

**Infection Prevention and Control Simulation
Skill Packet**

**Safe Injection Practices
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The contents of this packet include fundamental core infection prevention and control concepts. Simulation scenarios outlined in this packet were developed by the Kentucky Infection Prevention Training Center (KylP) using fundamental core infection prevention and control concepts in collaboration with the Center of Diseases and Control's (CDC's) Project Firstline training initiative.

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INTRODUCTION TO PROJECT FIRSTLINE

About Project Firstline

Project Firstline is a national collaborative led by the U.S. Centers for Disease Control and Prevention (CDC) to provide infection control training and education to frontline healthcare workers and public health personnel. The Kentucky Infection Prevention Training Center is proud to partner with the Kentucky Department of Public Health and Project Firstline. Funding for the Kentucky Infection Prevention Training Center (KylP) is provided through the Centers for Disease Control and Prevention (CDC) Epidemiology and Laboratory Capacity (ELC) Enhancing Detection grant supplement award to the Kentucky Department for Public Health (KDPH). CDC is an agency within the Department of Health and Human Services (HHS). The contents of this simulation skill packets do not necessarily represent the policies of CDC or HHS and should not be considered an endorsement by the Federal Government

Project Firstline provides innovative and accessible infection control education for all frontline healthcare workers – so they can protect their patients, their coworkers and themselves from infectious disease threats in health care. As a collaborative, Project Firstline brings together more than 75 healthcare, academic, and public health partners to reach a wide range of healthcare audiences and settings across the country. Project Firstline offers educational resources in a variety of formats to meet the diverse learning needs and preferences of the healthcare workforce.

Resources are designed using adult learning principles, educational best practices, CDC recommendations, and the science that informs them.

Learn more about Project Firstline: https://youtu.be/PUjZlV_lw-I

The Concept of Infection Control

The goal of everything we do in infection control, for any disease, is to keep people from getting sick. The goal of Project Firstline is to make sure you have the infection control knowledge that you need and deserve to keep yourself, your patients, your colleagues, and your family safe.

Link to: What is the goal of infection control?

<https://www.cdc.gov/infectioncontrol/projectfirstline/videos/Ep1-Goal-LowRes-New.mp4>

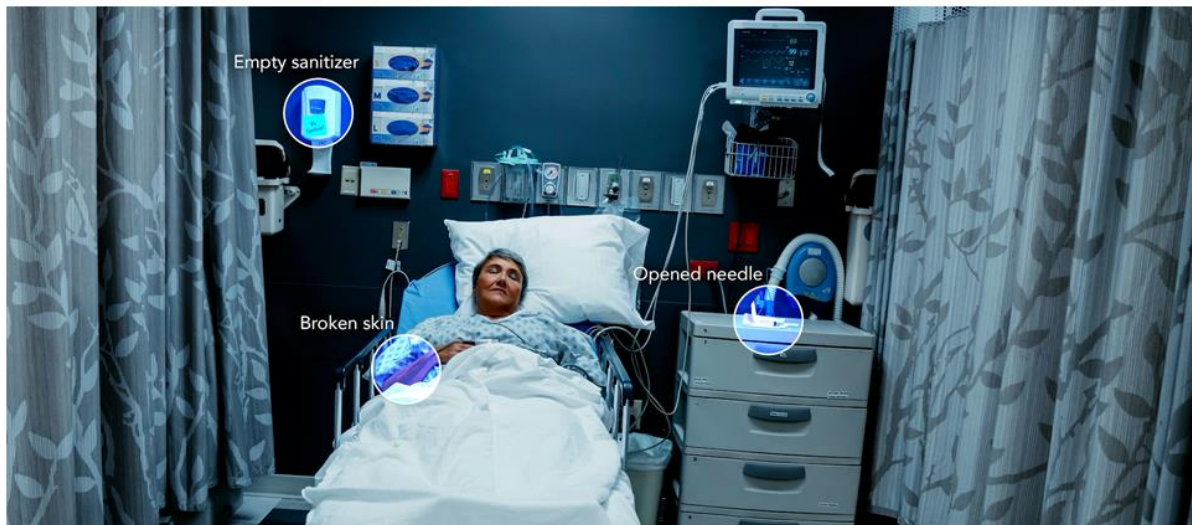
Risk Recognition

Risk recognition is seeing the potential for a problem to happen. You see risk every day at home and at work, and you take steps to minimize it. You can help control infections in healthcare by learning to recognize the risks for germs to spread and cause infection, and not letting it happen. Healthcare is a unique setting – we consider germs differently in healthcare than we do in other places, like at home or in the community. The work that we do in healthcare presents many opportunities for germs to spread. Everyone, no matter your training or role, can recognize an infection risk and take action to keep germs from spreading.

No two days are the same in health care but caring for and protecting patients is always the top priority. This includes protecting patients from getting infections while they are receiving care. With a foundational knowledge about germ spread and the “why” behind infection control, you can recognize infection risks and make the right decisions to prevent people from getting sick, regardless of what the day brings.

Recognize Infection Risks in Health Care

[Español \(Spanish\)](#) | [Print](#)



Source: [Recognize Infection Control Risks in Health Care](#) | [Project Firstline](#) | [CDC](#)

Explore Project First line’s educational content and resources to learn more about **where germs live in healthcare settings** and how to **recognize the risk** for them to spread – which is the first step in understanding when to take action to protect your patients and yourself from infections.



Link to risk recognition in healthcare:

<https://www.cdc.gov/infectioncontrol/projectfirstline/videos/RecognizeRisks-LowRes.mp4>

As you're going about your workday, there are certain things that you are likely already doing to reduce the risk of spreading germs, like cleaning your hands between tasks or cleaning and disinfecting shared medical devices. *Standard Precautions* are the things you're doing, every day, for every patient, to keep germs from spreading. Because risks will always exist in healthcare settings, we follow these Standard Precautions to protect patients and ourselves — regardless of whether you know a patient has a specific infection — because often you don't know.

Recognizing infection risks goes beyond Standard Precautions. Because no two days in health care are ever the same, there will be moments when healthcare workers might need to apply infection control recommendations to situations that aren't usually described in guidelines. That's why understanding how germs spread and make people sick is so helpful — **it allows you to recognize infection risks throughout your workday, no matter the moment.**

What are Reservoirs?

"Reservoirs" are the places on and in our bodies and in the environment where germs live. Germs frequently spread between and among these reservoirs.

