USP <800> Safe Handling of Hazardous Drugs – Where Do We Go From Here?

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Disclosures
The speaker has no relevant financial disclosures.

Learning Objectives
Upon completion of the seminar, participants should be able to:
1. Explain the history of hazardous drug compounding
2. Describe recommendations and improvements in Hazardous Drug compounding that lead to USP Chapter <800>
3. Describe how to conduct a Risk assessment in the hazardous compounding area
4. Identify the 'must haves' of USP <800> compliance

The Hazards
"Safe handling of hazardous drugs is crucial to protecting healthcare workers, personnel, and environment in practice sites administering these medications."

The Hazards
2005 American Journal of Health-System Pharmacists article evaluated three studies looking at soil surface contamination of chemotherapeutic agents. All three studies found surface contamination on vials obtained from commercial manufacturers.

A study published in 2012 by the American Journal of Obstetrics and Gynecology found that personnel who were exposed to antineoplastic agents had a two-fold increase of spontaneous abortion.

Learning Objectives Cont.
5. Outline the required training for personnel compounding hazardous drugs
6. Describe the requirements for facilities and engineering controls.
7. Explain the protocols for cleaning and deactivation of hazardous compounding areas
History of Hazardous Drug Compounding

- **1970's** - First concerns about occupational exposure to antineoplastic agents appeared in medical publications.
- **1980's** - OSHA publishes recommended guidelines of equipment, PPE, and work practices after visiting a hospital and becoming aware of the facility's poor chemotherapy preparation practices.
- Nearly 40 years of studying the risks associated with compounding, handling, and administering of hazardous drugs.
- USP<800> protects the patient, personnel, and the environment.

Hazardous Drug Handling Guideline History

<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>OSHA 1986</td>
<td>1986 OSHA becomes the first government agency to publish guidelines to safe handling of Cytotoxic (Antineoplastic) Agents</td>
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<tr>
<td>ONS 1988</td>
<td></td>
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<tr>
<td>ASHP 1990</td>
<td></td>
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<tr>
<td>OSHA 1995 &amp; 1999</td>
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<td>ONS 2003</td>
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USP<800> becomes federally enforceable July 2018 and is strictly dedicated to Hazardous Drug (HD) compounding, handling, storage, and administration.

Recommendations from these guidelines leading to USP<800>

- Double gloving during compounding
- Compounding in a dedicated area / use of a BSC
- Wearing a mask
- Non-permeable gown
- Safe handling
- Training and Competency Tests
- Disposal of Hazardous Drug

To whom does USP<800> apply?

Applies to ALL personnel and entities who handle Hazardous Drugs!!

The MUST and REQUIRED of USP<800>

USP<800> draws clear MINIMAL, MUST and REQUIRED guidelines.

Each entity **must** have a designated person who is qualified and trained to oversee compliance with USP<800>

**Must** follow USP<795> and USP<797>

Closed-system Transfer Device (CSTD) **must** be used for administration of Hazardous Drugs (HDs) when possible (CSTD & drug compatibility)
The MUST and REQUIRED of USP<800> Cont.

**Must** have form signed by personnel with reproductive capability confirming their understanding of risks related to handling HDs

Facilities **must** dedicate equipment to HD's

**Must** have Standard Operating Procedures (SOPs) related to HDs throughout facility. (Reviewed and updated annually)

Safety Data Sheets (SDS) **must** be readily available

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**Designated Person’s Responsibilities**

**Must** understand:

- Rationale for risk-prevention policies
- Risks to themselves and others
- Risks of noncompliance that may compromise safety
- Responsibility to report potentially hazardous situations to management

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**Facility and Engineering Control Requirements**

- Receipt and unpacking of hazardous materials **must** occur in a neutral or negative pressure area dedicated to HDs.
- HDs and Active Pharmaceutical Ingredients (APIs) requiring manipulation **must** be stored separately from non-hazardous medications, including refrigerated items.
- Storage area **must** be externally ventilated, negative-pressure room with at least 12 air changes per hour (ACPH)
- Containment—Primary Engineering Control (C-PEC) **must** be externally vented (preferred) or have a redundant HEPA filter and located within a C-PEC. (i.e. Biological Safety Cabinet -BSC)

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**Required Training and Competency of Personnel**

- All personnel who handle hazardous drugs **must** be trained and pass competency tests **before** they handle Hazardous Drugs (HDs).
- Personnel **must** test every 12 months.

