Safe Handling of Hazardous Drugs: 2019 ASCO Standards

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Presentation Outline

- Describe the scope of standards that are already in existence, with a focus on United States Pharmacopeia (USP) Chapter <800>.
- Delineate the difference between the requirements and recommendations advanced in USP Chapter <800>.
- Discuss the areas in which the ASCO Standards differ from the requirements outlined in USP Chapter <800>.

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Existing References for Safe Handling of Hazardous Drugs

- NIOSH ALERT: Preventing Occupational Exposures to Antineoplastic and Other Hazardous Drugs in Health Care Settings
- ASHP Guidelines on Handling Hazardous Drugs
- Workplace Solutions: Personal Protective Equipment for Health Care Workers (CDC)
- Oncology Nursing Society: Safe Handling of Hazardous Drugs, 3rd Edition, 2018.

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Evolution of Recommendations

- 1990, 2006 ASHP Guidelines on Handling Hazardous Drugs (HDs)
- 2004 NIOSH Safety Alert
- NIOSH LIST of Antineoplastic and Other Hazardous Drugs in Healthcare Settings – most recent update 2016 (updated every 2 years)
- USP <797>
- USP <800> Final chapter published 2/1/16 – enforceable December 1, 2019

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Scope of USP Chapter <800>

- Standards apply to:
  - Areas where hazardous drugs (HDs) are compounded, stored, transported, and administered
- Health care personnel include, but are not limited to:
  - Pharmacists and pharmacy techs
  - Physicians and physician assistants
  - Nurses and home health care workers
  - Veterinarians and veterinary techs

Pharmaceutical compounding – Hazardous drugs – handling in healthcare settings (Chapter <800>). n: The United States Pharmacopeia 39th rev., and the National Formulary 34th ed. Rockville, MD: The United States Pharmacopeia Convention; 2016:285.

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Facilities Impacted

- Patient treatment clinics
- Physician practice facilities
- Pharmacies
- Hospitals and other health care institutions
- Veterinarian's offices

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Definitions in <800>

- **Must** = Compliance is mandatory effective December 1, 2019, where legislated
- **Should** = Recommendations only – not requirements

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NIOSH List of HDs (2016)

- Group 1: Antineoplastic Drugs
- Group 2: Non-antineoplastic Drugs deemed hazardous by meeting one or more NIOSH criteria for a hazardous drug
- Group 3: Reproductive Risks
  - Drugs that primarily pose a reproductive risk to men and women who are actively trying to conceive and women who are pregnant or breast feeding, because of excretion in breast milk

NIOSH 2016. NIOSH list of antineoplastic and other hazardous drugs in healthcare settings 2016.Connor TH, MacKenzie BA, DeBord DG, Trout DB, O'Callaghan JP. Cincinnati, OH US DHHS, CDC.

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HD Exposure Risk Points

Job Function	Risk Points
Receipt	Drug residue is present on outer packaging of HDs
Dispensing	Counting or splitting tablets or opening capsules
Patient-care activities	Handling body fluids or contaminated linens
Spills	Spill management and disposal
Transport	Moving HDs within a healthcare setting
Waste	Collection and disposal of hazardous waste

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Who is Responsible for Compliance?

- Each institution must have a designated person who is qualified and trained to be responsible for:
  - Developing and implementing appropriate procedures
  - Overseeing entity compliance with all applicable laws, regulations and standards
  - Environmental control of compounding and storage areas

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Skill Set of Responsible HD Compliance Officer

- Thorough understanding of:
  - Risk-prevention policies
  - Risks to staff members
- Articulating risk to senior management
- Understanding of monitoring program for the entire facility with respect to HDs
- Maintain reports testing/sampling within facilities

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Receipt of HDs

- Antineoplastic HDs and all HD active pharmaceutical ingredients (API) must be unpacked (removed from external shipping containers) in an areas that are **neutral** or **negative** pressure relative to surrounding areas

- HD must **not** be unpacked from their external shipping containers in sterile compounding areas or in positive pressure areas

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Storage of HDs

- HDs must be stored to prevent spillage/breakage if the container falls; no storage on the floor
  - Storage of antineoplastic HDs not in a final dosage form must be segregated from non-hazardous inventory in an externally ventilated negative pressure environment with ≥ 12 air changes per hour (ACPH)
  - Sterile and non-sterile HDs may be stored together
  - Refrigerated HDs must be stored in a dedicated unit in a negative pressure room with ≥ 12 ACPH
  - Reproductive risk only HD and final dosage forms of antineoplastic HDs may be stored with other inventory