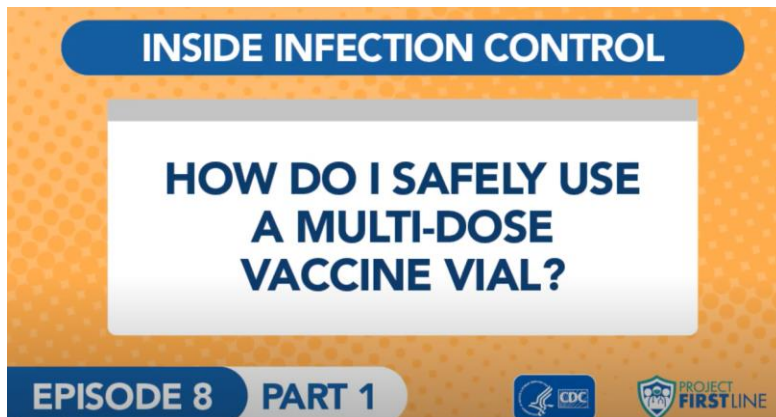
Four reservoirs in the human body that are important for infection control are

1. The skin;
2. The gastrointestinal (GI) system or "gut";
3. The respiratory system; and blood.

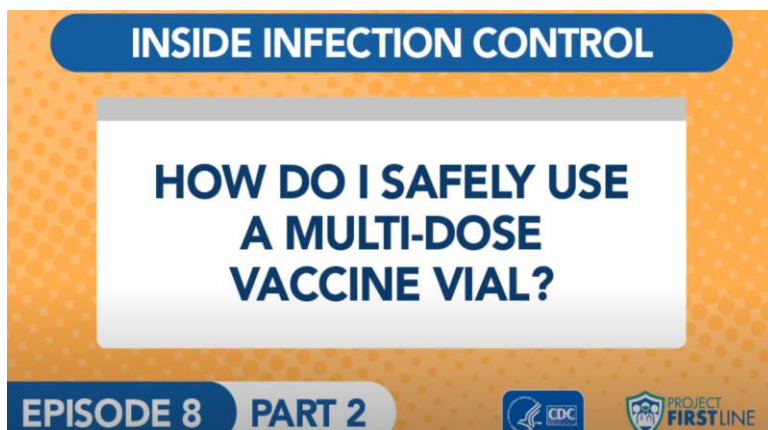
Understanding where germs live helps us recognize where there is risk for them to be spread, and helps us understand why infection control actions work to stop them from spreading and making people sick.

Project Firstline Vlogs: Safe Injection Practices

Multiple doses vials are different from single dose vials in several ways and require important injection safety actions. In episode 8, part 1 of this video, Dr. Abby Carlson explains what a multi-dose vial is, how it is different from a single dose vial, and why they are an infection control challenge. Knowing this information can help vaccinators protect vaccines from contamination and feel more confident administering vaccines that come in multi-dose vials. In episode 8, part two of this video, Dr. Carlson breaks down the critical steps every vaccinator should follow when administering vaccines that come in multi-dose vials



[Episode 8a: How Do I Safely Use a Multi-Dose Vaccine Vial? Part 1 - YouTube](#)



[Episode 8b: How Do I Safely Use a Multi-Dose Vaccine Vial? Part 2 - YouTube](#)

Health Equity Guiding Principles for Inclusive Communication

Safe Injection Practices Simulation Packet

The contents of this packet incorporates the CDC's Health Equity for Inclusive Communication. These principles are intended to help health communicators ensure that their communication products and strategies adapt to the specific cultural, linguistic, environmental, and historical situation of each population or audience of focus ³.



Link to Spanish resources: <https://www.cdc.gov/infectioncontrol/projectfirstline/es/index.html>

INTRODUCING SIMULATION AS A TOOL IN INFECTION PREVENTION EDUCATION AND TRAINING

Every day one out of every 31 hospitalized patients end up with a healthcare-associated infection (HAI) ⁷. This leads to an increased number of days hospitalized, a higher risk of mortality, and increased cost to the healthcare system. Unfortunately, HAIs have occurred in virtually all healthcare settings and have affected patients, residents, and healthcare workers. The ongoing rates of HAIs coupled with the challenges posed by the SARS-CoV-2 pandemic have underscored gaps in infection prevention practice and the need to refocus on basic principles of infection prevention.

The goal of the Infection Prevention Skills Stations Series is to provide opportunities for healthcare personnel to review basic infection prevention core practices and apply them through a variety of simulated learning experiences. Simulation is a process where situations encountered during healthcare can be represented, demonstrated, or performed using a variety of educational techniques. This approach serves as a connection between traditional classroom learning with real-world clinical experiences. The benefits of simulation learning include a range of learning opportunities, the ability to make mistakes without harm; the chance for evaluation and feedback, and the opportunity to practice a skill hands-on until proficient, and that is important for all healthcare workers ⁸. Participants in simulation can apply knowledge and critical thinking in situations that occur in all settings where healthcare is delivered including acute, long term, and ambulatory care and can be used with novice and experienced learners ¹. The key is to make simulations relevant to the individual.

This Skills Station will introduce you to the concept of simulation in healthcare, specifically in the areas of infection prevention (IP) and focused on Personal Protective Equipment. This simulation is designed to reach new and experienced learners in healthcare and seeks to create a fundamental understanding of infection prevention practices using scenarios that will show how various healthcare interactions, even those seemingly small, can lead to devastating complications and negative outcomes. Our hope is that this simulation can be used routinely as part of healthcare education and training, and ultimately decrease infection associated with patient care.

Skills Stations are organized into the following six sections:

1. The name or topic of the simulation is aligned with areas of practice or outcomes included in the Centers for Disease Control and Prevention (CDC) Core Infection Prevention and Control Practices for Safe Healthcare Delivery in all Settings—Recommendations of the HICPAC (CDC, 2017).
2. Learning objectives are outlined at the beginning of each Skills Station to define the problem and outline intended outcomes for the learner.
3. Each station will be structured into Pre-brief, Simulation, and Debrief segments and designed to take approximately one hour. Now, remember your audience. For novice and beginner learners, education or pre-briefing may be better assigned prior to coming into the simulation and having a quick recap to Pre-brief before the simulation session. For more proficient or expert learners, the Pre-brief may only need to occur right before the simulation begins. Debriefing is the most

critical part of the process and should be the segment where sufficient time is devoted for engagement, interaction, and reflection. The Skills Stations have been structured with information for each section to standardize and streamline the process. A variety of simulation approaches have been incorporated across the Series and include video demonstrations, role playing scripts, games, group interactions, and instructions for return demonstrations.

