COURSE #91380 — 2.5 CONTACT HOURS/CREDITS Release Date: 03/01/23 Expiration Date: 02/28/26

Safe Handling of Hazardous Medications

HOW TO RECEIVE CREDIT

- Read the enclosed course.
- Complete the questions at the end of the course.
- Return your completed Evaluation to NetCE by mail or fax, or complete online at www.NetCE.com. (If you are a physician or Florida nurse, please return the included Answer Sheet/Evaluation.) Your postmark or facsimile date will be used as your completion date.
- Receive your Certificate(s) of Completion by mail, fax, or email.

Faculty

Latousha (Tasha) P. Jackson, PharmD, BCPS, QP503A, received her bachelor of science in biology degree from Norfolk State University. She then went on to receive her doctor of pharmacy degree from the Medical College of Virginia (Virginia Commonwealth School of Pharmacy) in 2004. After receiving her degree, she started her career in hospital pharmacy practice at Sentara Norfolk General Hospital in Norfolk, VA. After several years of hospital practice, Dr. Jackson obtained board certification in pharmacotherapy. Her experiences in hospital pharmacy practice and news of the New England Compounding Center tragedy inspired a desire to shift her practice into sterile compounding and patient safety. With renewed focus and training, she relocated to North Carolina to serve as Pharmacist Administrative Coordinator – Sterile Products at the Moses Cone Hospital in Greensboro, NC. She also went on to earn the CriticalPoint QP503A credential. Prior to joining the CriticalPoint team, Dr. Jackson served as the Compounding and Hazardous Medication Compliance Program Manager with the U.S. Department of Veterans Affairs in Durham, NC.

Faculty Disclosure

Contributing faculty, Latousha (Tasha) P. Jackson, PharmD, BCPS, QP503A, has disclosed no relevant financial relationship with any product manufacturer or service provider mentioned.

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The division planners and director have disclosed no relevant financial relationship with any product manufacturer or service provider mentioned.

Audience

This course is designed for members of the healthcare team involved in receiving, handling, and administering hazardous medications.

Accreditations & Approvals

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Course Objective

Many medications require special handling to avoid hazardous exposure. The purpose of this course is to provide healthcare professionals with the knowledge and skills necessary to safely handle and administer potentially hazardous drugs.

Learning Objectives

Upon completion of this course, you should be able to:

1. Review the intent and focus of USP <800>.
2. Discuss the appropriate use of personal protective equipment (PPE) for handling hazardous medications.
3. Describe recommendations for the safe receipt, handling, and administration of hazardous medications.
4. Outline the appropriate steps for deactivating, decontaminating, and cleaning following hazardous medication exposure.
5. Evaluate components of an effective medical surveillance program.

INTRODUCTION

Most healthcare workers are aware that antineoplastic drugs (medications used to treat cancer, also referred to as chemotherapy drugs), such as cisplatin, methotrexate, mercaptopurine, or cyclophosphamide, have significant side effects and must be handled with care. However, other medications that require special handling to avoid hazardous exposure, such as fluconazole or phenytoin, may not be that obvious [1]. In addition, even if healthcare professionals can identify a hazardous medication, they still may not know how to safely handle the agent to prevent toxic exposure. For example, if a box of antineoplastic vials dropped to the floor and broke, would you know how to handle the spill?

U.S. Pharmacopeia (USP) Chapter <800> was created to provide better guidance on how to safely handle hazardous medications in all settings, including both inpatient (e.g., hospitals, nursing homes) and outpatient (e.g., pharmacies, physician offices) sites. It includes safe handling of hazardous medications for all employees, such as those receiving the product, compounding the medication, or transporting it to the patient and those who clean areas where these products are administered. In addition, USP Chapter <800> focuses on minimizing the risk of contamination not only to the patient but also to healthcare professionals and the environment [1].