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HD Compounding and Engineering Controls

- Engineering controls are required to prevent cross- and microbial contamination using three controls:
  - Containment **primary** engineering control (C-PEC) - a ventilated device for direct handling of HDs
  - Containment **secondary** engineering control (C-SEC) - **the room** in which the C-PEC is placed
  - Supplemental engineering controls*

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Engineering Controls for Sterile HD Compounding

Configuration	C-PEC	C-SEC
ISO Class 7 buffer room with an ISO Class 7 ante-room	Externally vented* Examples: Class II Biological Safety Cabinet (BSC) or Compounding Aseptic Containment Isolator (CACI)	Externally vented 30 air changes per hour (ACPH) Negative pressure between 0.01 and 0.03 inches of water column relative to the adjacent areas
Unclassifiable Containment Segregated Compounding Area (C-SCA)	Externally vented Examples: Class II BSC or CACI	Externally vented 12 ACPH Negative pressure between 0.01 and 0.03 inches of water column relative to adjacent areas

*ASCO Standards recommend that more research is needed before requiring external ventilation.

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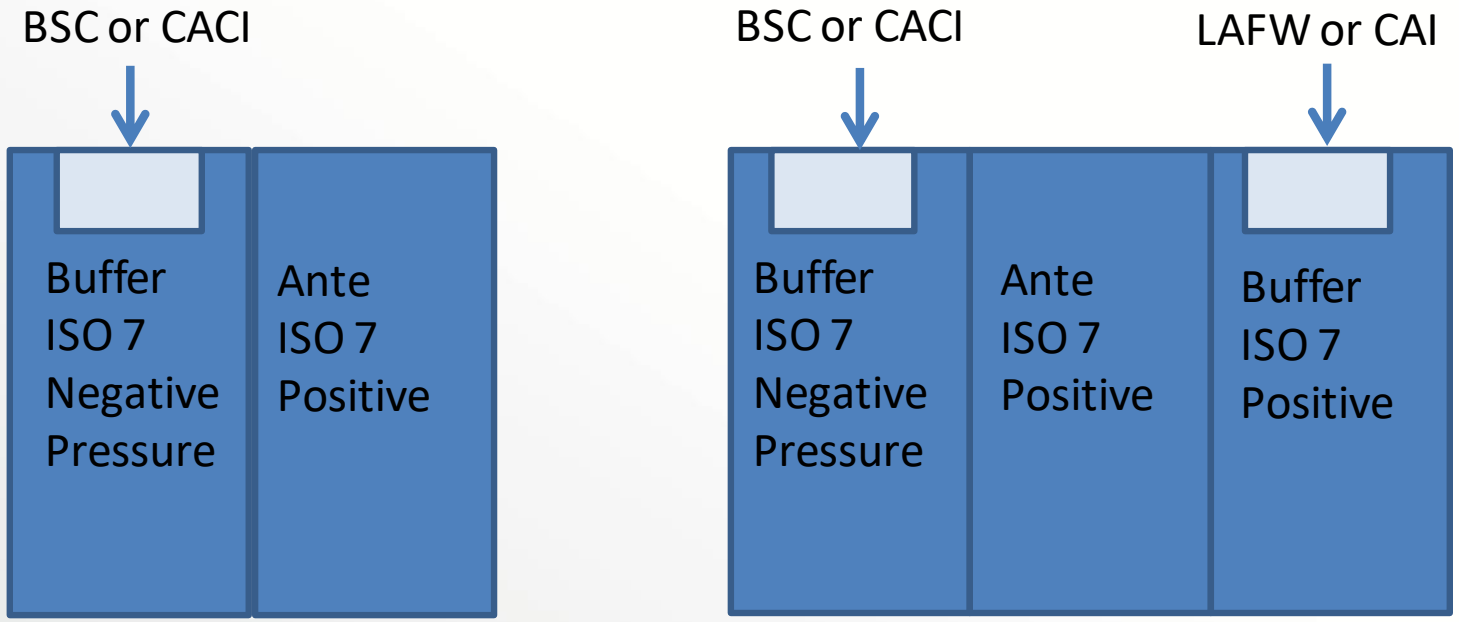
Recommended Configurations for Sterile HD Compounding



Anteroom: Minimum positive pressure of 0.02 inches of water column to adjacent spaces; at least 0.01 inches of water column to HD buffer room; 30 ACPH; hand washing sink.