4. A list of supplies needed for the individual Skills Station is provided. If expired supplies are used, it is vital that those supplies remain separated from supplies that will be used in actual patient care situations.
5. The workflow process for each Skills Station is included to help organize the learning session. A suggested time flow for the simulation, and specifics regarding each of the segments, is included in the section below.
6. Evaluation of performance of the learners as well as their perceptions of the experience are important to capture. This information may assist with additions or improvement to the process and serve to demonstrate value to the use of simulation for infection prevention practice for front-line healthcare workers.

TITLE: USE OF SIMULATION TO PROMOTE SAFE INJECTION PRACTICES

LEARNING OBJECTIVES:

At the end of this Skill Station, participants will be able to:

1. Review the basics of safe injection practices and their application to healthcare
2. Review elements of aseptic technique relevant to injection practices
3. Identify key differences between multi-dose and single-dose vials.
4. Apply knowledge in practice to minimize risks and behaviors associated with unsafe injection practices

PRE-BRIEF (BACKGROUND)

Injectable medicines are commonly used in health-care settings for the prevention, diagnosis, and treatment of various illnesses. Examples include chemotherapy, intravenous antibiotics, vaccinations, and medications used for sedation and anesthesia. Medical injections often are administered in conjunction with surgical procedures, endoscopy, imaging studies, pain control, and cosmetic or complementary and alternative medicine procedures. Safe manufacturing and pharmacy practices are essential because every injection must begin with sterile medication. The appropriate medication must then be safely prepared (typically drawn up in a syringe), then administered in a manner that maintains sterility and minimizes risk for infection. Safe administration depends on adherence to the practices outlined in CDC's evidence-based Standard Precautions guideline.

Health-care providers should never:

- Administer medications from the same syringe to more than one patient,
- Enter a vial with a used syringe or needle, or
- Administer medications from single-dose vials to multiple patients. They also should maintain aseptic technique at all times and properly dispose of used injection equipment.

SAFE INJECTION PRACTICES

Injection safety, or safe injection practices, is a set of measures taken to perform injections in an optimally safe manner for patients, healthcare personnel, and others ². A safe injection does not harm the recipient, does not expose the provider to any avoidable risks, and does not result in waste that is dangerous for the community (e.g., through inappropriate disposal of injection equipment)². Injection safety includes practices intended to prevent transmission of infectious diseases between one patient and another, or between a patient and healthcare provider, and also to prevent harms such as needle stick injuries ².

The transmission of blood borne viruses and other microbial pathogens to patients during routine health care procedures continues to occur because of the use of improper injection, infusion, medication vial, and point-of-care testing practices by health care personnel

Standard Precautions

Standard Precautions are the basic practices that apply to all patient care, regardless of the patient's

suspected or confirmed infectious state, and apply to all settings where care is delivered. These practices protect healthcare personnel and prevent healthcare personnel or the environment from transmitting infections to other patients. Due to increased reports of infectious disease transmission through inappropriate handling of injectable medications, the CDC now considers safe injection practices to be a formal element of standard precautions.

The highlighted injection safety practices was recently added to the CDC's Infection Prevention and Control Practices for Safe Healthcare Delivery in All Settings:

- **Prepare medications in a designated clean medication preparation area that is separated from potential sources of contamination, including sinks or other water sources.**
- Use aseptic technique when preparing and administering medications
- Disinfect the access diaphragms of medication vials before inserting a device into the vial
- Use needles and syringes for one patient only (this includes manufactured prefilled syringes and cartridge devices such as insulin pens).
- Enter medication containers with a new needle and a new syringe, even when obtaining additional doses for the same patient.
- Ensure single-dose or single-use vials, ampules, and bags or bottles of parenteral solution are used for one patient only.
- Use fluid infusion or administration sets (e.g., intravenous tubing) for one patient only
- Dedicate multi-dose vials to a single patient whenever possible. If multi-dose vials are used for more than one patient, restrict the medication vials to a centralized medication area and do not bring them into the immediate patient treatment area (e.g., operating room, patient room/cubicle)
- Wear a facemask when placing a catheter or injecting material into the epidural or subdural space (e.g., during myelogram, epidural or spinal anesthesia)

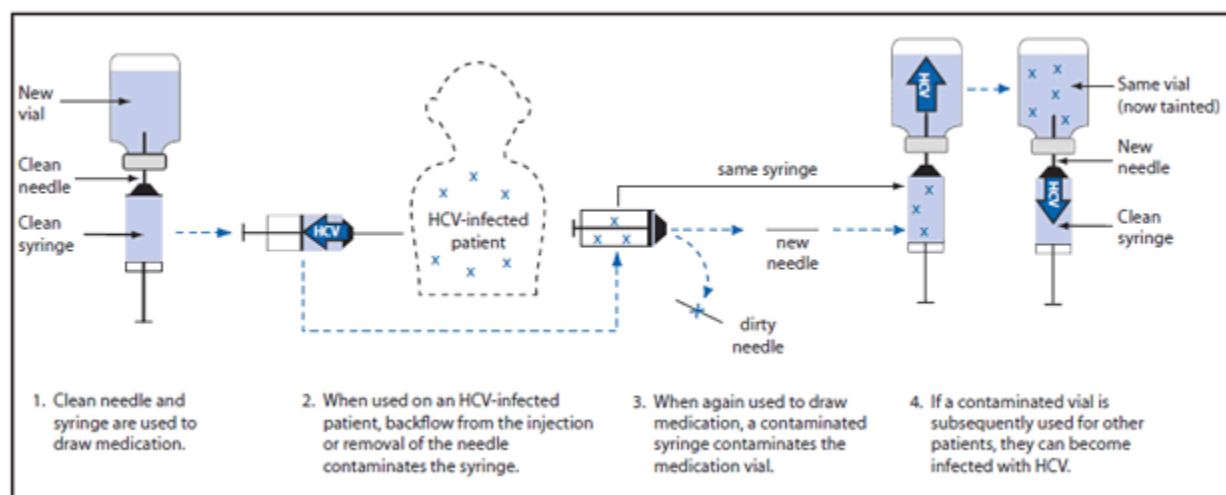
These core practices are intended to serve as a standard reference and reduce the need to repeatedly evaluate practices that are considered basic and accepted as standards of medical care. Future updates to the Core Practices will be guided by the publication of new or updated CDC infection prevention and control guidelines.