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Training / competency assessment **must** be documented and **must** include:

- An overview of the entity’s HD list
- Review of the entity’s HD SOPs
- Proper use of Personal Protective Equipment (PPE)
- Proper use of equipment and devices (engineering controls)
- Response to known or suspected HD exposure
- Spill management
- Proper disposal of HDs and trace-contaminated materials

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**Facility and Engineering Control Requirements**

- Containment—Secondary Engineering Control (C-SEC) -(i.e. Buffer room) **must** be externally vented, physically separate, have 12 ACPH, with a negative pressure of 0.01 – 0.03 relative to adjacent areas
- **Must** have eye wash station. (Fixture with running water)
- Closed-system Transfer Device (CSTD) **must** be used for administration of HDs when possible (check CSTD & drug compatibility)
- There is **NO** exemption for low volume sterile HD compounding
Sterile HD Compounding Design

<table>
<thead>
<tr>
<th>OPTIMAL SPACE - PREFERRED</th>
<th>SPACE LIMITATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="source" alt="Diagram" /></td>
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HD Storage requirements

- HD storage areas and containers must be clearly
- HD's must be stored separately from non-HD inventory
- Storage must be in a negative pressure room with at least 12 air changes per hour (ACPH)
- Refrigerated HDs must be stored in a dedicated refrigerator in the HD storage room, buffer room, or containment segregated compounding area (C-SCA)

HD Storage Requirements

- HDs must be stored at or below eye level
- Containers (bins) that HD's are stored in must minimize the risk of breakage and leakage
- HD's CANNOT be stored on the floor
- Storage of sterile and nonsterile HDs may be intermingled **BUT**
- HD storage in a sterile compounding buffer area must be limited to those used for sterile compounding

Closed System Transfer Device (CSTD)

CSTD mechanically prohibits the transfer of environmental contaminants into the system and the escape of HD or vapor concentrations outside the system.

Closed-system Transfer Device Examples

- BD - PhaSeal
- ICU Medical - ChemoLock
- Equashield

Risk Assessment Resources

NIOSH list groups drugs into three categories:

- Antineoplastics
- Non-antineoplastics
- Reproductive hazards only

Risk Assessment Tools

USP <800> provides regulatory framework for limiting exposure to hazardous drugs in the healthcare workplace.

BD and Joint Commission Resources have developed a resource to help organizations complete an assessment in preparation to compliance.

OR

USP800 Gap Analysis Tool
www.800.gaptool.com

Source: CDC.gov/NIOSH

Source: ICU Medical
Steps To Conduct Risk Assessment

1st
• Designate a person responsible for HD.
• Identify drugs and dosage forms used at your location from the NIOSH 2014 List of Antineoplastic and Other Hazardous Drugs.

Steps To Conduct Risk Assessment

2nd
2nd Approaches
• USP 800 has two approaches to handling HD’s:
  • Handle all agents, in all dosage forms on the NIOSH list with containment strategies listed in USP<800>
  • Or Perform assessment of risk— Determining what PPE is required for handling of each HD.

Assessment of Risk Option
• Assessment of risk must consider:
  • Type of hazardous drug – antineoplastic, non-antineoplastic, reproductive risk only
  • Dosage form – capsule, tablet, liquid, powder
  • Risk of exposure
  • Packaging
  • Manipulation
  • Documentation of the alternate containment strategies and/or work practices

Requirements:
• Head Cover
• Beard cover
• Eye protection
• Face Mask
• Respirator for spills
• Disposable Gowns (Non-Permeable and able to close in back)
• 2 pair of certified ASTM D6978 gloves (outer glove must be sterile)
• 2 Pair of shoe covers (Remove outer pair when exiting)

When is PPE required?