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Personal Protective Equipment (PPE)

- PPE provides worker protection to reduce exposure to HDs aerosols and drug residue
- Gowns, gloves, head, hair, and shoe covers are required for compounding sterile and nonsterile HDs
- Gloves and gowns are required when administering injectable HDs
- Institutions must develop SOPs for PPE based on risk of exposure and activities performed

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Use of Gloves with HD Handling

- Two pairs of gloves required for compounding and administering HDs
  - Use **sterile** gloves for **outer** pair for **sterile compounding**
- Gloves must meet standards set by American Society for Testing and Materials (ASTM)
- Chemotherapy gloves must be powder-free
- Inspect gloves for defects before using and do not use defective gloves
- Change gloves every 30 minutes or when torn, punctured or contaminated

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Use of Gowns with HD Handling

- Gowns must be tested to resist permeability by HDs; polyethylene-coated polypropylene or other laminate materials preferred
- Gowns must close in the back and have no seams/closures to allow HDs to pass through
- Gowns changed per manufacturer's recommendations or every 2 to 3 hours and after any spills/splashes
- Clothing, lab coats, scrubs can retain HDs

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Other Required PPE

- Head/hair covers (including beard/moustaches) required
- Second pair of shoe covers must be donned when compounding sterile HDs; remove when exiting buffer room
- Eye and face protection must use when risk for spills/splashes
- Use NIOSH certified N95 masks for respiratory protection – for spills, cleaning activities or potential airborne exposure

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Staff Training Program

- Training must occur prior to employee independently handling HDs and reassessed annually
- Training must include:
  - Overview of the institution's list of HDs
  - Review of SOPs related to handling of HDs
  - Proper use of PPE and equipment/devices
  - Spill management
  - Response to known or suspected HD exposure
  - Proper disposal of HDs

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Administration

- HDs must be administered safely by using protective medical devices and techniques (e.g., priming IV tubing with non-HD solution in a C-PEC)
- Appropriate PPE to be worn when administering HDs and disposed properly thereafter
- CSTDs are required by USP <800> for administration of antineoplastic HDs when the dosage form allows*
- Avoid manipulating HD dosage forms (e.g. crushing tablets, opening capsules) when possible; if necessary – use appropriate PPE

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Cleaning Procedures

Cleaning Step	Purpose	Agents
Deactivation	Render compound inert or inactive	EPA-registered oxidizers (e.g., peroxide formulations, sodium hypochlorite, etc.)
Decontamination	Remove HD residue	Alcohol, water, peroxide or sodium hypochlorite or other materials validated to be effective for HD decontamination
Cleaning	Remove organic or inorganic material	Germicidal detergent
Disinfection	Destroy microorganisms	Sterile alcohol or EPA-registered disinfectant

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Spill Control

- Train personnel about proper spill kit use
- SOPs are required for spill prevention and clean-up procedures including use of PPE and respirators
- Document circumstances of spill
- Provide immediate medical evaluation to potentially exposed personnel
  - Non-employees exposed to HD should report to designated emergency service for evaluation

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2019 ASCO Standards for Safe Handling of Hazardous Drugs

Background:

- The National Institute for Occupational Safety and Health (NIOSH) and ASCO co-hosted a workshop on Safe Handling of Hazardous Drugs in 2015.
- ASCO subsequently published editorials on the theme of stakeholder collaboration to create a culture of safety and standardization of practices. (1,2)
- ASCO noted several areas in existing standards where more review of evidence was required.
- In 2017 ASCO undertook to develop evidence-based standards for the safe handling of hazardous drugs, which have recently been published. (3)

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ASCO Standards and USP <800>

- ASCO Standards differ from or provide clarification to USP <800> in the areas of:
  - External ventilation
  - Closed system transfer devices (CSTDs)
  - Medical surveillance
  - Alternative Duties

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ASCO Standards: Medical Surveillance

USP <800> recommends that institutions develop a medical surveillance program for workers handling HDs.

Challenges:

- Medical surveillance in the context of safe handling fails to meet several established screening criteria (1);
- There are no valid tests or techniques for detecting early signs of disease:
- There are no established levels of exposure that have been linked to adverse health effects;
- There are no established actions in response to a particular result.

(1) Andermann A, Blancquaert I, Beauchamp S, Déry V. Revisiting Wilson and Jungner in the genomic age: a review of screening criteria over the past 40 years 2008 [Available from: http://www.who.int/bulletin/volumes/86/4/07-050112/en/.

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ASCO Standards: Medical Surveillance

Actions/Potential Solutions:

- Workers should be encouraged to report occupational health issues to employee health services at the time that they are experienced.

- As an alternative to routine ongoing medical surveillance programs, this ASCO endorses larger scale data collection in the context of a registry of health care workers.