CASE STUDY: OUTBREAK

Outbreaks investigated by CDC and state and local health departments have illustrated that the U.S. health-care system is susceptible to the dangers of unsafe injections. The investigation of an HCV outbreak in Nevada in 2008 revealed that reuse of syringes on multiple patients and use of single-use medication vials on multiple patients was the likely mechanism by which HCV infections were transmitted. The ambulatory surgical center (ASC) under investigation used the sedative, protocol, which is supplied in single-dose vials, during endoscopy procedures ([Figure 1](#)). At the start of a procedure, a new, clean needle and syringe were used to draw up medication. When used on an HCV-infected patient, backflow contaminated the syringe. Patients typically required additional medication to maintain sedation, and instead of using a new needle and syringe, nurses in this clinic reused the patient's syringe to draw up this medication, after replacing the needle. By putting the reused syringe in contact with the vial, contamination was transferred to the vial. This clinic routinely reused these single-dose vials for multiple patients, which established a pathway for the spread of HCV from one patient to another. Changing the needle in this situation did not prevent contamination of the vial; however, it did expose the nurse to the risk for a sharps injury and occupational disease transmission. To avoid this risk, a new needle and syringe should be used every time a vial is accessed to withdraw medication.

Cite: [CDC Grand Rounds: Preventing Unsafe Injection Practices in the U.S. Health-Care System](#)

FIGURE 1. Unsafe injection practices and circumstances that likely resulted in transmission of hepatitis C virus (HCV) at a clinic in Las Vegas, Nevada



Source: CDC. Acute hepatitis C virus infections attributed to unsafe injection practices at an endoscopy clinic—Nevada, 2007. MMWR 2008;57:513–7. Available at <http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5719a2.htm>.

The figure above shows unsafe injection practices and circumstances that likely resulted in transmission of hepatitis C virus (HCV) at a clinic in Las Vegas, Nevada, during 2007. The investigation revealed reuse of syringes on multiple patients and use of single-use medication vials

on multiple patients was the likely mechanism by which HCV was transmitted. The ambulatory surgical center under investigation used the sedative, propofol, which is supplied in single-dose vials, during endoscopy procedures.

How can poor injection safety practices lead to an outbreak?

The transmission of blood borne viruses and other microbial pathogens to patients during routine health care procedures continues to occur because of the use of improper injection, infusion, medication vial, and point-of-care testing practices by health care personnel (HCP) ¹⁰. The investigation of four large outbreaks of hepatitis B virus (HBV) and hepatitis C virus (HCV) among patients in ambulatory care facilities in the United States identified a need to define and reinforce safe injection practices. The four outbreaks occurred in three different settings; a private medical practice, a pain clinic, an endoscopy clinic, and a hematology/oncology clinic. The primary breaches in infection control practice that contributed to these outbreaks were related to reinsertion of used needles into a multiple-dose vial or solution container (e.g., saline bag) and using a single needle/syringe to administer intravenous medication to multiple patients.

According to Seigel, Rhinehart, Jackson, et.al, one factor that contributed to the viral hepatitis outbreaks was that the preparation of medications was done in the same workspace where used needle/syringes were dismantled, while other outbreaks could have been prevented by adherence to basic principles of aseptic technique for the preparation and administration of parenteral medications ¹¹. Aseptic technique include the use of a sterile, single-use, disposable needle and syringe for each injection given and prevention of contamination of injection equipment and medication ². Whenever possible, use of single-dose vials is preferred over multiple-dose vials, especially when medications will be administered to multiple patients. Outbreaks related to unsafe injection practices indicate that some healthcare personnel are unaware of, do not understand, or do not adhere to basic principles of infection control and aseptic technique ¹¹. According to the CDC, survey of US healthcare workers who provide medication through injection found that 1% to 3% reused the same needle and/or syringe on multiple patients ¹¹. Among the deficiencies identified in recent outbreaks were a lack of oversight of personnel and failure to follow-up on reported breaches in infection control practices in ambulatory settings. Therefore, to ensure that all healthcare workers understand and adhere to recommended practices, principles of infection control and aseptic technique need to be reinforced in training programs and incorporated into institutional policies that are monitored for adherence ².

UNSAFE INJECTION PRACTICES EXAMPLES

The most common practices that have resulted in transmission of hepatitis C virus (HCV), hepatitis B virus (HBV) and/or other pathogens include:

- Using the same syringe to administer medication to more than one patient, even if the needle was changed or the injection was administered through an intervening length of intravenous (IV) tubing ².
- Accessing a medication vial or bag with a syringe that has already been used to administer medication to a patient, then reusing contents from that vial or bag for another patient ².
- Using medications packaged as single-dose or single-use for more than one patient ².
- Failing to use aseptic technique when preparing and administering injections ².

SAFE INJECTION PRACTICE Q&A

Safe injection practices are all about reducing the risk of pathogen transmission. However, in order to prevent contamination of injection equipment it is important to recognize where germs live and how they spread.

What are reservoirs?

- Reservoirs are places where germs can live
- They can be environment surfaces but what we often fail to realize is that the skin, gut, respiratory system and blood are all reservoirs and places where germs can live. Here is a fun fact- scientist's use blood to grow bacteria in the lab because it is good food for germ/ pathogens.

What are pathways?

- Pathways are *how* germs can spread
- Examples of pathways are contact and airborne. Some microorganisms can however have more than one pathway

Where should medications be prepared?

- Prepare medications in a clean, designated medication area away from where the patient is being vaccinated and away from any potentially contaminated items. Remember the environment is a reservoir. Medications should be drawn up in a designated clean medication area that is not adjacent to areas where potentially contaminated items are placed. Examples of contaminated items that should not be placed in or near the medication preparation area include: used equipment such as syringes, needles, IV tubing, blood collection tubes, needle holders (e.g., Vacutainer® holder), or other soiled equipment or materials that have been used in a procedure. In general, any item that could have come in contact with blood or body fluids should not be in the medication preparation area. Proper hand hygiene should be performed before handling medications.

What is aseptic technique?

- In this context, aseptic technique refers to the manner of handling, preparing, and storing of medications and injection equipment/supplies (e.g., syringes, needles and IV tubing) to prevent microbial contamination. Avoid touching the end of the needle and the opening surface of the syringe and carefully connect the needle to the syringe. In the video the nurse touched all over the needle and syringe, this lead to contaminating both the needle and the syringe.

How should I draw up medications?

- Parenteral medications should be accessed in an aseptic manner. This includes using a new sterile syringe and sterile needle to draw up medications while preventing contact between the injection materials and the non-sterile environment. Proper hand hygiene should be performed before handling medications. The rubber septum should be disinfected with alcohol for 30 seconds prior to piercing it

Is it acceptable to combine (pool) leftover medication from single-dose or single-use vials?

- No. Do not combine (pool) leftover contents of single-dose or single-use vials or store single-dose or single-use vials for later use. Single-dose or single-use vials are intended for use on a single patient for a single case/procedure. There have been outbreaks resulting from pooling of contents of single-dose or single-use vials and/or storage of contents for future use.

