of a mix-up.\(^8\)

\textbf{References}


**Perioperative incremental local anesthetic injections**

**QUESTION:**
At times, our reconstructive and ear, nose, and throat surgeons inject a local anesthetic multiple times throughout a procedure by using the same syringe and needle. What safety considerations are recommended by AORN related to this practice?

**ANSWER:**
Safe injection practices (eg, one syringe and one needle) should be used by perioperative team members when administering medications from the sterile field. In most situations, a syringe and needle should be used only once to administer a medication to a single patient, after which the syringe and needle should be discarded. However, when administering incremental doses of a medication (eg, local anesthetics) to a single patient is an integral part of the surgical procedure, the same syringe and needle may be reused with strict adherence to aseptic technique. The syringe

- should be appropriately labeled with medication contents,
- should never be left unattended, and
- should be discarded immediately at the end of the procedure.

This practice is acceptable because it would increase the risk of a sharps injury if the scrub person had to change needles between injections. There is also an increased risk of error if scrub personnel are required to have multiple syringes with the same medication drawn up and labeled on the sterile field and to hand off a new syringe and needle for each incremental injection.

Perioperative team members should be aware of the increased risk for percutaneous injury when incremental doses of a medication are injected during the surgical procedure. Health care organizations and their employees are responsible for actively participating in strategies to reduce percutaneous injuries. Strategies to consider include using sharps with engineered, sharps-injury protection devices (eg, retractable, protective sheath, self-resheathing, self-blunting, hinged re-cap needles) to administer local anesthetics and other injectable medications. Other risk-reduction strategies for sharps safety in perioperative settings include

- using needleless systems whenever possible;
- using blunt cannulas to withdraw medications and fluids from vials;
- using the one-handed recapping technique only if no other alternatives exist;
- using a neutral or hands-free technique for passing sharp items instead of passing hand-to-hand;
- giving verbal notification when passing a sharp device;
keeping visual contact with the procedure site and the sharp device;
- taking steps to control the location of the sharp device;
- being aware of other staff members in the area when handling a sharp device;
- keeping hands away from the surgical site when sharp items are in use;
- accounting for all sharp items throughout the procedure;
- providing a barrier between the hands and the needle after use;
- containing used sharps on the sterile field in a designated, disposable, puncture-resistant needle container and replacing the container as necessary;
- making sure that the disposable, puncture-resistant needle container is securely closed before handing it off the field;
- activating the safety feature of a safety-engineered device immediately after use according to manufacturers’ instructions; and
- using gloves and an instrument to pick up hypodermic needles that have fallen on the floor.³

Perioperative team members also should monitor the patient for toxic medication levels when incremental doses of a medication are injected throughout the surgical procedure. Although rare, adverse events have been associated with the use of local anesthetics. If large amounts of local anesthetics are used, then toxicity may occur and may cause cardiovascular, respiratory, or central nervous system depression. Symptoms of toxicity may include
- metallic taste,
- tinnitus,
- light-headedness,
- syncope,
- visual disturbances,
- numbness of the tongue or lips,
- confusion,
- tremors,
- shivering,
- generalized seizures,
- tachycardia and hypertension (initially),
- bradycardia and hypotension (with increased toxicity),
- ventricular arrhythmias or cardiac arrest, and
- respiratory arrest.⁴

Perioperative medication care plans should include an evaluation of toxic dose ranges specific to each patient’s medication history and preexisting medical conditions.¹ The circulating nurse should document the total amount of medication administered when the same medication (eg, lidocaine) is administered via multiple injections during the procedure. Documentation should reflect the patient’s response to the medication administered as close as possible to the time that the medication is administered and the time that the response is observed.¹ When conveying transfer of care information to the postanesthesia care unit RN after the procedure, the circulating nurse should include the total amount of medication administered, the time of administration, the evaluation of toxic dose ranges identified in the medication care plan, and observations of the patient’s response to the medication during the procedure.¹

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References
Placing unsterile solutions on the sterile field

QUESTION:
What does AORN recommend for aseptic technique and safety practices when an unsterile solution is to be used for a sterile procedure?

ANSWER:
The principles used for safe medication practices also apply for unsterile solutions (eg, nonmedications, chemical solutions) that are transferred to a sterile field. The unsterile solution should be transferred with aseptic technique to the sterile field. The timing of the transfer should be as close as possible to the time that the solution will be used. The circulating nurse should verbally verify the information on the original solution container label (eg, solution name, strength, expiration date), and the person receiving the solution on the sterile field should concurrently verify the information with the circulating nurse. The person receiving the solution should immediately label the secondary container upon receipt of the solution to the sterile field. At a minimum, the label should include the solution name, strength, and concentration.¹

The unsterile solution should be contained on the sterile field and handed off immediately after it is used. For example, the circulating nurse transfers the unsterile solution to a sterile medicine cup and the scrub person labels the cup and places it inside a sterile basin. If sterile cotton tips are used to deliver the solution to the wound site, then the surgeon can place the cotton tip applicators in the basin with the medication cup when the application is completed, and the scrub person can hand the basin off to the circulating nurse. If unsterile applicators are used (eg, silver nitrate sticks), then the surgeon and the scrub person should change gloves after the application and hand off of the unsterile applicators.