EXAMPLES OF MEDICATIONS MEETING AT LEAST ONE TOXICITY CRITERION	
Carcinogenicity	Hydroxyurea Imatinib
Teratogenicity or other developmental toxicity	Valproic acid Fluconazole
Reproductive toxicity	Colchicine Dutasteride Paroxetine
Organ toxicity	Blinatumomab
Genotoxicity	Abacavir Mycophenolic acid

Source: [3] *Table 1*

IDENTIFYING HAZARDOUS MEDICATIONS AND LEVEL OF RISK

According to USP Chapter <800>, a hazardous drug is any drug identified as hazardous or potentially hazardous by the National Institute for Occupational Safety and Health (NIOSH) [2; 3]. NIOSH defines hazardous medications as any drug approved for use in humans that is either accompanied by prescribing information that specifies special handling information to protect people handling the drug, or is identified as exhibiting one or more of the following toxicity criteria in humans, animal models, or in vitro systems [3; 4]:

- Carcinogenicity (cancer causing)
- Teratogenicity or other developmental toxicity (causing harm to an embryo or fetus)
- Reproductive toxicity (interference with normal reproduction, such as effects on fertility in either sex)
- Organ toxicity at low doses (harming organs, such as heart, liver, or lungs)
- Genotoxicity (damaging the genetic information in a cell, which could ead to cancer)

Structure and toxicity profiles of new drugs that are the same as drugs considered hazardous by the above criteria. Examples of medications with at least one of these characteristics are provided in ***Table 1***.

Most healthcare facilities are likely to handle at least some of the medications on NIOSH's hazardous medications list. USP <800> provides guidance and recommendations on handling hazardous drugs when there is a risk of exposure to patients, healthcare workers, and the environment [2]. Specifically, USP <800> containment strategies and work practices to limit exposure to hazardous drugs must always be adhered to for hazardous active pharmaceutical ingredients (API) (a substance or mixture

of substances intended to be used in compounding) and for antineoplastic drugs undergoing manipulation, such as IV compounding [2]. USP has clarified that for the purposes of implementation of Chapter <800>, the requirements for antineoplastic drugs refer to the antineoplastic drugs listed in Table 1 of the most current NIOSH list [5].

For these antineoplastic that do not require manipulation, and for other hazardous drugs, USP <800> allows facilities to customize their containment strategies/work practices based on an assessment of hazardous risk [1; 2]. This assessment should include a review of the risk of exposure to the patient, environment, and all personnel who will interact with the medication, including those receiving, storing, compounding, dispensing, transporting, administering, and disposing of the medication and equipment/materials used during the handling of the medication. In addition, consideration should be made for those responsible for removing medication waste, cleaning patient waste (e.g., excreted unmetabolized drug), and managing any kind of spill or damage to the dosage form [1].

The extent to which a medication may be harmful is dependent on several factors, including drug toxicity, drug potency, route of exposure, properties of the medication, the drug's formulation, and workplace activities [6]. A drug's toxicity refers to the type of harm a drug can cause to a person's health. For example, antineoplastic medications can cause cancer or other harm to healthcare workers who work with or handle them without adequate protection. Some drugs may harm a person's ability to have healthy children.

Some drugs are very toxic at very low doses, while other drugs may cause harm only when a worker is exposed to very high doses. Exposure to high doses of hazardous drugs is uncommon in most healthcare settings [6].

How workers may be exposed to a drug is an important factor to consider in developing strategies for controlling exposure. Workers can be exposed to hazardous drugs through breathing vapors, dusts, or aerosols, absorbing it through skin contact (e.g., touching dust or liquid residue on surfaces), swallowing it, or accidental injection [6].

The physical and chemical properties of drugs that influence their hazard include vapor pressure, physical state (solid, liquid, or gas), and molecular weight of the drug. Many drugs have very low vapor pressures, so inhaled vapor is not a route of exposure of concern for most drugs. However, drugs in liquid or powder form may be inhaled as aerosols, droplets, or dusts. In addition, drugs may be absorbed through skin, especially if the skin is chapped, abraded, or has cuts or scrapes. However, skin contact alone does not necessarily lead to toxicity. For example, when a drug has a high molecular weight, like a monoclonal antibody, and its typical dosing regimen is via injection, the drug would generally be absorbed through intact skin very poorly. Therefore, the likelihood that a worker would suffer harm from exposure is also very low. Of course, there may still be a risk of exposure to such drugs from accidental needle sticks or inhalation of dusts or droplets [6].

Like a drug's physical and chemical properties, the formulation of the drug is an important indicator of the types of precautions needed to avoid exposure. Different risk management strategies are needed for powders than pre-filled syringes.

How workers use and handle the drug in the workplace—such as administering the drug, compounding it, shipping it, or receiving it—impacts level of risk. Different activities have very different potential for healthcare worker exposure [6].

