



CADTH Reference List

Safe Handling of Cytotoxic Drugs and Medications

August 2023

Key Message

We found 5 evidence-based guidelines about the safe handling of cytotoxic drugs and/or medications.

Research Question

What are recommendations regarding the safe handling of cytotoxic drugs and/or medications?

Methods

Literature Search Methods

An information specialist conducted a literature search on key resources including MEDLINE, the Cochrane Database of Systematic Reviews, the International HTA Database, as well as a focused internet search. The search approach was customized to retrieve a limited set of results, balancing comprehensiveness with relevancy. The search strategy comprised both controlled vocabulary, such as the National Library of Medicine's MeSH (Medical Subject Headings), and keywords. Search concepts were developed based on the elements of the research questions and selection criteria. The main search concepts were cytotoxic drugs, health care staff, and terms for safety, handling, exposure, or protection. CADTH-developed search filters were applied to limit retrieval to guidelines. The search was completed on July 26, 2023, and limited to English-language documents published since January 1, 2018. Internet links were provided, where available.

Selection Criteria and Summary Methods

One reviewer screened literature search results (titles and abstracts) and selected publications according to the inclusion criteria presented in [Table 1](#). Full texts of study publications were not reviewed. The Overall Summary of Findings was based on information available in the abstracts of selected publications. Open access full-text versions of evidence-based guidelines were reviewed when available, and relevant recommendations were summarized.

Table 1: Selection Criteria

Criteria	Description
Population	Individuals who handle cytotoxic drugs and/or medications
Intervention	Safe handling policies and/or practices
Comparator	Not applicable
Outcomes	Recommendations to reduce the risk of cytotoxic hazard, including endocrine and/or reproductive risk
Study designs	Evidence-based guidelines

Results

Five evidence-based guidelines about the safe handling of cytotoxic drugs and/or medications were identified.¹⁻⁵

Additional references of potential interest that did not meet the inclusion criteria are provided in [Appendix 1](#).

Overall Summary of Findings

Five evidence-based guidelines¹⁻⁵ were identified regarding the safe handling of cytotoxic drugs and/or medications. Three guidelines were developed internationally¹⁻³ and 2 were developed or intended for use within Canada.^{4,5}

One guideline³ focused on the prescribing, dispensing, and administration of systemic cancer drugs with a section focused on safe handling of intrathecal drugs, 1 guideline⁵ focused on oral anticancer agents in a community pharmacy setting, and 3 guidelines^{1,2,4} focused on the safe handling of hazardous drugs at all stages from reception to disposal. Some general themes that emerged from recommendations provided in the guidelines were training and education of staff involved with cytotoxic agents;^{1,3-5} drug reception, delivery, unpacking, and storage;^{1,3-5} preparation and dispensing of cytotoxic drugs;⁴ administration of cytotoxic agents to patients;^{1,3,4} personal protective equipment required for handling and administration of drugs; best practices on donning and removal;^{1,3-5} and waste clearance and disposal.^{1,3-5}

Furthermore, the Clinical Oncology Society of Australia provides specific recommendations for the safe handling of cytotoxic agents for health care professionals who provide care to patients at home.⁴ The American Society of Clinical Oncology provides a standard for alternative duty whereby workers actively trying to conceive, are pregnant, or breastfeeding should be offered alternative work options that do not involve the handling of cytotoxic agents.² Additionally, 2 of the identified guidelines^{2,4} provide recommendations with respect to engineering controls regarding the air-conditioning, heating, and ventilation of rooms where preparation of cytotoxic drugs occurs. The same 2 guidelines^{2,4} also provide recommendations regarding medical surveillance to investigate potential health effects of individuals who handled cytotoxic drugs.

A summary of guideline recommendations can be found in [Table 2](#).