Other medication safety practices should be implemented for nonmedication solutions used during a surgical procedure. For example, the circulating nurse should retain and isolate all original medication or solution containers and delivery devices until the end of the procedure.¹ A fatal error directly related to unlabeled containers of nonmedication solutions on the sterile field involved a 69-year-old woman from Seattle, Washington, who died when a clear chlorhexidine solution was injected intravascularly instead of the contrast media that was intended to be injected.² Maintaining possession of the original medication or solution containers facilitates the root cause analysis when an adverse event such as this occurs.¹ However, the empty medication or solution containers that are retained until the end of the procedure should not be used for another purpose. A reported error relating to accidental injection of a nonmedication solution resulted from an empty medication container being filled with a nonmedication solution. The case involved a 33-year-old man who was to be given tissue fragments from his arthroscopic meniscectomy surgery at the end of the procedure. The scrub person handed the tissue specimen to the circulating nurse who transferred it to a vial filled with formalin solution, which had previously contained cephazolin. The vial was labeled with the patient’s name and placed on the anesthesia cart with the intent that it be given to the patient after surgery. As a result of miscommunication, the anesthesia professional withdrew the solution in the container with the patient’s name on it thinking it was cephazolin and injected the formalin solution intravenously. Fortunately, the patient responded to dialysis and was discharged in good condition two days after the incident.³

If the nonsterile solution to be used on the sterile field or in a perioperative patient care area is considered hazardous (eg, phenol), a comprehensive safety program should be implemented to address special handling and disposal of the hazardous solution. Current material safety data sheets for all hazardous medications or chemical
solutions used in the workplace must be immediately available, and the hazardous solution should be stored in a segregated area with clear signage and warning labels. Spill kits and waste containers also should be immediately available in the storage area.1

To avoid confusion related to storage errors, nonmedication solutions and chemicals should be stored in an area separate from medication storage areas. One case report related to storing chemicals in medication storage areas involved an 18-year-old patient who ingested acetone instead of the intended dose of sodium citrate. The follow-up investigation found that the bottles of sodium citrate and acetate were both packaged with dark glass and white screw caps, were similar in size (ie, 30 mL and 50 mL), and were both stored on a spinal anesthesia cart in the labor and delivery department.6 Other reports involve patients, family members, or nurses mistaking testing reagents used to detect fecal occult blood (eg, hydrogen peroxide/denatured ethyl alcohol, hydrogen peroxide/ethanol) for eye drops because of the similarity of the packaging.7

In general, if a nonsterile solution is needed on the sterile field, then basic principles of aseptic technique apply. The solution needs to be contained and aseptic technique needs to be maintained. In the event that the solution is considered hazardous or there is risk of it not being adequately contained, the circulating nurse and scrub person should consider setting up a separate table with a sterile drape for the unsterile solution, and then changing gowns and gloves after the solution is used. Regardless of whether the solution is on the sterile back table or isolated on a separate sterile table, the solution should be transferred to the sterile field as close as possible to the time of use.

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### References
progression to a kidney infection. If the scope cannot be sterilized, then it should be processed by high-level disinfection immediately before the procedure.

Using a sterile or high-level disinfected scope handled with aseptic technique reduces the risk of introducing exogenous organisms into the surgical site. Aseptic technique also should be used for cystoscopies, transurethral prostate resections, and other urology procedures regardless of whether flexible or rigid endoscopes are to be used. The same principle applies to checking the reanastomosis endoscopically from a perineal approach after completing a bowel resection from an abdominal approach. The colonoscope or sigmoidoscope used should be set up on a sterile field with aseptic technique because there is a fresh wound at the reanastomosis site. When using flexible endoscopes for gastrointestinal or respiratory endoscopic procedures that are diagnostic or involve polyp extraction or biopsies for patients who are not considered high risk (eg, immunosuppressed) for postoperative infections, it is safe to use a scope that has been processed within the past five days without reprocessing the scope immediately before the procedure.1

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Reference

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Clinical Issues

This evaluation is used to determine the extent to which this continuing education program met your learning needs. The evaluation is printed here for your convenience. To receive continuing education credit, you must complete the Learner Evaluation online at http://www.aorn.org/CE. Rate the items as described below.

PURPOSE/GOAL
To educate perioperative nurses about providing safe nursing care throughout the perioperative continuum.

OBJECTIVES
To what extent were the following objectives of this continuing education program achieved?
1. Discuss practices that could jeopardize safety in the perioperative area.
   Low 1. 2. 3. 4. 5. High
2. Discuss common areas of concern that relate to perioperative best practices.
   Low 1. 2. 3. 4. 5. High
3. Describe implementation of evidence-based practice in relation to perioperative nursing care.
   Low 1. 2. 3. 4. 5. High

CONTENT
4. To what extent did this article increase your knowledge of the subject matter?
   Low 1. 2. 3. 4. 5. High
5. To what extent were your individual objectives met? Low 1. 2. 3. 4. 5. High

6. Will you be able to use the information from this article in your work setting? 1. Yes 2. No
7. Will you change your practice as a result of reading this article? (If yes, answer question #7A. If no, answer question #7B.)
   7A. How will you change your practice? (Select all that apply)
       1. I will provide education to my team regarding why change is needed.
       2. I will work with management to change/implement a policy and procedure.
       3. I will plan an informational meeting with physicians to seek their input and acceptance of the need for change.
       4. I will implement change and evaluate the effect of the change at regular intervals until the change is incorporated as best practice.
       5. Other: ____________________________
   7B. If you will not change your practice as a result of reading this article, why? (Select all that apply)
       1. The content of the article is not relevant to my practice.
       2. I do not have enough time to teach others about the purpose of the needed change.
       3. I do not have management support to make a change.
       4. Other: ____________________________

8. Our accrediting body requires that we verify the time you needed to complete the 1.4 continuing education contact hour (84-minute) program: ____________________________

This program meets criteria for CNOR and CRNFA recertification, as well as other continuing education requirements.
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Event: #12508; Session: #0001; Fee: Members $7, Nonmembers $14
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Each applicant who successfully completes this program can immediately print a certificate of completion.