Appropriate PPE must be worn when handling HDS. Level of PPE required is based on the activity. PPE is required when:
• Receiving intact supplies (pass-through door of compounding area)
• Receiving suspected/broken supplies
• Transporting intact supplies or compounded HDs
• Receiving intact supplies in the compounding area
• Stocking and inventory control of the compounding area
• Nonsterile compounding
• Sterile compounding
• Collecting and disposing compounding waste
• Administering
• Routine cleaning
• Collecting and disposing patient waste
• Managing spills

Table 1: Antineoplastic Agents (HIV Classification)

<table>
<thead>
<tr>
<th>Drug</th>
<th>Classification</th>
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<tr>
<td>Any Hazardous Drug</td>
<td>Active Pharmaceutical Ingredient (API)</td>
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\[ API \] any substance or mixture of substances intended to be used in the compounding of a drug product, thereby becoming the active ingredient in the preparation and performing pharmaceutic activity.

Table 2: Reproductive Risk Agents (HIV Classification)

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Source: Kansaspharmacy.org
Examples of PPE Requirements by Activity

<table>
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<tr>
<th>Receiving Intact Supplies</th>
<th>Receiving Broken Supplies</th>
<th>Spills</th>
</tr>
</thead>
<tbody>
<tr>
<td>□ ASTM tested chemotherapy gloves</td>
<td>□ ASTM Gloves</td>
<td>□ ASTM Gloves</td>
</tr>
<tr>
<td>□ □ Gown</td>
<td>□ □ Gown</td>
<td>□ Hair, Face, Beard, Shoe Covers</td>
</tr>
<tr>
<td>□ □ Hair, Face, Beard, Shoe Covers</td>
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</tr>
<tr>
<td>□ □ Eye and Face Protection</td>
<td>□ □ Eye and Face Protection</td>
<td>□ □ Full face chemical cartridge mask</td>
</tr>
<tr>
<td>□ □ Respiratory Protection (N95)</td>
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Areas of Exposure & Contamination

The primary sources of exposure are:

In the sterile environment:

• Reconstitution of powdered or lyophilized HD's
• Withdrawing and diluting of injectable and oral HD’s
• Expelling air from HD’s syringes
• PPE that comes into contact with HD residue
• Areas not properly deactivated

When Exposure Happens

In the non-sterile environment:

• Opening capsules and crushing tablets
• Pouring oral HD’s for administration
• Expelling air from oral syringes
• Applying topical HD agents to patient
• Spills not properly cleaned and deactivated

When Exposure Happens

In the sterile environment:

Cleaning and Deactivation of HD’s

All areas where hazardous drugs are handled and all reusable equipment MUST be:

1. Deactivated
2. Decontaminated
3. Cleaned
4. Disinfected

Cleaning and Deactivation of HD’s

Deactivation

• Render compound inert/inactive
• EPA registered oxidizers (peroxide formulations, sodium hypochlorite (i.e HYPOCHLOR, Clorox, Peridox RTU)

Source: Sterile.com
Cleaning and Deactivation of HD’s

Decontamination
• Physical wiping down surfaces to remove HD residue
• Alcohol, water, peroxide, or sodium hypochlorite

Source: CleanroomConnection.com

Cleaning
• Remove organic & inorganic material
• Germicidal detergent (i.e. Virex II, Accel TB, Peridox RTU)

Source: Fisher Scientific

Cleaning and Deactivation of HD’s

Disinfected
• Destroy Microorganisms
• EPA registered disinfectant (Peridox RTU) or sterile alcohol

Source: Decon Labs

Assessment Questions

1) USP<800> was designed to protect healthcare personnel only.
   a. True
   b. False

Assessment Questions

2) Who does USP<800> apply to?
   a. Pharmacist and pharmacy technicians
   b. Physicians, nurses, and pharmacy personnel
   c. Patients and nurses
   d. All healthcare personnel and entities who handle HD’s

Assessment Questions

3) Personnel who can handle HD’s____________________
   a. can handle HD’s without training.
   b. should pass competency assessments every other year.
   c. must be trained and assessed on competencies of handling HD’s every 12 months
   d. are smart individuals.
Assessment Questions

4) ___ Exposure of HD’s can be absorbed through which paths?
   a. Dermal contact and mucus membrane
   b. Inhalation
   c. Injection
   d. All of the above

5) ___ Reusable equipment and surfaces exposed to HD’s must be
   a. disinfected with alcohol.
   b. decontaminated and disinfected.
   c. deactivated, decontaminated, cleaned, and disinfected.
   d. cleaned, disinfected, and decontaminated.

References