REVIEW OF EQUIPMENT

Before delving into the specific USP guidance for handling hazardous medications, a review of the equipment that may be used will be helpful. This will assist when we get into specific requirements throughout this course.

PERSONAL PROTECTIVE EQUIPMENT (PPE)

PPE is designed to minimize exposure of healthcare personnel to hazardous drugs [1]. USP Chapter <800> and NIOSH provide recommendations for PPE, including which PPE to use and when to use them. Expect this information to be included in your facility's procedures.

Examples of PPE recommendations include [1; 3]:

- Compounding sterile and non-sterile hazardous medications: Two pairs of chemotherapy gloves, two pairs of shoe covers, one gown (impermeable to hazardous medications), and one head/hair/beard cover
- Administering injectable antineoplastic medications: Two pairs of chemotherapy gloves and one gown (impermeable to hazardous medications)
- Administering ready-to-use hazardous medication intact tablets or capsules: Double gloves are not required; however, a single set of chemotherapy gloves should be worn.

If the PPE being used is disposable, do not reuse it. For example, a healthcare professional leaving the IV chemotherapy area should not hang up their gown to reuse later. Instead, the gown should be disposed of and a new one used when returning to the area [1].

If PPE is non-disposable, then the facility's policy for proper and safe cleaning should be followed. Do not take these items home to clean [1].

Gloves

When chemotherapy gloves are required for handling hazardous medications, they must meet the American Society for Testing and Materials (ASTM) standard D6978 (or its successor) [1; 7]. When using chemotherapy gloves with hazardous medications [1]:

- Make sure they are powder-free, because powder can absorb hazardous material and particulates from the powder can contaminate the sterile compounding area.
- Inspect for defects prior to use and dispose if any are identified.
- Keep in mind the outer layer of chemotherapy gloves used during sterile compounding must be sterile.
- Change chemotherapy gloves at least every 30 minutes unless the manufacturer recommends an alternative duration. Gloves should also be changed if any kind of tear or puncture occurs.
- Wash hands with soap and water after removing gloves.

Gowns

Gowns for handling hazardous medications must be long-sleeved with elastic or knit cuffs at the end. They must be able to resist permeability by hazardous drugs. Gowns cannot have openings in the front and must close in the back and must not have seams or closures that could allow hazardous medications to pass through [1]. When using gowns with hazardous medications [1]:

- Change gowns according to the manufacturer's instructions. If no information is available from the manufacturer, then gowns must be changed every two to three hours and immediately after a spill.
- Do not use gowns worn in hazardous areas in other areas.

When handling other items accidentally exposed to hazardous substances, such as a lab coat or scrubs [1]:

- Remove the item immediately to prevent exposure to your skin.
- Do not take these items home to clean.
- Wash them according to the facility's policy.

Head, Hair, Shoe, and Sleeve Covers

Head, hair, shoe, and sleeve covers provide protection from contact with hazardous residues [1]. Shoe covers worn in hazardous medication areas must be removed before walking into other areas to prevent hazardous contamination.

Eye and Face Protection

If there is a risk of a spill or splash from a hazardous medication or its waste, expect to be required to use appropriate eye and face protection (e.g., face shield and goggles) [1].

Respiratory Protection

Respiratory protection may be required if unpacking hazardous medications that are not contained in plastic, if the repackaging or compounding process involves powders, when cleaning up large spills that cannot be contained with a spill kit, during certain decontaminating and cleaning procedures, or if vapor or gas exposure is suspected. Surgical masks and N95 masks are not acceptable because they do not prevent the inhalation of hazardous vapors. Policies should describe which respirators are acceptable and available at your facility [1].

EQUIPMENT USED DURING NON-STERILE COMPOUNDING

In order to protect the compounder from hazardous medication exposure, non-sterile compounding of hazardous medications should also be performed within a containment primary engineering control (e.g., biological safety cabinet, compounding aseptic containment isolator) that is located within a containment secondary engineering control (e.g., a cleanroom or buffer area) [1].

Other equipment used to compound non-sterile, hazardous products may include balances, spatulas, and mortars and pestles. This equipment should be dedicated for the use of hazardous medications only and should be decontaminated after each use [1; 8]. This will be discussed in detail later in this course.