Table 2: Summary of Recommendations in Included Guidelines

Guideline development group or author (year)	Guideline development group region	Summary of recommendations
Liu et al. (2023) ¹	China	Specific recommendations for handling antineoplastics can be found in the full text (p. 3-7). Recommendations cover the following areas: <ul style="list-style-type: none"> • Emergency spill treatment facilities (i.e., spill kit during the delivery, mixture,

Guideline development group or author (year)	Guideline development group region	Summary of recommendations
		administration, and disposal of the antineoplastic drug) <ul style="list-style-type: none"> • Procedures for managing an accidental spill • Personnel exposure prevention training, including the contents of the training curriculum • Measures to avoid exposure to antineoplastic drugs and medications during drug delivery, reception, and storage • Measures to avoid exposure to antineoplastic drugs when dispensing both oral and IV formulations • Preventive measures to be taken when administering antineoplastic drugs and medications to patients • Measures to avoid exposure when disposing of antineoplastics
ASCO (2019) ²	US	Standards for the safe handling of hazardous drugs including cytotoxic drugs and medications can be found in the full text. Recommendations cover: <ul style="list-style-type: none"> • Medical surveillance (p. 602) • Testing CSTDs (p. 604) • The external ventilation of C-SECs or C-SCAs (p. 606) • Alternative work options for health care workers who are actively trying to conceive, are pregnant, or are breastfeeding (p. 606)
COSA (2018) ³	Australia	Specific recommendations and practice points regarding the handling of cytotoxic drugs can be found in the full text. Recommendations include, but are not limited to: <ul style="list-style-type: none"> • Precautions and measures that health care professionals should follow (i.e., training, PPE, and policies and procedures organizations should develop and implement, p. 36 to 37) • Training needs required for medical staff in prescribing and administering intrathecal therapy (p.41) • Safety processes to follow when delivering and storing cytotoxic drugs and medications (p. 48) • Precautions to follow handling patient waste (p.60)
Ontario Health-Cancer Care Ontario (2022) ⁴	Ontario, Canada	Specific recommendations for the safe handling of hazardous drugs can be found in the full text (p. 1-16). Recommendations cover the following areas: <ul style="list-style-type: none"> • Continuing education required for staff involved with hazardous drugs • PPE required for handling drugs and best practices when handling hazardous drugs • Handling damaged containers upon reception of drugs • The unpacking and storage of hazardous drugs • Requirements for the oncology pharmacy, including air-conditioning, heating, and ventilation, systems • The preparation of all hazardous drugs – parenteral, oral, and topical preparations • Transportation of hazardous drugs after they have been prepared • Technique for the safe administration of drugs to limit exposure • Best practices for health care professionals providing home care to patients, including waste clearance • Hazardous waste management • Accidental exposure of hazardous drugs to a staff member’s skin or clothing

Guideline development group or author (year)	Guideline development group region	Summary of recommendations
		<ul style="list-style-type: none"> • Management of spills and the use of the spill kit • Medical surveillance to investigate potential health effects
Vu et al. (2018)⁵	Canada	Recommendations regarding the safe use and handling of oral anticancer drugs can be found throughout the text (p. 242-250). Recommendations cover the following areas: <ul style="list-style-type: none"> • Reception and unpacking of shipments • Storage • Preparation of oral drugs and equipment needed • Verification and dispensing of oral agents • PPE requirements • Disposal and waste management • Spill protocol including what a spill kit should include • Training and education required for the community pharmacy team

ASCO = American Society of Clinical Oncology; COSA = Clinical Oncology Society of Australia; C-SCA = containment segregated compounding area; C-SEC = containment secondary engineering control; CSTD = closed system drug transfer device; PPE = personal protective equipment.

