Safe Handling of Hazardous Drugs in the Pharmacy and the Home

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Disclosure

• Patricia Kienle is an employee and stockholder of Cardinal Health. She is an elected member and Vice Chair of the USP Compounding Expert Committee, but this talk is not endorsed by or affiliated with USP.

• Marc Stranz has consulted for Baxter/Australia.

• Off-label and/or investigational drug uses will not be discussed during this presentation.
Objectives

• Describe the general requirements of USP Chapter <800>
• Identify potential challenges with USP Chapter <800> facility requirements and strategies to address them
• List and briefly describe available resources and published guidelines for preventing occupational exposure to hazardous drugs
• Describe a home infusion pharmacy scenario that demonstrates the steps needed to achieve regulatory compliance with current and proposed hazardous drug handling standards
Patti’s Wish

• Identify three things that you can improve the next day you are at work
What’s All the Fuss?
Why <800>?

• To promote patient safety, worker safety, and environmental protection when handling hazardous drugs (HDs)
• Addresses, but is not limited to
  • Receipt
  • Storage
  • Compounding
  • Dispensing
  • Administration
  • Disposal
• Applies to all healthcare personnel who handle HDs
• Applies to all healthcare entities that store, prepare, transport, or administer HDs
HDs in Your Facility

- Receiving
- Storing
- Mixing
- Administering
NIOSH List of Hazardous Drugs

- Antineoplastic
- Non-antineoplastic
- Reproductive hazards

- Hazardous to personnel
  - Different from EPA hazards

Occupational Exposure

http://www.cdc.gov/niosh/topics/hazdrug/
Your HD List

• Review the NIOSH list of hazardous drugs
• Identify the drugs and dosage forms you handle
• Document review of this list annually
Your Handling Options

Treat all HDs as in <800>

Perform Assessment of Risk
## Your List

<table>
<thead>
<tr>
<th>All containment strategies in &lt;800&gt;</th>
<th>Alternative containment strategies</th>
</tr>
</thead>
<tbody>
<tr>
<td>API of any HD on the list</td>
<td>Antineoplastics you only need to count or package</td>
</tr>
<tr>
<td>Antineoplastics you have to manipulate</td>
<td>Non-antineoplastics</td>
</tr>
<tr>
<td>Items that don’t fit your Assessment of Risk approach</td>
<td>Reproductive hazards</td>
</tr>
</tbody>
</table>
Assessment of Risk

• Drug
• Dosage form
• Risk of exposure
• Packaging
• Manipulation
• Documentation of alternative containment strategies and/or work practices
• Review annually and document
HD Receipt

• Your supplier should mark containers
• Your receiving personnel need to be inserviced to assess the integrity of the container
• You must provide
  • Chemo gloves
  • Chemo spill kit
HD Storage and Compounding

• Separate room with fixed walls
• Negative pressure
• Vented to the outside
• Appropriate number of air changes per hour (ACPH)
Engineering Controls

• Primary
  • Biological Safety Cabinet (BSC)
  • Compounding Aseptic Containment Isolator (CACI)

• Secondary
  • The room in which the PEC is placed

• Supplemental
  • Closed system drug-transfer devices
Two Options for Sterile Compounding

• Cleanroom suite
  • Positive pressure ISO 7 anteroom opening into negative pressure ISO 7 buffer room with biological safety cabinet (BSC) or compounding aseptic containment isolator (CACI)

• Containment Segregated Compounding Area
  • Separate space with BSC or CACI
  • Limited to 12 hour beyond-use date (BUD)
  • NOTE: Not currently allowed by <797>

• Low volume exemption is no longer allowed
PPE Requirements in <800>

- Gloves
- Gowns
- Hair covers
- Shoe covers
- Face protection
- Respirators
Gloves for Handling HDs

- Chemo gloves tested to ASTM D6978
- Non-powdered
- Two pairs
- Gloves must be sterile when compounding sterile preparations
Gowns for Handling HDs

• Tested and shown to resist permeability by HDs
• Disposable
• Polyethylene-coated polypropylene or other laminate
• Close in back (no open front)
• Long-sleeved
• Elastic or knit closed cuffs
• No seams or closures that could allow HDs to pass through
PPPMag – January 2015

Are Gloves and Gowns Safe for Handling Chemotherapy?
Other Garb Issues

• Eye protection
  • BSC/CACI provide eye protection
  • Use goggles when working outside a PEC

• Respirators
  • Use when outside a PEC

• All garb is required when using a CACI
Closed System Drug-Transfer Devices

• CSTDs mechanically prohibit the transfer of environmental contaminants into the system and the escape of HD or vapor concentrations outside the system

