SAFE HANDLING Q&A

CLOSED-SYSTEM TRANSFER DEVICES

BY SETH EISENBERG, RN, OCN®, BMTCN®

WHAT NEEDS TO BE CONSIDERED WHEN SELECTING AND USING A CLOSED-SYSTEM TRANSFER DEVICE?

A closed-system transfer device (CSTD) is defined by the National Institute for Safety and Health (NIOSH, 2004) as "a drug transfer device that mechanically prohibits the transfer of environmental contaminants into the system and the escape of hazardous drug or vapor concentrations outside the system" (p. 44). Choosing a supplemental engineering control, of which CSTDs are the primary products, should be a joint decision between pharmacy and nursing (Eisenberg, 2018). Compounding is a very different process from administration, and what may work well in one department may not work as well in the other. In addition, some devices may not be compatible with existing pumps and tubing, so it is important to understand the variables during the CSTD selection process (Massoomi & Eisenberg, 2015). Organizations should consider using CSTDs for non-antineoplastics when applicable.

NIOSH has been working on a standardized CSTD testing protocol that is not yet available. Two test protocols have been proposed so far: the first is a vapor containment protocol published in 2015, and the second is a performance test protocol published in 2016 (Connor et al., 2017; NIOSH, 2016). Most of the CSTD manufacturers have tested their devices against both protocols. Once the protocol has been finalized, it will be up to each manufacturer to test their devices. NIOSH will not be performing independent testing. Some devices have peer-reviewed literature, but it is difficult to compare the devices or the publications because of lack of standardization. Clinicians should always ask for documentation that the device works as advertised, and a pilot or trial should be done with one or two products before making a final decision (Eisenberg, 2017).

SHOULD THEY BE USED FOR COMPOUNDING?

Although USP<800> does not require CSTDs for compounding, studies continue to show lower levels of contamination when they are used (Bartel et al., 2018; Hon et al., 2013; Salch et al., 2019). Contamination in the pharmacy can spread hazardous drugs (HDs) throughout the patient care areas from residue on the outside of IV bags and/or tubing (Eisenberg, 2016). CSTDs also offer the ability for pharmacy to compound IV bags safely without having the added burden of IV tubing inside of the already crowded biologic safety cabinet. Both direct spikes and dry spikes facilitate compounding with a CSTD. Direct spikes allow the nurse to safely attach IV tubing containing the mating CSTD at the bedside. A dry spike is constructed with thick, reinforced materials, allowing the nurse to use a standard IV spike without the risk of inadvertently puncturing the IV bag. The use of direct and dry spikes not only improves safety, but also can simplify workflow for pharmacists, technicians, and nurses (Eisenberg, 2018).

ARE THEY ALWAYS NEEDED FOR ADMINISTRATION?

CSTDs are the only engineering control available during administration. Because the primary goal in HD safety is to prevent environmental contamination and exposure, USP<800> requires CSTDs for antineoplastic HDs where dosage form allows. This means that if a CSTD can be used for the particular route/dosage, then it must be used. For example, there are currently no CSTDs designed to accommodate crushed oral HDs, so a CSTD is not required with this dosage form. Conversely, intravesicular administration can be safely achieved with adapters for CSTDs.

For subcutaneous administration, the CSTD offers protection when the drug is being compounded and prevents inadvertent syringe plunger movement during transportation. The syringe remains completely closed up until the needle is attached. Although some devices change the weight and balance of the syringe, all of them can safely be used for injections with education and practice.

It is vitally important that all staff using CSTDs be properly trained. Manufacturers will provide on-site training when a device is first brought in, but facilities must have a training plan for orientation of new staff to ensure the device is being used properly. Failure to do so can result in HD exposure.

REFERENCES

Bartel, S.B., Tyler, T.G., & Power, L.A. (2018). Multicenter evaluation of a new closed system drug-transfer device in reducing surface contamination by antineoplastic hazardous drugs. *American Journal of Health-System Pharmacy, 75*(4), 199–211. https://doi.org/10.2146/ajhp160948

Connor, T.H., Celano, P., Frame, J. N., & Zon, R.T. (2017). Summary of the Workshop on the Safe Handling of Hazardous Drugs Cohosted by the National Institute for Occupational Safety and Health and the

American Society of Clinical Oncology. *Journal of Oncology Practice, 13*(3), 199–205. https://doi.org/10.1200/JOP.2016.017384

Eisenberg, S. (2016). A call to action for hazardous drug safety: Where we have been and where we are now. *Clinical Journal of Oncology Nursing, 20*(4), 20–24. doi:10.1188/16.CJON.20-04AP

Eisenberg, S. (2017). Hazardous drugs and USP<800>: Implications for nurses. *Clinical Journal of Oncology Nursing, 21*(2), 179–187. https://doi.org/10.1188/17.CJON.179-187

Eisenberg, S. (2018). USP<800> and strategies to promote hazardous drug safety. *Journal of Infusion Nursing, 41*(1), 12–23. https://doi.org/10.1097/NAN.0000000000000257

Hon, C.Y., Teschke, K., Chu, W., Demers, P., & Venners, S. (2013). Antineoplastic drug contamination of surfaces throughout the hospital medication system in Canadian hospitals. *Journal of Occupational and Environmental Hygiene, 10*(7), 374–383. https://doi.org/10.1080/15459624.2013.789743

Massoomi, F., & Eisenberg, S. (2015). Pharmacy and nursing collaborate on CSTD training. *Pharmacy Purchasing and Practice, May*, 12–15.

National Institute for Occupational Safety and Health. (2004). *NIOSH alert: Preventing occupational exposures to antineoplastic and other hazardous drugs in health care settings*. https://www.cdc.gov /niosh/docs/2004-165

National Institute for Occupational Safety and Health. (2016). A performance test protocol for closed system transfer devices used during pharmacy compounding and administration of hazardous drugs. https://www.cdc.gov/niosh/docket/archive/docket288a.html

Salch, S.A., Zamboni, W.C., Zamboni, B.A., & Eckel, S.F. (2019). Patterns and characteristics associated with surface contamination of hazardous drugs in hospital pharmacies. *American Journal of Health-System Pharmacy, 76*(9), 591-598. https://doi.org/10.1093/ajhp/zxz033