For information on storage and handling of vaccines please refer to [the CDC Vaccine Storage and Handling Toolkit](#) or the manufacturer's recommendations for specific vaccines

Is it acceptable to use a syringe (that has not been used on a patient) to draw up and mix contents from multiple medication vials?

- The safest practice is to always enter a medication vial with a sterile needle and sterile syringe. There has been at least one outbreak attributed to healthcare personnel using a common needle and syringe to access multiple multi-dose vials for the purpose of combining their contents into a single syringe. If one vial becomes contaminated, this practice can spread contamination to the others, prolonging presence of the pathogen and increasing the potential for disease transmission. Syringe reuse in this fashion may also have been a factor in additional outbreaks.
- While it is not recommended to use the same needle and syringe to enter more than one medication vial because of the risks described above, there are circumstances where more than one vial may need to be entered with the same syringe and needle (e.g., when reconstituting medications or vaccines). In these circumstances, aseptic technique must be followed and reconstitution should be performed in a designated clean medication area that is not adjacent to areas where potentially contaminated items are placed.

When should hand hygiene be performed?

- Health care personnel should complete proper hand hygiene before preparing vaccines. The nurse in the video touched her coat and then reached straight for the medication vial. Why is performing hand hygiene important? Because the skin is a reservoir on which pathogens live and if we do not clean our hands these germs will make their way into medication vials and vaccination equipment.

When should multi-dose vials be discarded?

- Medication vials should always be discarded whenever sterility is compromised or cannot be confirmed. In addition, the United States Pharmacopeia (USP) General Chapter 797 recommends the following for multi-dose vials of sterile pharmaceuticals :
 - i. If a multi-dose has been opened or accessed (e.g., needle-punctured) the vial should be dated and discarded within 28 days unless the manufacturer specifies a different (shorter or longer) date for that opened vial.
 - ii. If a multi-dose vial has **not** been opened or accessed (e.g., needle-punctured), it should be discarded according to the manufacturer's expiration date.

- The manufacturer's expiration date refers to the date after which an unopened multi-dose vial should not be used. The beyond-use-date refers to the date after which an opened multi-dose vial should not be used. The beyond-use-date should never exceed the manufacturer's original expiration date.

What is a single-dose or single-use vial?

- A single-dose or single-use vial is a vial of liquid medication intended for parenteral administration (injection or infusion) that is meant for use in a single patient for a single case/procedure/injection. Single-dose or single-use vials are labeled as such by the manufacturer and typically lack an antimicrobial preservative.

Can single-dose or single-use vials be used for more than one patient?

- No. Vials that are labeled as single-dose or single-use should be used for a single patient and single case/procedure/injection. There have been multiple outbreaks resulting from healthcare personnel using single-dose or single-use vials for multiple patients.
- Even if a single-dose or single-use vial appears to contain multiple doses or contains more medication than is needed for a single patient, that vial should not be used for more than one patient nor stored for future use on the same patient.
- To prevent unnecessary waste or the temptation to use contents from single-dose or single-use vials for more than one patient, healthcare personnel should select the smallest vial necessary for their needs when making purchasing decisions.

Is it acceptable to use the same syringe to give an injection to more than one patient if I change the needle between patients and I don't draw back before injecting?

- No. A small amount of blood can flow into the needle and syringe even when only positive pressure is applied outward. The syringe and needle are both contaminated and must be discarded.

Is it acceptable to use the same syringe and/or needle to administer multiple injections to the same patient (e.g., in the case of numbing a large area of skin or to provide incremental doses of intravenous medication)?

- The safest practice is for a syringe and needle to be used only once to administer a medication to a single patient, after which the syringe and needle should be discarded. This practice prevents inadvertent reuse of the syringe and protects healthcare personnel from harms such as needle stick injuries.

Is it acceptable to visually inspect syringes to determine whether they are contaminated or can be used again?

- No. Pathogens including HBV, HCV, and human immunodeficiency virus (HIV) can be present in sufficient quantities to produce infection in the absence of visible blood. Similarly, bacteria and other microbes can be present without clouding or other visible evidence of contamination. Just because blood or other material is not visible in a used syringe or IV

tubing does not mean the item is free from potentially infectious agents. All used injection supplies and materials are potentially contaminated and should be discarded.

When should single-dose or single-use vials be discarded?

- Medication vials should always be discarded whenever sterility is compromised or questionable. In addition, the following recommendations are made for handling of single-dose or single-use vials:
 - a) If a single-dose or single-use vial has been opened or accessed (e.g., needle-punctured) the vial should be discarded according to the time the manufacturer specifies for the opened vial or at the end of the case/procedure for which it is being used, whichever comes first. It should not be stored for future use.
 - b) If a single-dose or single-use vial has **not** been opened or accessed (e.g., needle-punctured), it should be discarded according to the manufacturer's expiration date.

Is it acceptable to leave a needle or other device inserted in the septum of a medication vial for multiple medication draws?

- No. A needle or other device should never be left inserted into a medication vial septum for multiple uses. This provides a direct route for microorganisms to enter the vial and contaminate the fluid.

How many times individual single-dose or single-use vials may be entered for a single patient?

- The safest practice is to enter a single-dose or single-use vial only once so as to prevent inadvertent contamination of the vial and infection transmission. Single-dose or single-use vials should be used for a single patient and a single case/procedure/injection. Therefore, they should require only a single entry into the vial.
- However, in certain situations, healthcare personnel may believe that drawing the entire contents of the vial into a single syringe will not allow for safe and accurate titration of dosage (e.g., pediatric dosing during a surgical procedure). In these circumstances, healthcare personnel must consider the risk of repeated entry into a single-dose or single-use vial for that single patient/procedure.
- If the single-dose or single-use vial will be entered more than once for a single patient as part of a single procedure, it should be with a new needle and new syringe, and the vial must be discarded at the end of the procedure and not stored for future use.

If I used a syringe only to inject medications into an IV tubing port that is several feet away from the patient's IV catheter site, is it acceptable to use the same syringe for another patient?

- No. Everything from the medication bag to the patient's catheter is a single interconnected unit. All of the components are directly or indirectly exposed to the patient's blood and cannot be used for another patient. A syringe that intersects through ports in the IV tubing or bags also becomes contaminated and cannot be used for another patient. Separation from the patient's IV by distance, gravity and/or positive infusion pressure does not ensure that small amounts of blood are not present in these items (CDC, 2020).

One or two-handed needle recap method?

- While the one-handed swoop method is the preferred method of needle recapping, risk of contamination can occur if the swoop is done incorrectly when the needle touches a contaminated surface. Often when this happens the healthcare worker is unaware of this and therefore special attention and caution will need to be practiced when performing this method. A mechanical device designed for holding the needle cap when recapping needles can be used to minimize the risk of exposure.



