

ELSEVIER Clinical Skills

Containment of Hazardous Medication Spills (Oncology) – CE

ALERT

Don appropriate personal protective equipment (PPE) based on the patient's signs and symptoms and indications for isolation precautions.

Refer to Oncology Nursing Society (ONS) interim guidelines for PPE recommendations during an emergent shortage of PPE (e.g., pandemic).⁵

Exposure to hazardous medications by accidental spillage creates potential health risks that include genotoxicity, carcinogenicity, teratogenicity, and infertility to health care team members who handle the cleaning process or anyone else who is accidentally exposed. Ensure that spill kits are available where hazardous medications are stored, transported, prepared, or administered.^{1,4}

Do not touch a spill with unprotected hands.

OVERVIEW

Many agents (e.g., chemotherapy, biotherapy, hormonal agents) are considered hazardous to humans and require special handling techniques to avoid health risks from exposure. Health risks include carcinogenicity (may cause cancer), teratogenicity (may adversely affect a developing fetus), infertility (may cause inability to have children), organ toxicity (may cause hair loss, abdominal pain, dermatitis, and skin or eye injuries), and genotoxicity (may cause damage to deoxyribonucleic acid [DNA]).^{6,7} People are exposed via direct or indirect drug contact, injection, inhalation, or ingestion.¹

PPE is required in the handling of hazardous substances, including the cleanup of an accidental spill.^{6,7} Spill kits should be readily available where hazardous medications (such as most antineoplastic agents) are stored, transported, prepared, or administered.^{1,4} Anyone involved in activities that include hazardous medications must be trained on how to clean up a spill and when to call a hazardous materials response team or an environmental services specialist to clean up a larger spill.^{6,7} Each organization should have management protocols or procedures for hazardous spills, and employees should be familiar with them.² Safety data sheets should be available in locations where hazardous medications are stored, prepared, and administered.^{6,7} The Centers for Disease Control and Prevention's National Institute for Occupational Safety and Health's (NIOSH's) most current list of drugs considered to be hazardous should be reviewed regularly because many nonantineoplastic therapies are also on this list, and it is updated regularly.

Spill cleanup is performed according to the type, location, and size of the spill.² Any spill greater than a few drops must be reported and documented according to the organization's practice.¹

EDUCATION

- Encourage the patient to bring his or her caregiver to the educational session.
- Explain to the patient and caregiver that, despite close monitoring and expert administration, hazardous medication spills can still occur.
- Educate the patient and caregiver about routes of exposure: direct and indirect contact, injection, inhalation, and ingestion.
- If hazardous medications are administered in the home:

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- Ensure that the patient who is self-administering hazardous medications in the home has a spill kit readily available.
- Inform the patient and caregiver to contact the practitioner if a spill occurs.
- Instruct the patient and caregiver to avoiding touching or inhaling any spilled hazardous medication.
- Instruct the patient and caregiver on steps to follow in the event of a hazardous medication spill ([Box 1](#)).⁶⁷

Box 1 Patient and Caregiver Instructions for Spills in the Home

1. Open the spill kit provided for home use. **Do not touch the spill with unprotected hands.**
2. Put on both pairs of chemotherapy gloves, a chemotherapy-resistant gown, face shield, shoe covers, and the National Institute for Occupational Safety and Health-certified respirator.
3. If the bag or syringe with a hazardous medication is leaking and a catheter or implanted port is in place, disconnect the catheter from the tubing and flush and cap it.
4. Contain the spill with absorbent pads.
5. If the skin and dressing are contaminated, remove the dressing and cleanse the skin with soap and water.
6. Wipe up the spill with absorbent pads or sheets.
7. Wipe up solids using wet absorbent pads.
8. Put contaminated cleanup materials directly into the plastic bag contained in the kit. Do not lay them on unprotected surfaces.
9. Wash the area with dishwashing or laundry detergent and warm water, using disposable rags or paper towels, and put them in the plastic bag with other waste.
10. Rinse the area with clean water and dispose of the towels in the same plastic bag.
11. Put all contaminated materials, including the spill kit box, into the plastic bag. Seal the bag with the hazardous waste label included in the kit.
12. Place the sealed wasted bag into a second waste bag labeled as hazardous waste. Do not seal it yet.
13. Remove all personal protective equipment, place it in the second plastic bag, and seal the second bag.
14. Place the sealed waste bag in a puncture-proof hazardous waste container.
15. Wash hands with soap and water.
16. If the spill occurs on sheets or clothing, wash the items in hot water, separate from other laundry. Wash clothing or bed linen contaminated with body wastes in the same manner.
17. Notify the home health nurse, clinic, or practitioner's office promptly to report the spill. The spilled hazardous medication will need to be replaced so that treatment can be completed.
18. Arrange for the waste to be picked up or taken to the clinic for proper disposal.

(Adapted from Polovich, M., Olsen, M.M. [Eds.]. [2018]. *Safe handling of hazardous drugs* [3rd ed.]. Pittsburgh: Oncology Nursing Society.)