• NIOSH has published a proposed performance protocol

Photo courtesy of BD
Decontamination

<table>
<thead>
<tr>
<th>Step</th>
<th>Agent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deactivate</td>
<td>Properly-diluted EPA-approved oxidizer intended for use with hazardous drugs</td>
</tr>
<tr>
<td>Decontaminate</td>
<td>Germicidal detergent</td>
</tr>
<tr>
<td>Clean</td>
<td>Sterile isopropyl alcohol</td>
</tr>
</tbody>
</table>
Environmental Monitoring

- <797> requires EM to detect microbial contamination
- <800> recommends wipe samples to detect rogue hazardous drug contamination

Screenshot courtesy of ChemoGlo
Spill Control

• Policy for you and for your patient
• Spill kits
• Contain spill and clean up
Medical Surveillance

- Recommended by <800>
- Requirement to follow organizational policies
- Consider
  - Health questionnaire
  - History of exposure to HDs
  - Record of acute exposure (spills)
  - CBC and diff

Documentation

- Policies and procedures
- HD list
- Assessment of Risk
- Personnel training and monitoring
- Certification reports
- Incident reports
Timeframe for Compliance

USP <800> will be federally enforceable on July 1, 2018
Implementation

*Start now; set realistic deadlines; take them seriously*
- Parkinson's law - work expands so as to fill the time available for its completion
- <insert favorite procrastination quote here>

Prioritize
- Assign responsibility and authority; who drives compliance?
- Prioritize activity by duration
  - Construction takes about a year
  - Policy > new products/process/staff > train > policy change > repeat
  - QC/QA
Implementation

• It’s not new...
• If you follow the session objectives in this and other Chapter 800 presentations you have a structure
• Chapter 800 suggests a policy outline, provides links to resources (appendices), and contains the shall/should actions items
• If all else fails, you can buy the policy, training, and the cleanroom from consultants
General requirements of Chapter 800

- List of hazardous drugs
- Type of exposures
- Personnel responsibilities
- Facility design and engineering controls
- Personnel protective equipment
- Hazard communication program
- Training for compounding personnel
- Receiving, transporting
- Dispensing HD dosage forms not requiring alteration
- Compounding HD dosage forms
- Protection when administering HD dosage forms
- Cleaning: deactivation, decontamination, cleaning, disinfection
- Spill control, disposal
- Environmental and quality control
- Documentation
- Medical Surveillance
- Timeframe for compliance
General requirements of Chapter 800

- List of hazardous drugs
- Type of exposures
- Personnel responsibilities
- Facility design and engineering controls
- Personnel protective equipment
- Hazard communication program
- Training for compounding personnel
- Receiving, transporting
- Dispensing HD dosage forms not requiring alteration

- Antineoplastic drugs
- Antibiotics: chloramphenicol, telavancin, fluconazole
- Antivirals
- Anticonvulsants
- Biological response modifiers
- Hormones
- Fetal Risk categories D, X
General requirements of Chapter 800

- List of hazardous drugs
- Type of exposures
- Personnel responsibilities
- **Facility design and engineering controls**
- Personnel protective equipment
- Hazard communication program
- Training for compounding personnel
- Receiving, transporting
- Dispensing HD dosage forms not requiring alteration
- Separate designated areas shall be available for hazardous drugs
  - Receipt
  - Storage
  - Non-sterile compounding
  - Sterile compounding
  - Administration
  - Disposal
General requirements of Chapter 800

• Deactivation/decontamination
  • Na hypochlorite/thiosulfate 2%
  • Weekly or after spills, before and after certification, if containment device moved

• Environmental
  • Wipe sampling to detect HDs
  • Benchmark and at least every 6 months
  • Assay for presence of commonly used HDs

• Compounding HD dosage forms
• Protection when administering HD dosage forms
• Cleaning: deactivation, decontamination, cleaning, disinfection
• Spill control, disposal
• Environmental and quality control
• Documentation
• Medical Surveillance
• Timeframe for compliance
General requirements of Chapter 800

- Baseline (pre-placement) medical and occupational history
- Records of:
  - HDs, quantities, types handled
  - Hours/week handling HDs
  - Compounds/administrations per week
  - Accidental exposures
- Follow-up plan for workers with health changes suggesting toxicity or who have experienced an acute exposure
- Completion of an exit examination to document medical, reproductive, and exposure histories.