SIMULATIONS

Workflow for Simulations

- Test all virtual connections including those with learners as well as video access
- Have all videos open and available for rapid and sequential access to minimize down time during the simulation
- Have resources available in PowerPoint format with ability to share screen with virtual learners, or have paper copies if needed for in-person learners. You want all learners to indicate their responses for the scenario questions during Simulations 1 and 3 so determine how to best capture this information. Polling questions, self-reported scores in Zoom chat, verbal responses, or written submissions are examples of methods that can be used.
- Go through each simulation and perform Debrief following all videos, discussions, and scenario responses
- Use the PEARLS Debriefing Tool to help guide the discussion. The goals with the debriefing include:
 - Learner reactions to the simulations
 - Clarifications, if needed
 - How the simulations impact current practices, or not
 - Challenges to performance
 - Additional comments from learners
 - Takeaway points
 - Key learning points (review the objectives)

Simulation #1: Vial Contamination- Improper Preparation Technique

DESCRIPTION: Demonstrates drawing up medication from a multiple dose vial with breaks in aseptic technique and the use of improper technique. Participants will identify breaks in aseptic technique

AUDIENCE: Virtual and in-person

SUPPLIES NEEDED: Needle, syringe, 1 x medication vial, sterile alcohol prep pad, hand sanitizer, blue table pad, sharps container, powder glow germ, and black light.

Video #1 accessed via provided link below

Equipment to show video in-person or virtually

Live or virtual connection with learners

Mechanism for learners to take notes

PEARLS Healthcare Debriefing Tool for Simulation leader

SUGGESTED TIME FLOW FOR THE SIMULATION: 4 minutes

SIMULATION VIDEO #1



Link:

https://www.dropbox.com/s/of5zobp09my3tho/Sim09072022b_edited_09132022.mp4?dl=0

VIDEO #1 SHOWS THE FOLLOWING ERRORS:

(The errors are bolded below)

- Vaccine doses prepared in an **area that does not appear visibly soiled**
(Surface area is prepped with glow germ powder to demonstrate contamination).
- **Surfaces where vaccine will be prepared is not disinfected** prior to placing any items on that surface.
- **Hand hygiene not performed** prior to contact with vaccine vials or injection equipment and surrounding surface
- Syringe and needle packages are not opened and handled in a way that prevents contamination. **Touching of the “no touch” sterile areas and dropping of syringe on the contaminated surface**
- Vials are removed from vaccine refrigerator and gently swirled or inverted according to manufacturer instruction.
- Vial cap is removed then the **rubber septum is touched and not disinfected with a sterile alcohol swab** prior to puncture.
(Syringe and needle is prepped with a small amount of oil glow germ. The needle is then used to puncture the septum allowing the glow germ to enter the vial. This demonstrates the introduction of germs from the environment into the multiple dose vaccine vial.)
- **Two-handed needle recap method**
- Lights are turned off and black light illuminates contaminated vaccine content.

Simulation #2: Vial Contamination- Reusing a Syringe

DESCRIPTION: Highlights using the same syringe to give an injection to more than one patient but only changing the needle between patients and not the syringe.

AUDIENCE: Virtual and in-person

SUPPLIES NEEDED: Syringe, needle, glow germ, black light, and medication vial.

Video #2 accessed via provided link below

Equipment to show video in-person or virtually

Live or virtual connection with learners

Mechanism for learners to take notes

PEARLS Healthcare Debriefing Tool for Simulation leader

Resource 1

Additional items for in person simulations

SUGGESTED TIME FLOW FOR THE SIMULATION: 4 minutes

SIMULATION VIDEO #2



Link: https://www.dropbox.com/s/nockq7fmwwh1qvl/Sim09072022c_edited_09132022.mp4?dl=0

VIDEO #2 SHOWS THE FOLLOWING ERRORS:

Video demonstrate reuse of a syringe while only replacing the needle. This causes contamination of the medication vial, syringe, and the needle. Even though the needle is removed and replaced, pathogens (glow germ) remain present in the syringe due to the backflow of blood that occurs when medication is injected. The big take away is to always use a new sterile syringe and needle for each patient.

Simulation Video Demonstrates:

- Drawing up of medication using a needle and a syringe (needle is prepped with oil glow germ)
- Demonstrate injecting medication into skin/or joint of patient.

- The **skin is not disinfected using a sterile alcohol pad prior to the injection**. The skin is a reservoir where germs or pathogens live.
- When an injection is administered a backflow of blood occurs (blood is a reservoir where germs can live).
- When a backflow of blood occurs the syringe and the needle are both contaminated.
- The “dirty” or “contaminated” needle is removed “dirty” needle (discard in sharps container) and replace this with a new needle. Do not replace the syringe.
- Now use the new needle and old syringe combination to draw up more medication and administer this to patient #2.
- Turn off the lights to reveal illuminated (contamination) of the inside of the syringe.

DEBRIEF (DISCUSSION)

Set the scene by reviewing the simulation.

Use the PEARLS Healthcare Debriefing Tool to open the discussion. Tools are provided in the Appendices.

1. Ask for reactions and use learner responses gathered during the Simulation discussion to probe further.
2. Describe situations in the scenario that seem to be points of confusion or discussion.
3. Analyze the simulation by asking some discussion questions:
 - a. What went well and what would you change?
 - b. Advocacy and Inquiry
 - i. State your observation and opinion
 - ii. Ask how the learner saw it
 - c. Provide constructive feedback to close gaps in knowledge
 - d. Prompts to consider
 - i. “What errors did you identify?”
 - ii. “What is the impact?”
 - iii. “What practices may prevent this issue?”
 - iv. “How far up the chain will you take this?”
 - v. “How can Human Factors Engineering be applied to this issue?”
4. Application and Summary
 - a. Take-away points
 - i. What did the learner take away?
 - ii. What were the key learning points from the instructors view?

Simulation #1 Discussion (Debrief)

Initiate an open discussion with your group focused on:

What were the errors observed? What should happen when a break in technique is observed?

How can vaccination errors be prevented?

When should hand hygiene be performed?

Why is it important to use proper aseptic technique?

How can Human Factors Engineering be applied to this issue?