CONTAINMENT SUPPLEMENTAL ENGINEERING CONTROLS

Closed-system drug-transfer devices (CSTDs) provide additional protection while handling medications. USP Chapter <800> states that CSTDs must be used when administering an antineoplastic agent if the dosage form allows [1]. It is important to be aware that some CSTDs may be physically or chemically incompatible with some hazardous medications. For example, a solvent in the antineoplastic agent bendamustine (Treanda) called dimethylacetamide (DMA) dissolves the plastic in CSTDs made from polycarbonate, which can lead to spills [9]. Of note, a different formulation of bendamustine (Bendeka) is available without DMA and instead contains the solvent polyethylene glycol, which does not dissolve CSTDs [10].

HANDLING HAZARDOUS MEDICATIONS

Facilities are required to develop policies and procedures for the safe use of hazardous medications. All employees who handle these medications in any way must be trained on how to prevent harm to themselves, patients, and the environment. Although the first thought may be of the pharmacist or technician compounding a hazardous medication or the nurse administering it, there are many other steps in the medication management process during which other employees may be handling or exposed to hazardous medications [1; 3].

Situations that could expose employees to hazardous materials include [1]:

- Accidentally crushing a hazardous medication tablet during repackaging
- Handling a container holding hazardous medications that has residue on the outside
- Handling a hazardous medication spill incorrectly
- Incorrectly collecting hazardous waste
- Incorrectly handling the container used to transport hazardous medications
- Opening a hazardous medication capsule to place down a patient's feeding tube or to compound into a liquid
- Priming a hazardous IV infusion on a patient care unit of a hospital

Facilities should select a trained employee who can serve as the Designated Person. This role must ensure all policies and procedures are meeting accepted standards for safe use. This employee may lead the process of developing safe procedures and overseeing compliance to them. For example, this person will likely make sure all employees involved with hazardous medications are adequately trained [1].

All personnel exposed to hazardous medications should be trained prior to performing their responsibility. There should also be some type of competency to ensure proper understanding and demonstration of the material. Competencies should occur before a new employee can handle the hazardous medications and reassessed at least every 12 months. Training should also occur if significant changes are made to the facility's procedures, or if new hazardous medications are brought into the facility. All training and competencies should be documented [1].

Training must include the following elements [1]:

- How to respond if employees or patients are inappropriately exposed to hazardous medications
- How to respond to and manage spills
- Instructions for devices or other equipment used to handle hazardous medications
- Instructions for PPE
- Labeling required to identify hazardous medications at the facility
- Overview of the hazardous medications used within the facility and their risks
- Proper disposal of hazardous medications and any materials with their residue (e.g., gloves and gowns)
- Review of the facility's hazardous medication policies and procedures, including written confirmation that personnel who can get pregnant understand the risks of handling hazardous medications and their recommended safe use

Hazardous medication policy and procedures must be reviewed at least every 12 months. Any changes made must be communicated to all personnel who handle hazardous medications, and evidence of these communications must be documented and maintained for the length of time as required by the facility's state regulations [1].

The policy and procedures should include standards for properly handling a medication from the minute it is delivered to the facility until its disposal and removal. Expect the following to be included about hazardous medications at the facility [1]:

- Environmental monitoring to ensure hazardous exposure is not exceeding recommended standards (encouraged but not required)
- How to dispose of hazardous medications and any exposed materials (e.g., wipes used for cleaning)

EXAMPLES OF ACTIVITIES INVOLVING HAZARDOUS MEDICATIONS AND GUIDANCE FOR SAFE HANDLING		
Example Activity	**Personal Protective Equipment**	**Engineering Control**
Receiving, unpacking, and storing medications determined to be potentially hazardous during these procedures	• Single chemotherapy gloves, unless spill occurs, then double glove • Special circumstances may require additional items, such as if spills occur (see handling spill example below)	Not required
Administering ready-to-use intact hazardous medication tablets or capsules	• Single chemotherapy gloves	Not required
Administration of compounded hazardous medication	• Double chemotherapy gloves • Gown (impermeable to hazardous drugs) • Eye/face protection if liquid could splash	Closed-system drug-transfer devices must be used if the dosage form allows.
Handling waste of hazardous medications	• Double chemotherapy gloves • Gown (impermeable to hazardous drugs) • Eye/face protection if liquid could splash • Respiratory protection if vapor or other inhalational exposure	N/A
Handling spills	• Double chemotherapy gloves • Gown (impermeable to hazardous drugs) • Certain larger spills may require eye/face protection and/or respiratory protection (should be described in policy)	N/A
Source: [1; 3]		*Table 2*

- How to manage spills from hazardous medications
- Procedures for administration
- Procedures for dispensing and transporting hazardous medications
- Procedures for safe non-sterile and sterile compounding
- Medical surveillance of employees handling hazardous medications (encouraged but not required)
- Where to receive (unpack) orders containing hazardous medications
- Where to store hazardous medications

Table 2 provides a few commonly encountered examples and some guidance for safe handling [1; 3].

