An Overview on Safe Injection Practices

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Abstract

Safe injection practices are critical components of infection prevention and patient safety in healthcare settings. These practices aim to minimize the risk of transmission of infectious diseases such as hepatitis B, hepatitis C, and HIV, as well as prevent injection-related complications. The core principles of safe injection practices include the use of sterile equipment, proper hand hygiene, correct disposal of sharps, and avoidance of medication contamination through reuse or improper handling. Implementing and monitoring safe injection protocols significantly reduces healthcare-associated infections and enhances the overall quality of care.

Keywords

Safe, injection practices, infection

Introduction

The World Health Organization (WHO) defines ‘a safe injection’ as one that does not harm the recipient, does not expose the provider to any avoidable risk, and does not result in any waste that is dangerous to the community (1).Injection safety practices include clean workspace, hand hygiene, use of gloves where suitable. It must be followed best infection control practices such as the use of sterile injection equipment and the preventing contamination of injection equipment and medication, using aseptic method when preparing and administering injections, using medications labeled as single-dose for only one patient, avoid the using the used needles and syringes for more than one patient and avoid entering a medication ampule with a used needle or syringe, even when obtaining extra doses for an individual patient , skin preparation and disinfection and proper waste management (2, 3).Because injections are used to administer medications, no discussion of safe injection practices would be complete without addressing the foundational processes associated with safe medication administration. Nurses who inject medications should understand the intended purpose, potential adverse effects, recommended dose, effects, and contraindications for each medication. At a minimum, before administering any medication, the nurse should verify the correct patient, medication, dose, and route or method of administration. The nurse should also verify that the patient has no allergies or sensitivities to the medication (4).Ensuring the safe appropriate administration of an injection by a well-trained safe professional healthcare provider by a sterile device (needle, syringe, etc.) and its proper disposal in a puncture-proof sharps disposal container at well-equipped and protected environment is the rational preventative measures to be achieved by any medical facility (5).The "nine rights" of injection safety ensures that the right patient is given the right drug in the right dosage and right formulation using the right injection equipment at the right time and right route with right storage and the right method of disposal (6).

Safety of recipient:

The risk of harming recipient can be avoided by administering useful medication with a sterile single use

device, and practicing proper technique by qualified and well trained health workers to ensure that safety there should be sufficient supply of single use devices throughout the year **(7).**

Safety of the provider:

Needle stick injury (NSI) is commonly encountered by the provider especially during recapping and it can be reduced by disposing used syringe in a puncture proof closed container immediately after use without recapping. About thirty infectious diseases may be transmitted by NSI, but the risk of hepatitis B infection is much higher than other infections. That is why full immunization against hepatitis B is important to ensure safety of the provider. These interventions (proper disposing technique without recapping and vaccination) can provide protection to the healthcare worker from occupational infection with blood born viral disease **(7).**

Safety of the community:

Used syringes and injection devices should be disposed safely according to local and international disposal infection control policy through incineration or grinding, unfortunately half of injection wastes through developing countries are improbably disposed and threat the communities **(7).**

Safe injection practices:

1-Clean work environment:

The first step of safe injection is clean work environment; it is important to prepare injection in a clean designated area. The preparation of injections in contaminated environments might also lead to infection such as HBV, HCV, and HIV. Because HBV persists for up to seven days on surfaces, which can potentially lead to environmental contamination. HCV persists three weeks on environmental surface at room temperature. While HIV lives three days in dried blood at room temperature.

Accordingly, clean then disinfect the selected area to prepare the medication prior gathering the necessary injection equipment (such as alcohol-based hand rub, needles and syringes in their sterile packaging, and alcohol wipes) **(8)**

2- Hand hygiene:

Secondly, Hand hygiene is a part of safe injection practices. Hand hygiene has been identified as the most important method of preventing and reducing the transmission of pathogens from one patient to another and from an infected site on a patient to a clean site on the same patient **(9, 10).** Unfortunately, compliance with hand hygiene by healthcare workers is often sub-optimal **(11).**

There are many reasons for suboptimal hand hygiene compliance among healthcare workers, including:

- Environment - location and/or availability of hand washing sinks
- Organizational - availability of high profile clinical role models
- Psychological - a perceived lack of time for hand hygiene
- Education - for example, misconceptions about when hand hygiene should be performed
- Physical factors - for example skin irritation and dryness

Research has shown that behavioral change requires a multi-level, multidisciplinary, multi-modal program. Hand hygiene compliance programs should consider:

- Education programs
- Feedback and positive reinforcement
- Administrative mandate (and sometimes organisational culture and system change)
- Leadership and motivation (**12**)

The Occupational Safety and Health Administration (OSHA) Blood borne Pathogens standard states that employers are required to provide hand washing equipment and facilities and employees are required to know when and how to wash their hands (13).Hand hygiene can be done with an alcohol-based hand sanitizer or soap and water (14).