References

Guidelines and Recommendations

International

1. Liu W, Wu Z, Sun T, et al. Management guidelines for preventing exposure to antineoplastics. *Chin J Cancer Res.* Feb 28 2023;35(1):1-10. [PubMed](#)
Refer to Recommendations 3-11, and 14 (pages 3-7)
2. Celano P, Fausel CA, Kennedy EB, et al. Safe Handling of Hazardous Drugs: ASCO Standards. *J Clin Oncol.* 03 01 2019;37(7):598-609. [PubMed](#)
Refer to Bottom line box (pages 599-600); Medical surveillance standard (page 602); Alternative duty standard (page 606)
3. Cancer Therapy Medication Safety Working Group. COSA guidelines for the safe prescribing, dispensing and administration of systemic cancer therapy. Sydney (AU): Clinical Oncology Society of Australia; 2018: https://wiki.cancer.org.au/australiawiki/images/2/29/Cancer_chemotherapy_medication_safety_guidelines.pdf. Accessed 2023 Aug 2.
Refer to recommendations Q3.1.19 (page 36); Practice points for Q3.1.19 (pages 36-37); Q3.1.26 recommendation 2 (page 41); Q3.1.32 recommendation 4 (page 48); Q3.1.40 recommendation 5 (page 59); Q3.1.41 recommendation 2 (page 60)

Canada

4. Kennedy K, Vu K, Coakley N, et al. Safe Handling of Hazardous Drugs. (*Program in Evidence-Based Care Guideline No.: 16-3 V3.*) Toronto (ON): Ontario Health (Cancer Care Ontario); 2022: <https://www.cancercareontario.ca/en/guidelines-advice/types-of-cancer/2161>. Accessed 2023 Aug 1.
5. Vu K, Emberley P, Brown E, et al. Recommendations for the safe use and handling of oral anticancer drugs in community pharmacy: A pan-Canadian consensus guideline. *Can Pharm J (Ott).* Jul-Aug 2018;151(4):240-253. [PubMed](#)

Appendix 1: References of Potential Interest

Systematic Reviews

Closed-system transfer-devices for limiting exposure to cytotoxic anti-cancer drugs in healthcare professionals, patients and visitors. Glasgow (GB): Healthcare Improvement Scotland, Scottish Health Technologies Group; 2019: <https://shtg.scot/our-advice/closed-system-transfer-devices-for-limiting-exposure-to-cytotoxic-anti-cancer-drugs-in-healthcare-professionals-patients-and-visitors/>. Accessed 2023 Aug 1.

Systematic Review of Guidelines

Bernabeu-Martinez MA, Ramos Merino M, Santos Gago JM, Alvarez Sabucedo LM, Wanden-Berghe C, Sanz-Valero J. Guidelines for safe handling of hazardous drugs: A systematic review. *PLoS ONE*. 2018;13(5):e0197172. [PubMed](#)

Guidelines and Recommendations

Unclear Methodology – International

Hodson L, Ovesen J, Couch J, et al. Managing Hazardous Drug Exposures: Information for Healthcare Settings. (DHHS (NIOSH) Publication No. 2023-130). Cincinnati (OH): U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health (NIOSH); 2023: <https://www.cdc.gov/niosh/docs/2023-130/default.html>. Accessed 2023 Aug 1.

Anonymous. ISOPP Standards for the Safe Handling of Cytotoxics. *J Oncol Pharm Pract*. 04 2022;28(3_suppl):S1-S126. [PubMed](#)

Crul M, Breukels O. Safe handling of cytostatic drugs: recommendations from independent science. *Eur J Hosp Pharm*. Sep 16 2022;16:16. [PubMed](#)

Cytotoxic drugs: Keeping workers safe when handling cytotoxic drugs and related waste. Wellington (NZ): WorkSafe New Zealand; 2020: <https://www.worksafe.govt.nz/topic-and-industry/health-and-safety-in-healthcare/cytotoxic-drugs/>. Accessed 2023 Aug 2.

Guidelines for Managing Specific High Risk Medications Relevant to the Organisation. East Perth (AU): Government of Western Australia, Department of Health; 2020: <https://www.health.wa.gov.au/~media/Files/Corporate/Policy-Frameworks/Clinical-Governance-Safety-and-Quality/Policy/High-Risk-Medication-Policy/Supporting/Guidelines-for-Managing-Specific-High-Risk-Medications-Relevant-to-the-Organisation.pdf>. Accessed 2023 Aug 2.