RECEIPT OF HAZARDOUS MEDICATIONS

Hazardous medications on NIOSH's list should be reviewed for their potential risk of exposure upon receipt. For example, the antineoplastic agent cisplatin is available as a liquid in a vial. If the vial breaks upon delivery to the facility, then it could lead to hazardous exposure to employees who receive the order. It is recommended to contain any potential exposure by receiving medications like this in a neutral or negative-pressure area. In addition, a spill kit must be available in this area and employees should be trained to use necessary PPE, such as chemotherapy gloves [1].

If the facility does have a negative-pressure area for compounding hazardous, sterile medications, it is important to remember that this will not be the best place to receive a medication. Opening boxes and containers could contaminate the room and interfere with the sterility requirements for compounding sterile products [1; 11].

Some agents on NIOSH's hazardous medications list are not likely to cause toxic exposure upon receipt, such as phenytoin capsules available in their final dosage form. The facility's policies and procedures should explain how to differentiate between the medications that require special handling upon receipt and those that do not [1; 3].

For medications that do require special handling, pay attention to packaging as it arrives. Hazardous medications should be received from the supplier in impervious plastic (a plastic that does not allow fluids to pass through). If there appears to be damage to the packaging, expect the facility's policy to provide guidance on how to handle this situation. For example, one may be instructed to reseal the container and return it to the manufacturer [1].

STORAGE OF HAZARDOUS MEDICATIONS

Antineoplastic hazardous drugs requiring manipulation and hazardous active pharmaceutical ingredients must be stored separately to prevent hazardous exposure to other medications. For example, cisplatin vials should be stored in a separate area designated for hazardous medications. Expect this designated area to be a negative-pressure area that is vented to the outside. Sterile and non-sterile hazardous medications can be stored together [1].

After an assessment of risk, the facility may determine that other hazardous medications that are not likely to cause toxic exposure upon receipt or storage can be placed in the regular storage area with other non-hazardous medications. For example, the oral chemotherapy agent erlotinib is available as a tablet in its final dosage form and should not pose hazardous exposure risk upon receipt or storage. The facility's policy should delineate which medications require special hazardous storage and which do not [1].

LABELING, PACKING, TRANSPORTING, AND DISPOSING OF HAZARDOUS MEDICATIONS

As discussed, each facility is responsible for determining which hazardous medications on NIOSH's list require special handling procedures. Medications identified as hazardous should be clearly labeled at all times during transport [1].

Hazardous medications that do not require any further manipulation, such as the oral chemotherapy agent erlotinib available in its final dosage form, may not require special handling. However, the facility must make an assessment of the medication and determine what best practices should be put in place for its safe handling. For example, anything that could damage or disrupt this final dosage form, such as automated counting or packaging machines, which can subject hazardous medications to stress and may create powdered contaminants, must be avoided. Review the facility's policy to determine how to handle all potentially hazardous medications and ask questions if you have any concerns [1].

Any medication that may be hazardous must be packaged in a way to prevent exposure to those transporting it. In addition, the medication must be transported in the safest way possible [1].

Finally, any employee involved in removing hazardous waste should be trained on appropriate procedures to protect themselves and the environment [1].

ADMINISTERING HAZARDOUS MEDICATIONS

All employees who may administer any hazardous medication should be educated on safe handling. For those hazardous medications that will require special handling, such as compounded IV antineoplastics, nurses should be educated on administration procedures, such as appropriate PPE and the use of closed-system drug-transfer devices. Spiking an IV set into a hazardous solution at the patient bedside should be avoided. It is a best practice for the pharmacist to attach and prime the IV set to the final container in the hood prior to adding the hazardous medication. This prevents all personnel from being exposed to spiking a hazardous medication [1; 7].