Alcohol-based hand sanitizers are preferred because they are:

- More effective at killing microorganisms on the hands than soap.
- Simpler to use.
- Less likely than soap and water to dry or irritate the skin**. (8)**

An alcohol-based hand sanitizer should be used in these situations:

- Immediately before and immediately after touching a patient
- Immediately before performing an aseptic procedure or before handling an invasive device or a piece of invasive equipment

- Immediately after taking off gloves
- After touching anything in the patient's immediate environment
- After contacting blood, body fluids, or a contaminated surface
- Before touching a clean part of the patient after you have been working or touching a contaminated or soiled part **(15,16)**

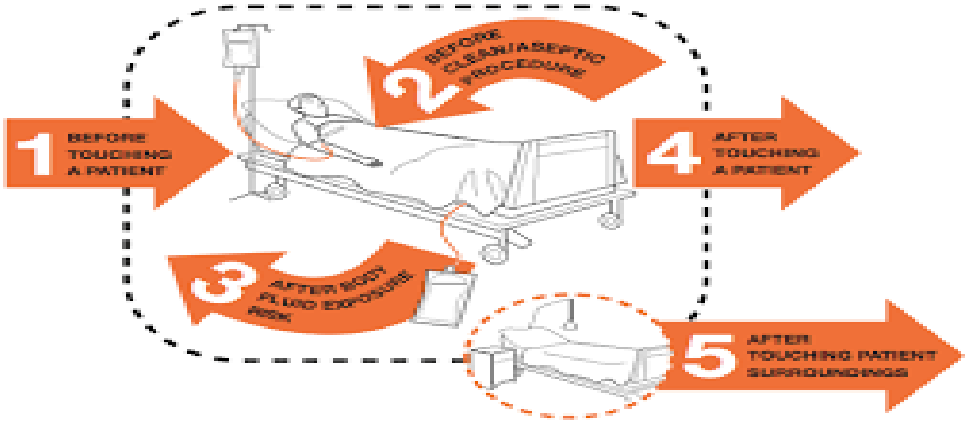

Figure (I): Five moments for hand hygiene.

To use an alcohol-based hand sanitizer, put the recommended amount on the hands. Rub the hands together, covering every part of hands and fingers until they are dry; this usually requires about 20 seconds **(15).**

Soap and water should be used in these situations:

- When the hands are visibly soiled
- When providing direct care for someone who has or could have infectious diarrhea
- If having contact with spores, e.g., **B. Anthracis, C. Difficile (15**)

To wash hands with soap and water, wet the hands. Apply the recommended amount of soap and then rub the hands together, covering every part of the hands and fingers; do this for 15 to 20 seconds. Rinse the hands and fingers, use a paper towel to dry them, use the towel to turn the faucet handle to the off position, and discard the towel. The recommended time of 15 to 20 seconds is a guideline. The CDC recommends that the length of time is less important than making sure you clean all areas of your hands **(8**).

Figure (II): 'How to Hand Wash Poster**.**

Figure (III): How to Hand Rub Poster.

Alcohol-based hand rubs (ABHR) have activity against broad-spectrum pathogens. Alcohol-based formulations for hand antisepsis are rapidly germicidal, effectively reduce bacterial counts on hands, and can aid in preventing the transfer of healthcare-associated pathogens. ABHR designed for reducing the number of viable microorganisms on the hands usually contain 60 % to 95% ethanol or isopropanol. In most studies, alcohol-based products are equally or more effective than antimicrobial soaps and antimicrobial detergents (povidone- iodine, 4 % chlorhexidine, or triclosan) in reducing the number of pathogens recovered from healthcare workers' hands **(17**).

Patel and Smith (18) clarified that alcohol is effective against some, but is not for all, infectious agents. like isopropyl alcohol at concentrations of 60-70% or greater, has germicidal activity against both gram negative and gram-positive bacteria, such as Escherichia coli (E. coli) or Methicillin-resistant Staphylococcus aureus (MRSA), respectively. Alcohol is also effective against many viruses includıng HIV, influenza, respıratory syncytial virus (RSV), and herpes simplex viruses (HSV), HBV and HCV. Alcohol is not effective against bacterial spores (such as those causing clostridium difficile), The bactericidal function is accomplished during the evaporation of the liquid alcohol and is not complete until dry.

Gloving necessity varies according to type of injection. HCWs must wear gloves during vascular access injections because of the possibility of blood exposure at the puncture site is prevailed. Moreover, it is necessary to wear gloves if skin integrity is compromised by local infection or other skin conditions as eczema, burns, cuts and scabs. But for routine intradermal (ID). subcutaneous (SC). Or intramuscular (IM) injections, gloves are not required if injection providers skin and the patients` skin are intact **(19**).Hand washing and the proper use of gloves are effective infection control techniques. However, healthcare workers often do not follow hand washing recommendations **(20),** and gloves can tear and be penetrated **(21**). The CDC's stance on the use of gloves and hand washing is: The use of gloves does not eliminate the need for hand hygiene. Likewise, the use of hand hygiene does not eliminate the need for gloves **(14**). Gloves should be changed when they are damaged, when you move from a contaminated body site to a clean body site, and when the gloves are bloody, dirty, or contaminated by body fluids **(8).**