Kim JT, Park JY, Lee HJ, Cheon YJ. Guidelines for the management of extravasation. *J Educ Eval Health Prof*. 2020;17():21. [PubMed](#)
Refer to Management of Extravasation (pages 3-4) and Prevention of Extravasation (pages 4-5)

Smith AN, Klahn S, Phillips B, et al. ACVIM small animal consensus statement on safe use of cytotoxic chemotherapeutics in veterinary practice. *J Vet Intern Med*. May 2018;32(3):904-913. [PubMed](#)

Health and Safety Executive. Safe handling of cytotoxic drugs in the workplace. [Date unknown]; <https://www.hse.gov.uk/healthservices/safe-use-cytotoxic-drugs.htm>. Accessed 2023 Aug 2.

Unclear Methodology – Canada

BC Cancer. BC Cancer Pharmacy Practice Standards for Hazardous Drugs. 2021; <http://www.bccancer.bc.ca/health-professionals/clinical-resources/pharmacy/safe-handling-manual>. Accessed 2023 Aug 1.

Guidance Document for Pharmacy Compounding of Non-sterile Preparations – Companion to the Model Standards for Pharmacy Compounding of Non-sterile Preparations. Ottawa (ON): National Association of Pharmacy Regulatory Authorities (NAPRA); 2018: <https://www.napra.ca/wp-content/uploads/2022/09/NAPRA-Mdl-Stnds-Pharmacy-Compounding-Nonsterile-Preparations-Guidance-EN-June-2018-CLAR-Jan-2022.pdf>. Accessed 2023 Aug 1.

Alternative Methodology – International

New South Wales Government eviQ. Safe administration of anti-cancer drugs. 2023; <https://www.eviq.org.au/clinical-resources/administration-of-anti-cancer-drugs/5-safe-administration-of-anti-cancer-drugs>. Accessed 2023 Aug 1.
Refer to Pre-administration- safe handling precautions; Administration- Oral anti-cancer drug administration

HSE Guideline on the Safe Handling of Cytotoxic Drugs. Dublin (IE): Health Service Executive; 2022: https://assets.hse.ie/media/documents/Guideline_on_the_Safe_Handling_of_Cytotoxic_Drugs.pdf. Accessed 2023 Aug 1.

- Gabay M, Johnson P, Fanikos J, et al. Report on 2020 Safe to Touch Consensus Conference on Hazardous Drug Surface Contamination. *Am J Health Syst Pharm*. 08 30 2021;78(17):1568-1575. [PubMed](#)
Refer to Consensus statements 2-3 (page 1570) and 7-8 (page 1573)
- Valero-Garcia S, Gonzalez-Haba E, Gorgas-Torner MQ, et al. Monitoring contamination of hazardous drug compounding surfaces at hospital pharmacy departments. A consensus Statement. Practice guidelines of the Spanish Society of Hospital Pharmacists (SEFH). *Farm Hosp*. Mar 11 2021;45(2):96-107. [PubMed](#)
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- United States Pharmacopeia and National Formulary. USP General Chapter <800>: Hazardous Drugs—Handling in Healthcare Settings. Revised 2020; <https://www.usp.org/compounding/general-chapter-hazardous-drugs-handling-healthcare>. Accessed 2023 Aug 2.
- Santillo M, Field A, Henderson J, et al. Guidance on Handling of Injectable Cytotoxic Drugs in Clinical Areas in in NHS Hospitals in the UK (Yellow Cover). 1st ed. [London (GB)]: NHS Pharmaceutical Quality Assurance Committee; 2018: <https://www.sps.nhs.uk/articles/guidance-on-handling-of-injectable-cytotoxic-drugs-in-clinical-areas-in-in-nhs-hospitals-in-the-uk-yellow-cover-edition-1-july-2018/>. Accessed 2023 Aug 2.
- Uda-Urzaiz M, Alonso-Herreros JM, Fernandez-Gomez JM, Gaspar-Carreno M, Cozar-Olmos JM, Cercos Lleti AC. Review of evidence on handling hazardous drugs and Products in Urology Services; consensus document between the Spanish Urology Association and the Spanish Society of Health-System Pharmacists. *Farm Hosp*. 09 01 2018;42(5):212-215. [PubMed](#)