KEY TAKE HOME POINTS

- Vaccine doses must be prepared in a designated clean and well lit areas away from patient care areas.
- Surfaces where vaccine will be prepared must be disinfected prior to placing any items on that surface. Allow surface to dry.
- Hand hygiene performed using an alcohol based hand sanitizer must occur prior to contact with vaccine vials or injection equipment. Allow sanitizer to air dry.
- Syringe and needle packages are opened and handled in a way that prevents contamination or touching of the “no touch” sterile areas of those items (aseptic technique).
- Immediately connect needle to syringes when packages opened.
- Vials are removed from vaccine refrigerator and gently swirled or inverted according to manufacturer instruction.
- Vial cap is removed and the rubber septum is disinfected with a sterile alcohol swab prior to puncture. Allow surface to dry. Draw up medication and carefully recap using sweep method.
- Different vaccines must remain separated and labelled at all times.
- Dose is withdrawn into sterile syringe ensuring that air is expelled and vaccine occupying the needle and syringe to the appropriate dose volume. Needle should not be removed from the vial until air has been expelled and the accurate dose has been achieved. Vaccine is never to be ‘squirted into the air’ or otherwise expelled from the syringe outside the vial.
- Discard all used needles in sharps container. Sharps containers need to be discarded when $\frac{3}{4}$ full.

Simulation #2 Discussion (Debrief)

Initiate an open discussion with your group focused on:

What were the errors observed?

How can vaccination errors be prevented?

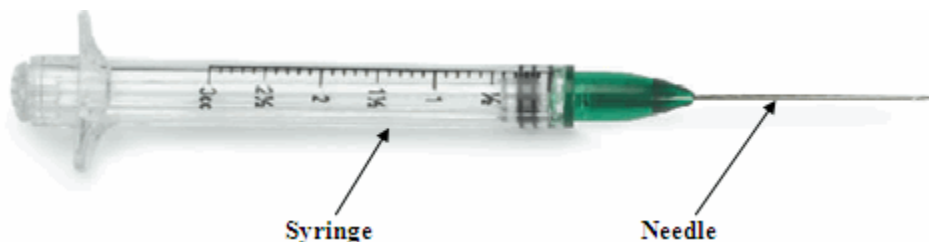
When should a new sterile needle and syringe be used?

Why is it important to discard used needles and syringes?

How can Human Factors Engineering be applied to this issue?

KEY TAKE HOME POINTS

Patients need to be aware of a very serious threat to their health – the reuse of needles or syringes, and the misuse of medication vials. Healthcare providers (doctors, nurses, and anyone providing injections) should **never reuse a needle or syringe** either from one patient to another or to withdraw medicine from a vial. Both needle and syringe must be discarded once they have been used. It is not safe to change the needle and reuse the syringe – this practice can transmit disease.



A single-use vial is a bottle of liquid medication that is given to a patient through a needle and syringe. Single-use vials contain only one dose of medication and should only be used once for one patient, using a clean needle and clean syringe.

- Never administer medications from the same syringe to more than one patient, even if the needle is changed.
- Consider a syringe or needle contaminated after it has been used to enter or connect to a patient's intravenous infusion bag or administration set.
- Do not enter a vial with a used syringe or needle.
- Never use medications packaged as single-use vials for more than one patient.
- Assign medications packaged as multi-use vials to a single patient whenever possible.
- Do not use bags or bottles of intravenous solution as a common source of supply for more than one patient.
- Follow proper infection-control practices during the preparation and administration of injected medications.

Adapted from: CDC. Guideline for isolation precautions: preventing transmission of infectious agents in healthcare settings 2007. Atlanta, GA: US Department of Health and Human Services, CDC; 2007. Available at http://www.cdc.gov/ncidod/dhqp/gl_isolation.html.

Source: CDC. Acute hepatitis C virus infections attributed to unsafe injection practices at an endoscopy clinic—Nevada, 2007. MMWR 2008;57:513–7. Available at <http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5719a2.htm>.

APPENDICES

Test Your Knowledge: Truth or Myth? Match the phrase to the correct column

TRUTH		MYTH
	1. Changing the needle makes a syringe safe for reuse.	
	2. Single-dose or single-use vials should not be used for more than one patient regardless of how much medicine is remaining	
	3. Once they are used, both the needle and syringe are contaminated and must be discarded. A new sterile needle and a new sterile syringe should be used for each injection and each entry into a medication vial.	
	4. Syringes and needles should never be reused. The IV tubing, syringe, and other components represent a single, interconnected unit. Distance from the patient, gravity, or infusion pressure do not ensure that small amounts of blood won't contaminate the syringe once it has been connected to the unit.	
	5. Syringes can be reused as long as an injection is administered through IV tubing.	
	6. If you don't see blood in the IV tubing or syringe, it means that those supplies are safe for reuse.	
	7. It's okay to use leftover medicine from use single-dose or single-use vials for more than one patient.	
	8. Germs such as hepatitis C virus and staph or MRSA are invisible to the naked eye, but can easily infect patients even when present in microscopic quantities. Do not reuse syringes, needles, or IV tubing	

Answer Key

TRUTH		MYTH
	1. Changing the needle makes a syringe safe for reuse. <i>Syringes and needles should never be reused. The IV tubing, syringe, and other components represent a single, interconnected unit. Distance from the patient, gravity, or infusion pressure do not ensure that small amounts of blood won't contaminate the syringe once it has been connected to the unit.</i>	x
x	2. Single-dose or single-use vials should not be used for more than one patient regardless of how much medicine is remaining	
x	3. Once they are used, both the needle and syringe are contaminated and must be discarded. A new sterile needle and a new sterile syringe should be used for each injection and each entry into a medication vial.	
x	4. Syringes and needles should never be reused. The IV tubing, syringe, and other components represent a single, interconnected unit. Distance from the patient, gravity, or infusion pressure do not ensure that small amounts of blood won't contaminate the syringe once it has been connected to the unit.	
	5. Syringes can be reused as long as an injection is administered through IV tubing. <i>Once they are used, both the needle and syringe are contaminated and must be discarded. A new sterile needle and a new sterile syringe should be used for each injection and each entry into a medication vial.</i>	x
	6. If you don't see blood in the IV tubing or syringe, it means that those supplies are safe for reuse. <i>Germs such as hepatitis C virus and staph or MRSA are invisible to the naked eye, but can easily infect patients even when present in microscopic quantities. Do not reuse syringes, needles, or IV tubing</i>	x
	7. It's okay to use leftover medicine from use single-dose or single-use vials for more than one patient. <i>No, never pool or combine leftover medication from different vials.</i>	x
x	8. Germs such as hepatitis C virus and staph or MRSA are invisible to the naked eye, but can easily infect patients even when present in microscopic quantities. Do not reuse syringes, needles, or IV tubing	

