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Developing a compendium of policy levers and opportunities to reduce exposure to antineoplastic (cytotoxic) drugs in pharmacies

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SUMMARY FOR GENERAL PUBLIC AUDIENCE

Summary of Results:

- Antineoplastic drugs are commonly used to treat cancer. However, these drugs are hazardous and many are known to cause cancer. In 2016, CAREX Canada estimated that approximately 75,000 Canadians were exposed to antineoplastic drugs at work. While guidelines on the safe handling of antineoplastic drugs exist, compliance is poor.

- Our study found that the most common barriers to safe handling of antineoplastic drugs were: poor training, poor workplace safety culture, cost, inconsistent policies, and lack of safety controls. The most common facilitators for safe handling of antineoplastic drugs were: adequate safety training, leadership support, consistent policies, and monitoring and evaluation.

- We further compared policy levers for the safe handling of antineoplastic drugs between Alberta, Manitoba, and British Columbia and found there were stark differences in policies and regulations, and in the way health and safety is managed. The wide variation highlights the importance of pan-Canadian policy levers that can be adopted by all provinces.

For decision makers:

- Our study identified an important gap: there is no national repository of policies or policy levers regarding the safe handling of antineoplastic drugs.

    - We have addressed this by creating a policy levers compendium that would assist policy makers and healthcare leaders create safe handling guidelines and policies within their respective organizations and jurisdiction.

    - This has the potential to set a standard landscape in Canada for the safe handling of antineoplastic drugs and have a subsequent positive impact for prevention of adverse health outcomes among healthcare workers

- We have also created a prevention framework that would aid decision makers in auditing existing policy levers and improving their practices related to the safe handling of antineoplastic drugs.

For frontline workers:

- The results of this study will assist workers in understanding the barriers and facilitators towards the safe handling of antineoplastic drugs, and to enhance workers' awareness about the importance of these exposures to their occupational health and that of their coworkers.

For researchers:

- This study adds to the growing body of literature regarding the safe handling of antineoplastic drugs by bringing a nuanced approach that qualitatively highlights the challenges that workers face when handling antineoplastic drugs. Furthermore, our research provides a stepping-stone for future studies to look into programs that adapt our recommendations and measure the effectiveness of behavior change interventions aimed at improving the safe handling of antineoplastic drugs.

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None

INTRODUCTION

Definition of antineoplastic drugs

Antineoplastic drugs, also referred to as chemotherapy drugs or cytotoxic drugs, are the most common type of systemic drug therapy used to treat cancer (1). These drugs interfere with the ability of cancer cells to grow and spread. The International Agency for Research on Cancer (IARC) has evaluated different antineoplastic drugs for evidence of carcinogenicity. Based on animal and human evidence, as well as mechanistic considerations, IARC has classified a number of antineoplastic drugs as known, probable or possible human carcinogens (2,3).

Occupational exposure to antineoplastic drugs in Canada

Occupational exposure to antineoplastic drugs can occur directly via dermal contact, inhalation, ingestion, accidental injection, or indirectly via contact with contaminated surfaces, fluids, and objects (4,5). Exposure can occur in hospitals, where antineoplastic drugs are handled in shipping and receiving areas, prepared in pharmacies, administered to patients in wards, and contacted through sanitary services such as laundry, cleaning, and waste handling (6). It can also occur outside of hospitals in workplaces such as community pharmacies, veterinary care facilities, and home care settings (7).

In 2016, CAREX Canada estimated that approximately 75,000 Canadians were exposed to antineoplastic drugs at work (8,9). Most exposures occur in the moderate category (low contact frequency with low exposure control or high contact frequency with high exposure control) (8). Over 75% of exposed workers were female (8,9). Important jobs in terms of number of workers exposed include pharmacy technicians and nurses (10).

Definitions

Definition of "policy levers"

In the context of this report, the term "policy levers" is used to refer to the range of tools that government and healthcare agencies have at their disposal to direct, manage, and shape change to protect workers from exposure to antineoplastic drugs (11,12). The two principal categories of policy levers included in this study are: governing instruments and policy/guidance documents.

- Governing instruments: These are policy levers that can only be made by government and that are legally enforceable. They include occupational health and safety statutes and any regulations made pursuant to them. These instruments are either prescriptive or performance-based (i.e., outcomes based). Prescriptive instruments are inflexible — they set out the standard that must be met, as well as the method by which it must be met. In contrast, outcomes- or performance-based instruments are more flexible (13). They set out the standard that must be met but allow the organization(s) being regulated to choose how they will meet the standard. Compliance with both prescriptive and outcomes-based instruments is mandatory and is enforced through inspections and statutory reporting requirements. However, outcomes-based instruments allow enforcement officers to exercise their discretionary powers.
- Policy/guidance documents: These are instruments that provide cues to action by those who manage and deliver services within the affected sector. In the case of antineoplastic drugs, they include policies, guidelines, standards, protocols, standard operating procedures (SOPs), etc. Because these types of policy levers are often developed by professional bodies and/or individual organizations/institutions, compliance may be voluntary or mandatory. However, unlike governing instruments, compliance is not enforceable by law.