- Instruct the patient who is on 24-hour infusions of hazardous medications to use a plastic-backed mattress pad to protect the mattress from contamination.
- Inform the patient that the clinic or home health agency may need to provide his or her spill kit.
- Encourage questions and answer them as they arise.

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ASSESSMENT AND PREPARATION

Assessment

1. Determine whether the spill can be absorbed with a spill kit that has sufficient supplies to absorb about 1000 ml (volume of one IV bag or bottle).³

Preparation

1. Gather additional health care team members and needed supplies, including a spill kit, alert signs, and the organization’s practice manuals.
2. Post signs that warn others of a hazardous spill to prevent unnecessary exposure.¹

PROCEDURE

1. Perform hand hygiene and don gloves and appropriate PPE based on the patient’s signs and symptoms and indications for isolation precautions. Use the ONS interim guidelines for PPE recommendations during an emergent shortage of PPE (e.g., pandemic) (Table 1).⁵

Table 1 Oncology Nursing Society (ONS) Recommendations and Interim Guidelines for Personal Protective Equipment (PPE) Use During Pandemic		
PPE	ONS recommendations*	Pandemic interim guidelines (in descending order)
Gown	Disposable poly-coated gown	<ul style="list-style-type: none"> • Regular disposable gown (water resistant) • Cloth gown (facility laundered) for infection control and nonhazardous drugs
Mask	Mask with face and eye protection required only if splashing likely and for spill cleanup	<ul style="list-style-type: none"> • N95 mask for symptomatic or patients with COVID-19 and hazardous drug spills and cleanup • PAPR
Eye protection	Mask with eye protection or goggles if splashing likely or spill cleanup	<ul style="list-style-type: none"> • Full facepiece air-purifying respirator or PAPR
Gloves	Double chemotherapy-tested gloves	<ul style="list-style-type: none"> • Single chemotherapy-tested gloves • Double standard examination gloves • Single standard examination gloves
Shoe covers	Only in area for compounding hazardous drugs	<ul style="list-style-type: none"> • Work-only, washable shoes

COVID, coronavirus, PAPR, powered air purifying respirator; PPE, personal protective equipment

*Highest-level recommended practice based on supplies of available PPE

(Data from Oncology Nursing Society. [ONS]. [2020]. ONS interim guidelines during the COVID-19 pandemic. Retrieved on April 3, 2020, from <https://www.ons.org/covid-19-interim-guidelines>)

2. When no PPE shortage exists, don gown or coveralls, shoe covers, gloves, face shield, and a NIOSH-certified respirator.³

Rationale: Safe handling standards require an appropriate full-face piece, chemical cartridge-type respirator to be worn when attending to hazardous medication spills larger than what can be contained with a spill kit or when there is known or suspected airborne exposure to powders or vapors.^{3,7}

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Do not touch the spill with unprotected hands.

3. Contain the spill with disposable, absorbent pads or sheets.
4. Wash the area by cleaning the spill according to location and type. Clean from the least contaminated area to the most contaminated area.

a. Hard surface

- i. Wipe up the spill with disposable absorbent pads or sheets. Wipe up solids using wet absorbent pads.
- ii. Collect any glass fragments with a plastic disposable scoop. If a scoop is not available, don disposable utility gloves over disposable, chemical-protective gloves and collect the glass fragments.
- iii. Place the glass fragments in a puncture-proof container.

b. Uncarpeted floors

- i. Use a commercially available deactivation product for medications that have been tested. If no information is available, use a bleach solution and a detergent solution.¹
- ii. Rinse with clean water.¹

c. Carpeted floors

- i. Use absorbent powder to absorb the spill.¹
- ii. Use a small vacuum designated only for hazardous material cleanup.
- iii. Clean the carpet as normal for the facility.
- iv. Dispose of the vacuum's collection bag as hazardous waste.
- v. Clean the outside of the vacuum before storing it.

5. Place all contaminated materials (including the puncture-proof container) into a leak-proof waste bag.
6. Seal the waste bag.
7. Place the sealed waste bag into a second waste bag labeled as hazardous waste. Do not seal it yet. Place it on the floor.
8. Remove PPE and place all items in the second unsealed waste bag.
9. Seal the second waste bag.
10. Place the sealed waste bag in a puncture-proof hazardous waste container.
11. Perform hand hygiene.
12. Report and document the spill according to the organization's practice.

For Spills with Exposure to the Health Care Team Member

1. Immediately remove all PPE.
2. Wash the affected area with soap and water.
3. If an eye is exposed, flood it at an eyewash station for at least 15 minutes.²
4. Seek medical attention in the emergency department or at employee health services.

For Spills with Exposure to the Patient

1. If the patient's skin and dressing are contaminated, remove the dressing and cleanse the patient's skin with soap and water.

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2. If an eye is exposed, flood it at an eyewash station for at least 15 minutes.²
3. Notify the practitioner of the patient's exposure.
4. Document the exposure in the patient's record according to the organization's practice.

MONITORING AND CARE

1. Schedule medical surveillance for exposed persons.

EXPECTED OUTCOMES

- Hazardous medication spill is contained and cleaned without exposing patient, health care team members, or environmental services team members.

UNEXPECTED OUTCOMES

- Nurse, patient, or others are exposed to hazardous medication(s).