3 & 4-Sterile injection equipment and Sterile vial medication:

In addition to sterile injection equipment and sterile vial of medication which considered the third and fourth steps of safe injection, WHO recommends using a new syringe and a needle from a new and sealed package for each injection and each reconstitution. Re-using prevention (RUP) syringes with a sharps injury protection feature are highly recommended wherever possible. Using single dose is preferred rather than multidose vials as many outbreaks have been associated with use of multidose medication vials (**22).**

5- Skin preparation prior to injection:

The fifth step of safe injection is skin preparation prior to injection. Skin disinfection with alcohol prior to injection markedly reduced skin bacterial counts. The need for skin cleaning and disinfection differs by the type of injections, must wiping the injection site before venous access with 60-70% alcohol-based solution on a single- use swab or cotton wool ball then allowing the disinfectant to dry. WHO recommends that when the injection site is visibly clean, it is unnecessary to disinfect the skin before administering immunizations, giving ID, SC and IM injections (**23**).

6- Proper collection of sharps:

The sixth step of safe injection is proper collection of sharps. Sharps waste must be discarded at the point of use by using sharp waste containers (SWCs). Such containers must conform to safety performance characteristics, which are divided into four areas, namely: functional, accessible, visible, and accommodation. The SWCs should be closable, leak proof and puncture resistant until disposal. The disposal opening should prevent spills of the contents while in use. During closure and during transportation of the waste within the health facility before treatment (**24**).Overfilling a sharps disposal container increases the risk of accidental needle-stick injury. When your sharps disposal container is about three-quarters (3/4) full, follow the community guidelines for getting rid of the container (**25**).

Figure (IV): The community guidelines for getting rid of the container (**25**).

7- Appropriate waste management:

Finally, the seventh step of safe injection is appropriate waste management. Awareness of the need for safe healthcare waste management is growing. Sharps waste is a part of infectious medical waste that contain items that could cause puncture wound, cuts which include needles, broken glass ampoules, scalpel, blades and infusion sets, etc. Whether sharps are infected or not, are considered highly dangerous and potentially infectious waste, due to their puncture or cutting property. Unsafe sharps waste management causes between 5% and 28% of needle stick injuries, transmission of infections or diseases and environmental pollution or degradation (**26**).

The essential elements of Safe Injection Practices:

- Whenever using IV catheters, IV delivery systems, or needles, use the aseptic technique.
- Do not administer medications from a syringe to multiple patients, even if the needle or cannula on the syringe is changed.
- IV catheters, IV infusion sets, IV bags, IV medications, IV solutions, needles, syringes, and cannulas are sterile, single-use items, and they should never be re-used for another patient.
- It should be considered contaminated after a cannula, a needle, or a syringe has been used to enter or connect to an IV tubing, IV administration set, or an IV bag.
- Single-dose medication vials should be used whenever possible.
- Do not use a single-dose ampule or vial to give medications to multiple patients, and do not combine the leftover contents of single-dose ampules or vials.
- Use a sterile cannula, needle, or syringe to enter a multiple-dose vial.

- Do not leave a multi-dose vial in the immediate area where patient care is delivered, store multi-dose vials as per the manufacturer's instructions.
- Do not use bags or bottles of intravenous solution as a common source of supply for multiple patients.
- Infection control practices for special lumbar puncture procedures include, wear a surgical mask when placing a catheter or injecting material into the spinal canal or subdural space, i.e., during myelograms, lumbar puncture, and spinal or epidural anesthesia **(27)**.

Guidelines for Patient Safety and Comfort During Injections:

- It is essential to use correct needle sizes and angles of insertion and select appropriate anatomical locations based on patient age, size, and type of injection to avoid complications.

For example, for intramuscular injections the ventrogluteal site is preferred in adults because it has the greatest muscle thickness, is free of nerves and blood vessels, and has a small layer of fat, resulting in less painful administration and optimal absorption of the medication.

- Using the correct needle length according to the type of injection to ensure delivery of medication into the correct layer of tissue and to reduce complications such as abscesses, pain, and bruising. Needle selection should be based on the patient's size, gender, and injection site.
- Being aware that women tend to have more adipose tissue around the buttocks and deltoid fat pad, which means a longer needle is required. Larger diameter (smaller gauge) needles have been found to reduce pain, swelling, and redness after an injection because less pressure is required to depress the plunger.
- Removing medication residue on the tip of the needle has been shown to reduce pain and discomfort of the injection. To remove residue from the needle, change needles after medication is removed from a vial and before it is administered to the patient.
- Additionally, placing the bevel side of the needle up on the patient's skin for quick and smooth injection of the needle into the tissue.
- Proper positioning of the patient will facilitate proper landmarking of the site and may reduce perception of pain from the injection. Position the patient's limbs in a relaxed, comfortable position to reduce muscle tension.

For example, when giving an intramuscular injection in the deltoid, have the patient relax their arm by placing their hand in their lap.

- The nurse can also encourage relaxation techniques to help decrease the patient's anxiety-heightened pain. For example, divert the patient's attention away from the injection procedure by chatting about other topics**. (28)**

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