- The collection of data to test research hypotheses is endorsed, provided that the necessary samples size to detect significant differences can reasonably be achieved, that peer-reviewed publication plans are determined a priori, and that approval has been given by a research ethics board.

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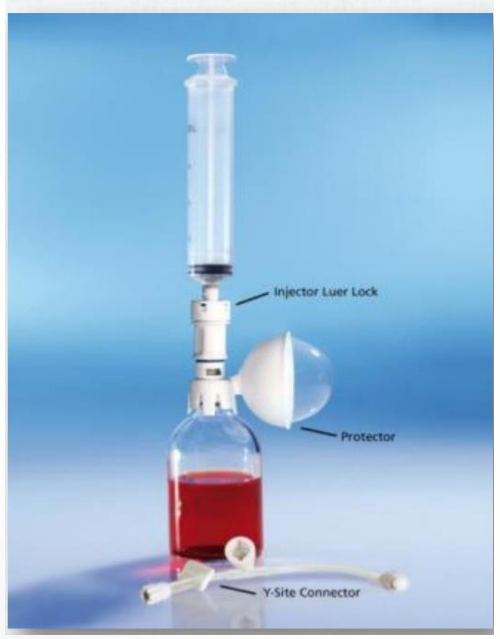
ASCO Standards: CSTDs

USP <800>: must not be used as a substitute for C-PEC when compounding, **should** be used when compounding HDs when the dosage form allows, and **shall** be used when administering HDs when the dosage form allows.

Challenge:

- No standard testing protocols or certification process for closed system transfer devices.
- No data on impact of CSTDs on worker health outcomes.



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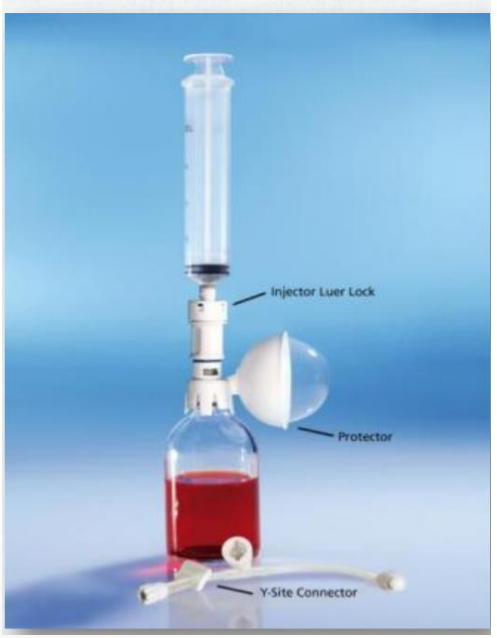
ASCO Standards: CSTDs

Actions/Potential Solutions:

- Independent research into the effectiveness of CSTDS.
- Incorporation of results from the NIOSH vapor containment testing protocol.
- Independent certification of effective CSTDs.



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ASCO Standards: External Ventilation

USP <800>: All C-SECs must be externally vented.

Challenge:

- HEPA filters are appropriate for capturing solid or aerosolized participles, but do not capture vaporized drugs.
- There is very little data available on the ability of hazardous drugs to vaporize within the workplace environment.

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ASCO Standards: External Ventilation

Actions/Potential Solutions:

- External ventilation may be viewed as part of a suite of protective measures that are designed to reduce the likelihood of exposure.
- Preparing hazardous drugs off-site or consolidating preparation activities in an externally-ventilated location may be considered where external ventilation is not possible within existing facilities due to structural or other constraints.
- More research is needed on the optimal environment for workers who handle hazardous drugs.
- Research is needed into the ability of hazardous drugs to vaporize within the workplace environment.

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ASCO Standards: Alternative Duty

Challenges:

- There may be special burdens on small practices looking to implement alternative duty programs.
- Very little is known regarding the level of risk in current workplaces for workers who are actively trying to conceive, are pregnant, or are breast-feeding.

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ASCO Standards: Alternative Duty

Actions/Potential Solutions:

- The health care setting has a policy that identifies potential alternative work options, where possible, for workers who are actively trying to conceive, are pregnant, or are breast-feeding.
- Health care workers are given information at the time of hire regarding the capacity of the organization to reassign to alternative duty. Reviewing the options for alternative work, where available, should be the shared responsibility of the employee and employer.