- Compounding HD dosage forms
- Protection when administering HD dosage forms
- Cleaning: deactivation, decontamination, cleaning, disinfection
- Spill control, disposal
- Environmental and quality control
- Documentation
  - Medical Surveillance
  - Timeframe for compliance
Abbreviations

• ACHP. Air changes per hour
• API. Active pharmaceutical ingredient
• BSC. Biological safety cabinet
• CACI. Compounding aseptic containment isolator
• C-PEC. Containment – primary engineering control. Biological safety cabinet
• C-SCA. Containment – segregated compounding area
• C-SEC. Containment – secondary engineering control. Negative pressure buffer room
• CVE. Containment Ventilated Enclosure (powder hood)
• HD. Hazardous drug
• HEPA. High-efficiency particulate air (filter)
• PEC. Primary engineering control (ISO 5 compounding area)
• WC. Water column. Historical measure of small pressure differentials
Facility design – receipt & storage

- Designated areas with signs restricting personnel access not near non-HD areas in the facility (break rooms, public spaces)
  - Receipt and unpacking of antineoplastic HDs or HD API (not in the cleanroom/positive pressure areas)
  - Storage of HDs (cleanroom/preparation areas)
    - Manner that prevents breakage; secure, lipped shelving
    - In a negative-pressure room with ≥ 12 ACPH
    - Sterile and non-sterile HDs can be stored together but only sterile HDs may be stored in the C-SEC
    - Refrigerated antineoplastic HDs must be stored in a
      - dedicated refrigerator
      - negative pressure area with ≥ 12 ACPH (storage, C-SEC, C-SCA)
      - If in C-SEC, consider exhaust duct behind refrigerator
Facility design - Nonsterile HD

• Nonsterile HDs must be compounded within a C-PEC located in a C-SEC
  • C-PECs do not require unidirectional ISO Class 5 air quality
  • C-PEC may be a CVE, Class I or II BSC, or CACI
  • C-PEC does not need to continuously run
  • C-PECs is externally vented or redundant–HEPA filtered in series.

• C-SEC is the room in which the C-PEC is placed and must
  • Be externally vented through HEPA filtration (the room exhaust)
  • Be physically separated (walls and door) from adjoining spaces
  • Be negative pressurized to adjoining spaces at -0.01 to -0.03 wc
  • Have at least 12 ACPH
  • Meet Chapter 797 requirements for SEC fit and finish
Facility design – Sterile HD

- C-PEC is the unidirectional air ISO 5 compounding area and must be:
  - Class II, Class III, or CACI type C-PEC
  - Externally exhausted
  - Operating continuously

- C-SEC is the room in which the C-PEC is placed and must be:
  - ISO 7 air quality with at least 30 ACHP
  - Externally vented through HEPA filtration (the room exhaust)
  - Physically separated (walls and door) from adjoining spaces
  - negative pressurized to adjoining spaces at -0.01 to -0.03 wc
  - If sterile and nonsterile C-PEC in same C-SEC, ISO 7 air required
    - Sterile and nonsterile C-PEC must be ≥ 1 meter apart
    - No particle generating activity during sterile compounding
Facility design – Sterile HD

• If the C-SEC is entered though the non-HD SEC, there must be:
  • Demarcated space in the C-SEC for garbing and degarbing
  • Transport HDs out of C-SEC to avoid SEC contamination by:
    • Pass-through between C-SEC and adjacent space that does not compromising C-SEC air quality. The pass-through shall be included in the required semi-annual facility certification
    • Sealed containers or other containment shown effective for HD and environmental control
Facility design – Anteroom

• Anteroom (Required in Chapter 797 v2016 for Category 2)
  • An enclosed space with walls and door and ≥ 30 ACPH
  • Positive pressure of ≥ 0.02 wc to adjacent unclassified spaces
  • Air quality of ISO Class 7 or better
  • Sink ≥ 1 meter from entrance to C-SEC
  • Eyewash station per state/federal regulations (ANSI Z358.1)

• C-SCA is an unclassified air space
  • Meets Chapter 797 requirements for SEC fit and finish
  • Sink and eyewash ≥ 1 meter from C-PEC
  • HD Storage requirements apply
  • At least 12 ACHP without HEPA filtration
  • Physically separated (walls and door) from adjoining spaces
  • Negatively pressurized to adjoining spaces at -0.01 to -0.03 wc
  • Externally vented through HEPA filtration (the room exhaust)
Facility design – Installation

• Considerations for C-SEC only
  • Cleanroom: walls, door, sealed ceiling, plenum, damper
  • Pass-through: interlocking doors, stainless steel
  • Electrical: Fan filter unit, lights, PEC, receptacles
  • Air Supply: HVAC, HEPA exhaust system (duct, plenum code)
  • Flooring: seamless, coved
  • Environment: pressure, temperature, humidity recording

• Architect

• Contractor