DOCUMENTATION

- Name of hazardous substance
- Approximate amount of hazardous substance spilled
- Events surrounding spill occurrence
- Procedures followed for spill cleanup
- Names of people exposed to hazardous substance, including patient involved
- Steps taken to minimize exposure
- Educational information provided to exposed people
- Management of and follow-up with exposed people
- People and departments notified of the spill
- Education
- Unexpected outcomes and related interventions

SPECIAL CONSIDERATIONS

- Patients who are nonadherent or very mobile, such as children, may need limb immobilization to avoid an accidental spill.
- Patients who are morbidly obese, cachectic, or prone to conscious or unconscious manipulation of the port (Twiddler syndrome) are at higher risk for a spill.
- Patients with impaired communication abilities may need assistance regarding how to alert a health care team member about an accidental spill.
- Older adults, children, and patients with mobility difficulties need to be assisted when moving from one area to another (e.g., the bathroom) to avoid accidental spills.
- Patients receiving hazardous medications in the home require at least one responsible party to be present who could monitor for and clean up an accidental spill.

REFERENCES

1. Eisenberg, S. (2018). Management of spills. In M. Polovich, M.M. Olsen (Eds.), *Safe handling of hazardous drugs* (3rd ed., pp. 54-58). Pittsburgh: Oncology Nursing Society. ([Level VII](#))
2. Occupational Safety and Health Administration (OSHA). (2015). OSHA infosheet: Health effects from contaminated water in eyewash stations. Retrieved April 3, 2020, from <https://www.osha.gov/Publications/OSHA3818.pdf> ([Level VII](#))
3. Occupational Safety and Health Administration (OSHA). (n.d.). Controlling occupational exposure to hazardous drugs. Retrieved April 3, 2020, from

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https://www.osha.gov/SLTC/hazardousdrugs/controlling_occe Hazardousdrugs.html (Level VII)

4. Olsen, M.M. (2018). Definition of hazardous drugs. In M. Polovich, M.M. Olsen (Eds.), *Safe handling of hazardous drugs* (3rd ed., pp. 3-5). Pittsburgh: Oncology Nursing Society. (Level VII)

5. Oncology Nursing Society. (2020). ONS interim guidelines during the COVID-19 pandemic. Retrieved on April 3, 2020, from <https://www.ons.org/covid-19-interim-guidelines> (Level VII)

6. Polovich, M., Olsen, M.M. (2018). Patient and family education. In M. Polovich, M.M. Olsen (Eds.), *Safe handling of hazardous drugs* (3rd ed., pp. 77-80). Pittsburgh: Oncology Nursing Society. (Level VII)

7. U.S. Pharmacopeial (USP) Convention, The. (2019). USP general chapter <800> hazardous drugs—Handling in healthcare settings. Retrieved April 3, 2020, from <https://www.usp.org> (Level VII)

ADDITIONAL READINGS

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He, B.Y. and others. (2017). Personal protective equipment use and hazardous drug spills among ambulatory oncology nurses: Results from a mailed survey. *Oncology Nursing Forum*, 44(1), 60-65. doi:10.1188/17.ONF.60-65

National Institute for Occupational Safety and Health (NIOSH). (2008). Workplace solutions: Personal protective equipment for health care workers who work with hazardous drugs. Retrieved April 3, 2020, from <https://www.cdc.gov/niosh/docs/wp-solutions/2009-106/pdfs/2009-106.pdf> (classic reference)*

*In these skills, a “classic” reference is a widely cited, standard work of established excellence that significantly affects current practice and may also represent the foundational research for practice.

Elsevier Skills Levels of Evidence

- Level I - Systematic review of all relevant randomized controlled trials
- Level II - At least one well-designed randomized controlled trial
- Level III - Well-designed controlled trials without randomization
- Level IV - Well-designed case-controlled or cohort studies
- Level V - Descriptive or qualitative studies
- Level VI - Single descriptive or qualitative study
- Level VII - Authority opinion or expert committee reports

Supplies

- Hazardous medication waste container
- Organization’s practice manuals for hazardous spill cleanup
- Sign to alert uninvolved people about risk
- PPE for isolation precautions: gloves and PPE, as indicated
- Spill kit
 - Two disposable, lint-free, solid-front chemotherapy-resistant gowns with back closure, long sleeves with tight cuffs, and polyethylene-coated, antineoplastic therapy–tested, low-permeability material

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- Two pairs of chemical splash goggles or face shields
- Two pairs of low-permeability, antineoplastic therapy–resistant disposable shoe covers
- One pair of disposable, chemical-protective utility gloves
- Four pairs of disposable, powder-free, nitrile, polyurethane, or neoprene chemotherapy-tested gloves
- Two NIOSH-certified respirator masks
- Absorbent powder
- Disposable, absorbent sheets or pads
- Disposable plastic scoop
- Disposable dustpan
- Puncture-proof container for glass fragments
- Two sealable, thick, plastic hazardous waste bags with appropriate warning label
- Plastic-backed mattress pad (if patient is having a 24-hour infusion at home)
- Small vacuum designated only for hazardous material cleanup

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