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Conclusions

- Where USP <800> has been officially adopted within certain states, users of this Standard should refer to the requirements contained within USP <800>.
- While the ASCO Standards differ in some ways from the USP <800>, existing Standards are largely endorsed by ASCO, and we hope to reinforce the hierarchy of controls that provides protection for workers.
- We strongly encourage workplaces to follow a philosophy of ALARA (as low as reasonably achievable) with respect to exposure, and endorse efforts that will reduce the barriers to implementation of effective controls.
- Within the Standards document we have identified areas, such as closed system transfer devices, where more research is needed.

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Questions

Please enter any questions into the Chat Box to be read by the Moderator

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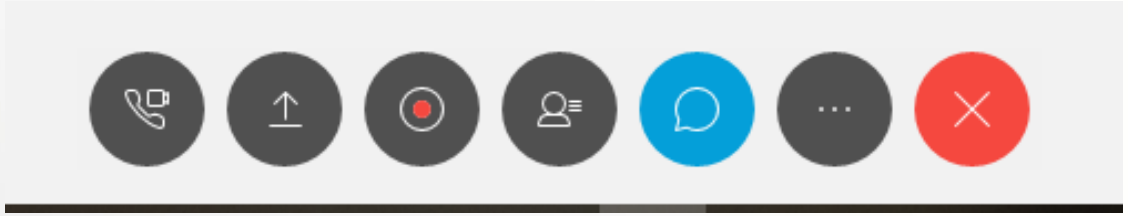
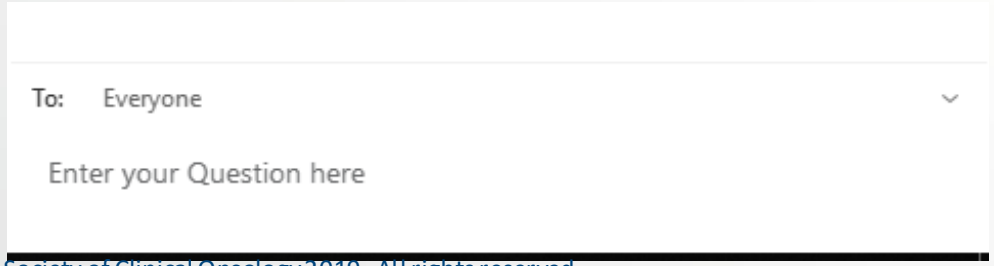


Type your question on in the box on the right side of the WebEx meeting



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Appendix

Additional resources are included in the following slides:

- Resources for HD Listing
- HD Compounding and Engineering Controls
- Maintaining a list of HDs
- References to ASCO Standards publications

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Resources for HD Listing

- Safety Data Sheets (SDS, formerly MSDS)
- Drug package inserts
- International Agency for Research on Cancer (IARC), http://www.iarc.fr
- Drugbank: http://www.drugbank.ca
- DailyMed: http://dailymed.nlm.nih.gov/dailymed/
- NIOSH: http://cdc.gov/niosh/topics/hazdrug

NIOSH 2016. NIOSH list of antineoplastic and other hazardous drugs in healthcare settings 2016. By Connor TH, MacKenzie BA, DeBord DG, Trout DB, O'Callaghan JP. Cincinnati, OH US DHHS, CDC.

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HD Compounding and Engineering Controls

- HDs must be compounded in a C-PEC (hood) in a C-SEC (buffer room)
- C-PEC shall operate continuously
- Segregate non-sterile and sterile compounding C-PECs
- Laminar airflow workbench (LAFW) or compounding aseptic isolator (CAI) must not be used for compounding HDs

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Maintenance of HD List

- Assessment of new drugs as they enter the marketplace
- Re-categorization as new toxicologic data becomes available
- Consider investigational agents hazardous if the mechanism of action suggests HD
- Consider dosage form and whether dosage form will be altered/crushed/compounded
- All hazardous drugs should be labeled

NIOSH 2016. NIOSH list of antineoplastic and other hazardous drugs in healthcare settings 2016. By Connor TH, MacKenzie BA, DeBord DG, Trout DB, O'Callaghan JP. Cincinnati, OH US DHHS, CDC.

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ASCO Standards Publications

- Celano P, Fausel CA, Kennedy EB, et al: Safe Handling of Hazardous Drugs: ASCO Standards. J Clin Oncol:JCO1801616, 2019
- Celano P, Kennedy EB, Zon RT: Safe Handling of Hazardous Drugs: ASCO Standards Summary. J Oncol Pract:JOP1800659, 2019
- Celano P, Kennedy EB, Oliver TK, et al: ASCO Standards for Safe Handling of Hazardous Drugs (editorial). J Oncol Pract:JOP1800701, 2019

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