Although hazardous medications in a ready-to-use dosage form may not require special handling procedures during administration, it is still important to educate patients, family members, and other healthcare providers about them. All persons should be advised not to manipulate the medication and to be aware of the risks that can occur. For example, it is important to avoid crushing fluconazole tablets. Instead, recommend switching to a fluconazole suspension is preferred. If possible, pharmacists should assist in identifying these medications so all healthcare providers involved in the handling and administering know not to manipulate them. It is also important to counsel patients on keeping capsules and tablets intact when they take them at home. If another dosage form is needed for administration, one should evaluate if a manufacturer produces an alternative form. If an alternative dosage form is not available and the medication must be manipulated, then safety steps should be used to prevent hazardous exposure. For example, a facility policy may require a nurse to wear a gown and gloves and use a plastic pouch to contain any dust or particles while crushing a potentially hazardous, non-antineoplastic drug tablet [1].

Other work controls and practices that are recommended during the administration of hazardous medication include [12]:

- Require the use of disposable gloves and gowns. Wear the gloves and gown cuffs in a manner that produces a tight fit (e.g., loose glove tucked under gown cuff; tight glove fitted over gown cuff).
- Discard gloves after each use and immediately if contaminated.
- Discard gowns on leaving the patient room and immediately if contaminated.
- Do not use intravenous containers designed with venting tubes.
- Use plastic-backed absorbent liners under IV tubing during administration of hazardous drugs to absorb any leakage and prevent the solution from spilling onto the patient's skin (a source of exposure to workers).
- Work at waist level, if possible; avoid working above the head or reaching up for connections or ports.
- Avoid contact with these drugs if pregnant or breastfeeding.
- Wash hands thoroughly after hazardous drugs are handled.
- Use disposable linen or protective pads for patients who are incontinent or vomiting.

DISPOSING OF HAZARDOUS MEDICATIONS

Disposing of medication, including hazardous medications, is regulated by the Environmental Protection Agency (EPA), the entity responsible for enforcing the Resource Conservation and Recovery Act (RCRA). The RCRA is a federal regulation that lays out specific medications that may be hazardous upon disposal. These medications may be similar to the ones on NIOSH's list, but they may also be different.

Special disposal of NIOSH-listed hazardous medications is not enforced on a federal level unless they are also RCRA medications. However, most facilities use NIOSH's list when finalizing their medication disposal policy.

DEACTIVATING, DECONTAMINATING, CLEANING, AND DISINFECTING

All areas, equipment, and devices handling hazardous medications must be deactivated, decontaminated, and cleaned. In addition, if it is used for sterile compounding, it must also be disinfected [1]. Deactivation makes the compound inactive. Decontamination removes hazardous residue from non-disposable surfaces and transfers it to an absorbent, disposable material, such as a wipe or towel. Cleaning removes contaminants, such as soil, from objects and surfaces. Disinfecting inhibits or destroys micro-organisms. All surfaces must be cleaned before they can effectively be disinfected.

There is no one proven product or method to deactivate or decontaminate. Each facility will need to consider products that are appropriate for the type of hazardous medications at the facility and are compatible with the equipment and devices according to manufacturer instructions. For example, sodium hypochlorite may be used to deactivate and decontaminate, but it can cause corrosion to some surfaces. This is why you may see sodium hypochlorite used with sodium thiosulfate. Sodium thiosulfate can neutralize sodium hypochlorite and prevent corrosion. The facility may use wipes or other absorbent, disposable materials to remove hazardous residue. However, spray bottles are avoided, as they may spread hazardous exposure [1; 7].

Each facility's hazardous medications policy should include details about:

- Which product to use for deactivating, decontaminating, cleaning, and if needed, disinfecting
- How to apply the product
- How long the product should remain on the surface before removal
- How often each step needs to be performed
- Documentation required to verify each step was completed as assigned

Healthcare professionals involved in this process should review their policy closely and ask questions if any step is not clear. This will help prevent problems, such as using the wrong agent or skipping important steps. The process for deactivating, decontaminating, cleaning, and disinfecting can be quite complicated. However, each step is important to protect you, your colleagues, patients, and the environment [1].

Because this process is complicated, it is limited to trained personnel. These staff members must be trained on the facility's procedures, including what PPE to wear while performing the different tasks. For example, expect personnel to decontaminate, deactivate, and clean while wearing at least two pairs of chemotherapy gloves and an impermeable disposable gown. Additional protective equipment may also be required depending on the circumstance [1].

