nurses, prescribers, risk management, and information technologists), government, or device manufacturers. Every HCP has an obligation to both practice injection safety and report unsafe practices. Creating a culture of safety is a vital component to effectively implementing safe injection practices and mitigating the risk of preventable harm. Empowering HCPs with the knowledge, power, and tools necessary to succeed will drive compliance and performance excellence with injection safety expectations.

There are many engineered devices to prevent needlestick injuries and reduce the reuse of both needles and syringes. In a systematic review, Harb et al[153] describe moderate evidence that sharp injury prevention syringes reduce the incidence of needlestick injuries for injections. Ottino et al[154] describe a reduction in needlestick injuries when using a safety device in 42 acute care hospitals. There is limited evidence that these safety devices reduce infections for either patients or HCPs; however, fewer needlestick injuries will reduce risk and lead to less transmission of infections.

APIC RECOMMENDATIONS

Based on the review of updated evidence and guidance, APIC provides a robust set of recommendations, as outlined below, to support safe injection practices, infusion, medication vials, and point-of-care testing practices in the health care setting.

UTILIZING ASEPTIC TECHNIQUE FOR MEDICATION PREPARATION OUTSIDE OF AN ISO 5 ENVIRONMENT OR PHARMACY

- DO—Store and prepare medications and supplies in a clean area, on a clean surface, away from sinks or other water sources.
- DO—Ensure disinfectants are available and disinfect nonsterile surfaces (ie, tables, contrast injector equipment) prior to medication preparation.
- DO—Perform hand hygiene before and after accessing supplies, handling vials and IV solutions, and preparing medications.
- DO—Use aseptic technique in all steps of medication preparation and administration (ie, medication vial use, including vaccine preparation, reconstituting powder medication vials in a medication area due to instability if premixed, parenteral medication administration, injections, and IV contrast preparation).
- DO—Disinfect IV hubs/ports and vial diaphragms (septum) with sterile 70% alcohol using friction for 15 seconds, and allow to dry prior to each entry, which includes after removing the cap of the vial, as the cap is considered only a dust cover.[155-161]
  - o A risk assessment should be completed if an alternative FDA-approved sterile disinfectant is intended to be used when accessing IV hubs/ports or vial diaphragm (septum).
- DO—Discard all opened vials, IV solutions, syringes, and unused prepared medications involved in an emergency.
- DO—Avoid contacting sterile drugs and sterile areas of devices and containers with nonsterile objects, secretions, or particles shed from personnel.
- DO—Wear a surgical mask or avoiding talking when preparing injectable medications for administration to joints or sterile spaces.[162,163]

Aseptic technique refers to properly handling, preparing, and storing medications and injection equipment or supplies to prevent microbial contamination.[164-166] This method is part of the standardized education and practice known as the aseptic nontouch technique. It is a key principle to infection prevention and control. Manufactured sterile medication products must meet stringent controls to prevent contamination. Additionally, pharmacies are required to follow similar controls to prevent medication contamination (ie, meeting ISO class 5 environment). However, in health care settings, certain cases require medications to be drawn-up, prepared, or modified outside of a pharmacy or ISO class 5 environment to meet specific patient needs. Examples include medication rooms, operating rooms, or patient bedsides. It is imperative that the HCP who prepares, administers, and stores the medication is knowledgeable and educated on the aseptic technique.

USP 797 describes environmental and personnel controls necessary for compounding medications to ensure medications remain free from contamination before administration.[146] However, USP 797 excludes the preparation of immediate-use medications and medication administration in general. Immediate-use medications are intended for immediate and emergency administration (ie, resuscitation or an emergency room procedure). Per USP 797, immediate-use medication involves no more than 3 sterile products; individuals preparing the medication need aseptic technique training and written standardized operating procedures (SOP), administration must begin within 4 hours, and they must be labeled unless mixed and administered by the same HCP or the same HCP witnesses the administration.[146] An example of 3 different sterile products could include 2 vials of the same drug (sterile product #1) reconstituted in 2 vials of sterile water for injection (sterile product #2) and then added to a single IV diluent bag of D5W (sterile product #3). Immediate-use medications are to be administered within 4 hours. They are not to be prepared and stored for an anticipated procedure or event greater than 4 hours later. USP 797 does not provide guidance on medication administration, such as how long a spiked IV bag/administration set can hang ready to use prior to administration to a patient. UPS 797 does not address compounded radiopharmaceuticals. Refer to General Chapter < 825 > for guidance on radiopharmaceuticals.

IV SOLUTIONS AND INFUSION TUBING/ADMINISTRATION SETS

- DO—Immediate use of IV solutions (for emergencies) needs to be administered (connected to the patient) within 4 hours.
- DO—Use USP 797 primary engineering controls with an ISO class 5 environment to prepare admixtures of IV solutions when immediate use is not required.
  - o An admixture is defined as the addition of one or more concentrated drug injections from ampules and vials to larger volume bags and bottles of IV solutions (eg, adding dopamine to an IV fluid bag of 5% dextrose).
- DO—Keep manufactured IV solution bags in their original packaging until use to prevent contamination or unknown admixtures.
- DO—Prepare IV solutions as close to administration as feasible to prevent contamination.
  - o The timeframe that can be allowed between preparation and initiation of the administration of a non-nutrient IV solution that has been spiked or has had admixtures added outside of an ISO class 5 environment remains unresolved. Up to 4 hours is considered safe with the use of other environmental controls to reduce the risk of contamination (ie, stored in a locked room, alcohol-impregnated caps on unused ports).[146,147] A risk assessment should be completed if a health care organization allows a non-nutrient IV solution that has been spiked or has had admixtures added outside of an ISO class 5 environment to hang and not be immediately administered (hooked up to a patient) for any amount of time.
- DO—Discard unused IV solutions immediately after patient use to avoid use on another patient or drug diversion.
- DON'T use IV solution containers (ie, bags, bottles, and vials) to obtain flushes or for any other purpose for more than 1 patient.
  - o Do not use spiking devices to remove fluid from IV bottles/bags for multiple uses or patients, even if they have a 1-way valve.