Project Firstline Interactive Activities



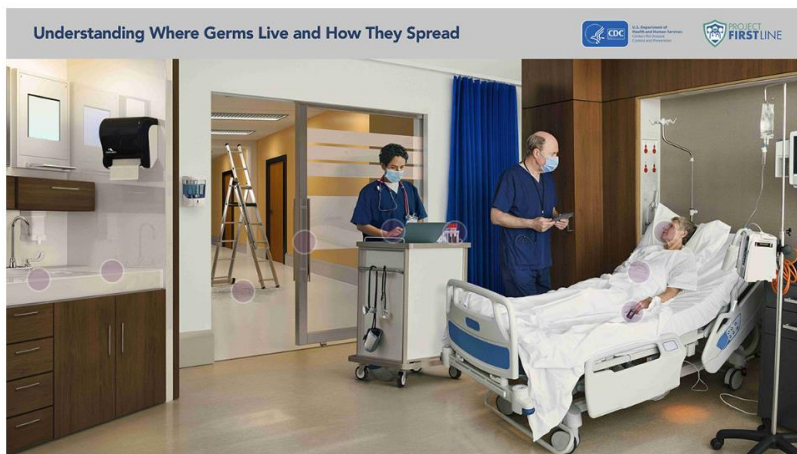
How Do Viruses Spread from Surfaces to People?

Viruses make us sick by spreading from person to person, but how does this happen? Scroll through this experience to find out how viruses travel through respiratory droplets and surface contact, and how infection control actions can stop the spread.

Link to activity: [How Do Viruses Spread From Surfaces To People? \(nnphi.org\)](https://nnphi.org/How-Do-Viruses-Spread-From-Surfaces-To-People/)

Where Germs Live in Healthcare Interactive Infographic

[Print](#)



Link to activity: [Where Germs Live in Healthcare Interactive Infographic | Project Firstline | Infection Control | CDC](#)

Safe Injection Practices Simulation Packet

Fidgeting Felix gets an IV

[Print](#)

What's the first thing you should do?

Select the correct option.

 Disinfect Felix's Skin	 Put on Gloves	 Dispose of Used Supplies	 Insert IV
 Put on Mask	 Use Hand Sanitizer	 Put on Gown	 Wash Hands with Soap and Water

Link to Interactive Activity: [Fidgeting Felix gets an IV](#) | [Project Firstline](#) | [Infection Control](#) | [CDC](#)

ADDITIONAL RESOURCES

Safe Injection Practices: PEARLS for Debriefing

The PEARLS Healthcare Debriefing Tool			
	Objective	Task	Sample Phrases
1 Setting the Scene	Create a safe context for learning	State the goal of debriefing; articulate the basic assumption*	"Let's spend X minutes debriefing. Our goal is to improve how we work together and care for our patients." "Everyone here is intelligent and wants to improve."
2 Reactions	Explore feelings	Solicit initial reactions & emotions	"Any initial reactions?" "How are you feeling?"
3 Description	Clarify facts	Develop shared understanding of case	"Can you please share a short summary of the case?" "What was the working diagnosis? Does everyone agree?"
4 Analysis	Explore variety of performance domains	See backside of card for more details	Preview Statement (Use to introduce new topic) "At this point, I'd like to spend some time talking about [insert topic here] because [insert rationale here]" Mini Summary (Use to summarize discussion of one topic) "That was great discussion. Are there any additional comments related to [insert performance gap here]?"
Any Outstanding Issues/Concerns?			
5 Application/Summary	Identify take-aways	Learner centered Instructor centered	"What are some take-aways from this discussion for our clinical practice?" "The key learning points for the case were [insert learning points here]"

*Basic assumption. Copyright © Center for Medical Simulation. Used with permission.

The Analysis Phase

Performance Domains

The analysis phase can be used to explore a variety of performance domains:

 Decision Making
  Technical Skills
  Communication
  Resource Utilization
  Leadership
  Situational Awareness
  Teamwork

Three Approaches

- Learner Self-Assessment**
Promote reflection by asking learners to assess their own performance
- Focused Facilitation**
Probe deeper on key aspects of performance
- Provide Information**
Teach to close clear knowledge gaps as they emerge and provide directive feedback as needed

Sample Phrases

- What aspects were managed well and why?
- What aspects do you want to change and why?
- Advocacy:** I saw [observation], I think [your point-of-view].
- Inquiry:** How do you see it? What were your thoughts at the time?
- I noticed [behavior]. Next time you may want to consider [suggested behavior], because [rationale].

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EVALUATION

The evaluation method will involve determination of reaction (how learners felt about the experience), learning (did the learner gain knowledge from the experience), behavior (was the learner able to apply the knowledge), and results (impact of the training on learner's practice. To gather evaluation information, the standard evaluation tool will be used for all Skill Stations learners within this series. An additional evaluation tool is available for sessions provided for facilitators.

Skills Stations Evaluation (Learner):

Simulation Topic: Safe Injection Practices

Date: __ \ __ \ ____

Circle your response to the following questions:

I was oriented to the purpose of this simulation experience.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
----------------	-------	-----------	----------	-------------------

The simulation experience was conducted in a skillful manner.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
----------------	-------	-----------	----------	-------------------

The simulation experience provided me with new knowledge.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
----------------	-------	-----------	----------	-------------------

The simulation experience provided me with an opportunity to apply my knowledge.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
----------------	-------	-----------	----------	-------------------

My current practice differed from that demonstrated during the simulation experience.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
----------------	-------	-----------	----------	-------------------

I intend to apply what I learned during the simulation experience.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
----------------	-------	-----------	----------	-------------------

My practice will change based upon what I learned during the simulation experience.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
----------------	-------	-----------	----------	-------------------

I found the simulation experience to be beneficial to my practice.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
----------------	-------	-----------	----------	-------------------

Comments:

Skills Stations Evaluation (Facilitator):

Simulation Topic: Safe Injection Practices

Date: __ \ __ \ ____

Circle your response to the following questions:

I was oriented to the purpose of this simulation experience.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
----------------	-------	-----------	----------	-------------------

I was provided with adequate information so I can conduct the simulation experience in a skillful manner.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
----------------	-------	-----------	----------	-------------------

The simulation experience provided me with new knowledge.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
----------------	-------	-----------	----------	-------------------

The simulation experience provided me with an opportunity to apply my knowledge.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
----------------	-------	-----------	----------	-------------------

My current practice differs from that demonstrated during the simulation experience.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
----------------	-------	-----------	----------	-------------------

I intend to apply what I learned during the simulation experience.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
----------------	-------	-----------	----------	-------------------

My teaching approach will change based upon what I learned during the simulation experience.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
----------------	-------	-----------	----------	-------------------

I found the simulation experience to be beneficial to my role.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
----------------	-------	-----------	----------	-------------------

Comments:

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