Alternative Methodology – Canada

Handling of health care waste materials. (CSA Z317.10:21). Toronto (ON): Canadian Standards Association; 2021: <https://www.csagroup.org/store/product/2701340/>. Accessed 2023 Aug 1.

Position Statements

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- American Society of Clinical Oncology Position Statement: Home Infusion of Anticancer Therapy. Alexandria (VA): American Society of Clinical Oncology (ASCO); 2020: https://old-prod.asco.org/sites/new-www.asco.org/files/content-files/advocacy-and-policy/documents/2020_Home-Infusion-Position-Statement.pdf. Accessed 2023 Aug 2.
- Canadian Union of Public Employees. Cytotoxic drugs. 2020; <https://cupe.ca/cytotoxic-drugs>. Accessed 2023 Aug 2.
- ISNCC Systemic Anti-Cancer Therapies Administration Position Statement. Vancouver (BC): International Society of Nurses in Cancer Care (ISNCC); 2019: https://www.isncc.org/resources/Documents/isncc_systemic_anti-cancer_t.pdf. Accessed 2023 Aug 2.

Additional References

Flowchart

Bernabeu-Martinez MA, Garcia-Salom P, Burgos-San Jose A, Navarro-Ruiz A, Sanz-Valero J, Wanden-Berghe C. Consensus to identify the dangerous drugs risks in hospital pharmacy services. *Farm Hosp*. 03 01 2020;44(2):51-61. [PubMed](#)

Compendium of Policy Levers

Fazel S. CAREX Canada's compendium of policy levers regarding the safe handling of antineoplastic agents in occupational settings. Vancouver (BC): CAREX Canada; 2020: https://www.carexcanada.ca/CAREX_ANTINEOPLASTIC_POLICY_LEVERS_JAN_2020.xlsx. Accessed 2023 Aug 2.

Policy Lever Comparison

Fazel S, Keefe A. Comparison of policy levers for the safe handling of antineoplastic agents in Alberta, Manitoba, and British Columbia. Vancouver (BC): CAREX Canada; 2020: https://www.carexcanada.ca/CAREX_ANTINEOPLASTIC_POLICY_LEVER_COMPARISON_FEB_2020.pdf. Accessed 2023 Aug 2.

User Guide

National Safety and Quality Health Service Standards: User Guide for Medication Management in Cancer Care. Sydney (AU): Australian Commission on Safety and Quality in Health Care; 2020: https://www.safetyandquality.gov.au/sites/default/files/2020-04/nsqhs_standards_user_guide_for_medication_management_in_cancer_care_april_2020.pdf. Accessed 2023 Aug 1.

Qualitative study

Mathias PI, MacKenzie BA, Toennis CA, Connor TH. Survey of guidelines and current practices for safe handling of antineoplastic and other hazardous drugs used in 24 countries. *J Oncol Pharm Pract*. Jan 2019;25(1):148-162. [PubMed](#)

Toolkit

Toolkit for Safe Handling of Hazardous Drugs for Nurses in Oncology. Pittsburgh (PA): Oncology Nursing Society; 2018: https://www.ons.org/sites/default/files/2018-06/ONS_Safe_Handling_Toolkit_0.pdf. Accessed 2023 Aug 2.

Training Module

Centre for Research Expertise in Occupational Disease (CREOD). Best practices to prevent healthcare workers' exposure to antineoplastic (hazardous) drugs. [2023]; <https://creod.on.ca/antineoplastic-drugs/>. Accessed 2023 Aug 2.

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