Each facility is responsible for including procedures on how to avoid spills and procedures for how to address a spill should one occur. Only trained personnel should manage a spill, and these personnel must be available any time hazardous medications are being handled at the facility. It is important to protect the employees cleaning the spill, any person located beside the spill, and the environment. If a spill may expose vapors, the employee managing the spill should wear an approved respirator and be familiar with how it works. Spill kits should be readily available in all areas where hazardous substances are handled. The locations of these spill kits should be included in the facility's procedures [1].

MEDICAL SURVEILLANCE PROGRAM

All healthcare personnel who are involved with handling hazardous medications on a regular basis should be enrolled in a medical surveillance program. This program will review the employee's baseline status and then follow-up with periodic evaluations. The goal is to minimize any adverse effects to employees potentially exposed to hazardous medications. Following procedures designed to ensure safe handling of hazardous medications is the most important step. Consider the medical surveillance program as a back-up—if unintentional exposure is occurring, a surveillance program may be able to provide early detection if a health problem is developing [1].

The facility should [1]:

- Define which employees will be enrolled in the program.
- Develop a process for these employees to have a baseline exam and then regular follow-up monitoring. Initial baseline exam should include:
  - Which hazardous medications the employee has been exposed to during the time since the last visit and the frequency of exposure, such as number of hazardous medications handled and estimated time per week handling them.
  - Physical assessment and lab work directed toward identifying common toxicities of the hazardous medication handled by the employee, such as monitoring a complete blood count with technicians who frequently compound IV antineoplastics.
- Create education for employees on self-monitoring for symptoms of exposure to the hazardous medications being handled and to help identify a pattern of increased absences that may be caused by exposure.

If workers exhibit signs of toxicity, the facility must investigate the cause of the exposure. Examples of steps the facility should take to follow up on a possible exposure-related incident include [1]:

- Identify cause of the exposure by verifying:
  - All engineering controls are working properly.
  - The employee received required training and is compliant with safe handling procedures.
  - Equipment is accessible (e.g., availability of PPE).
  - Policies and procedures are clear and easy to understand.
- Develop and document a plan to prevent future exposures.
- Notify any other employee who may have been exposed.
- Provide ongoing medical surveillance of all workers at risk for exposure to determine whether the plan is effective.

CONCLUSION

Procedures for proper handling of hazardous medications are imperative to ensure the safety of healthcare employees, patients, and the environment. USP Chapter <800> was created to enhance the guidance for safe use of hazardous medications.

Hazardous medications include not only chemotherapy agents, but also agents that may pose other toxicities, such as organ damage and reproductive toxicity. This is why it is so important for most healthcare workers to familiarize themselves with the standards within USP Chapter <800>. While this publication provides safety tips for known hazardous medications, it also provides advice on how to avoid toxic exposure from commonly used medications that many may not realize have hazardous potential. Many healthcare workers, patients, and their family members are exposed to these agents and benefit from awareness of the recommended practices to avoid hazardous contact.

RESOURCES

Occupational Safety and Health Administration
https://www.osha.gov

National Institute for Occupational Safety and Health
https://www.cdc.gov/niosh

USP General Chapter <800>
https://www.usp.org/compounding/general-chapter-hazardous-drugs-handling-healthcare

Implicit Bias in Health Care

The role of implicit biases on healthcare outcomes has become a concern, as there is some evidence that implicit biases contribute to health disparities, professionals' attitudes toward and interactions with patients, quality of care, diagnoses, and treatment decisions. This may produce differences in help-seeking, diagnoses, and ultimately treatments and interventions. Implicit biases may also unwittingly produce professional behaviors, attitudes, and interactions that reduce patients' trust and comfort with their provider, leading to earlier termination of visits and/or reduced adherence and follow-up. Disadvantaged groups are marginalized in the healthcare system and vulnerable on multiple levels; health professionals' implicit biases can further exacerbate these existing disadvantages.

Interventions or strategies designed to reduce implicit bias may be categorized as change-based or control-based. Change-based interventions focus on reducing or changing cognitive associations underlying implicit biases. These interventions might include challenging stereotypes. Conversely, control-based interventions involve reducing the effects of the implicit bias on the individual's behaviors. These strategies include increasing awareness of biased thoughts and responses. The two types of interventions are not mutually exclusive and may be used synergistically.

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