The government, organization or institution with responsibility and oversight for worker protection may use an individual lever or a combination of levers to achieve a particular prevention outcome.

Definition of "Policy Dimensions"

Policy dimensions are perspectives of a policy that can influence its uptake and implementation. Policy dimensions are used to study the effects of a policy and the contextual factors that influence its implementation.

Current Scenario

Policy levers for controlling antineoplastic drug exposures have been created by organizations such as the National Institute of Occupational and Safety and Health (NIOSH) in the United States, WorkSafeBC, and Association paritaire pour la santé et la sécurité du travail du secteur affaires sociales (ASSTSAS) in Quebec (14–16). These policy levers recommend the use of engineering controls, administrative measures, and personal protective equipment (PPE) during the preparation and handling of antineoplastic drugs (6,17). Despite the existence of polic levers, studies indicate poor compliance with current best practices (6,18).

Objectives

The aim of this study was to inform policymakers about policy levers and opportunities to reduce occupational exposure to antineoplastic drugs. The specific objectives of the study were to:

1. Create a compendium of antineoplastic drugs policy levers.
2. Compare policy levers adopted by Alberta, Manitoba, and British Columbia.
3. Create a prevention framework for the safe handling and management of antineoplastic drugs.
4. Identify and understand the barriers, facilitators, and their interrelationships in the safe handling of antineoplastic drugs in occupational settings.

METHODOLOGY

The methodology we selected for this research was adapted from a 4-step process described by Morestin et al. in "Method for Synthesizing Knowledge About Public Policies": 1) compile policy levers, 2) develop a logic model, 3) conduct a literature review, and 4) contextualize data through a deliberative process (19).

Compiling Policy Levers

An environmental scan was performed to identify policy levers (including legal requirements, guidelines, and evidence-best practices) governing the safe handling of antineoplastic drugss. The environmental scan examined policy levers from all relevant work settings including veterinary practices, hospitals, community pharmacies, and home care. Specific information sources included: federal and provincial government ministries with responsibility for ADs; federal and provincial agencies with delegated authority for occupational health regulations and/or guidelines; national and provincial healthcare organizations; and international or national regulatory organizations with expertise on the safe use of antineoplastic drugs.

Developing a Logic Model

A logic model was created by the two lead investigators, reviewed by all co-investigators, and modified with feedback from the project advisory committee and stakeholders. Initially, we looked at five policy dimensions to be considered during extraction and synthesis of data from the environmental scan and the literature review of policy levers. They include: 1) effectiveness, 2) unintended effects, 3) barriers, 4) facilitators, and 5) compliance. However, following examination of the context of the environmental scan and literature review, two policy dimensions were included: barriers and facilitators. We decided to omit effectiveness and compliance as part of this study because these dimensions are specific to a particular place and time and have been well studied, hence, they do not add value to the current literature. Similarly, we did not include unintended effects due to the lack of data concerning this dimension.

Literature Review

To gather knowledge on policy levers for the safe handling of antineoplastic drugs, electronic databases of the peer-reviewed literature (PUBMED, CINAHL and EMBASE) were first searched using the following terms and Boolean string: ((((((antineoplastic drug*) OR antineoplastic drug*) OR hazardous drug*) OR cytotoxic drug*) OR cytostatic drug*)) AND ((((policy) OR policies) OR best practice*) OR guideline*).

Studies were included if they were published in English and focused on antineoplastic drugs. Studies that focused on a specific drug, a piece of technical equipment, or on patient safety were excluded. No exclusions were made based on country or work setting. Finally, specific policy levers were added and/or omitted at the request of stakeholders. Studies were not appraised for their methodological quality but rather their relevance to the knowledge synthesis (19). The policy levers and policy dimensions in the environmental scan and peer-reviewed literature were coded by a study investigator using *NVivo 12* to identify themes and sub-themes.

Deliberative Processes

A deliberative process was conducted by presenting a synthesis of the data to study stakeholders and interviewing them individually or in groups. The stakeholders represented health organizations, governmental agencies, and professional colleges across a range of sectors (veterinary care, pharmacy, nursing, home care, and occupational health and safety). The stakeholders who agreed to participate

were then provided with the informed consent form, interview questions, logic model, and inventory of policy levers. Participants were recruited until response saturation was reached.

A semi-structured interview guide, approved by the Health Research Ethics Board of Alberta (HREBA.CC-18-0611), was used to elicit information regarding policy levers and two policy dimensions (barriers and facilitators) based on participants' experiential knowledge on the safe handling of hazardous drugs. The semi-structured interview obtained information in five areas: participant information, environmental policy scan, logic model, barriers and facilitators, and knowledge mobilization. The interview questions are presented in Appendix A.

In addition, the participants reviewed the logic model and inventory of policy levers and any modifications made based on their feedback. The interviews were recorded over Skype and transcribed using artificial intelligence software. The transcribed recordings were then verified for accuracy by a study investigator and coded for themes and sub-themes using *NVivo 12*.

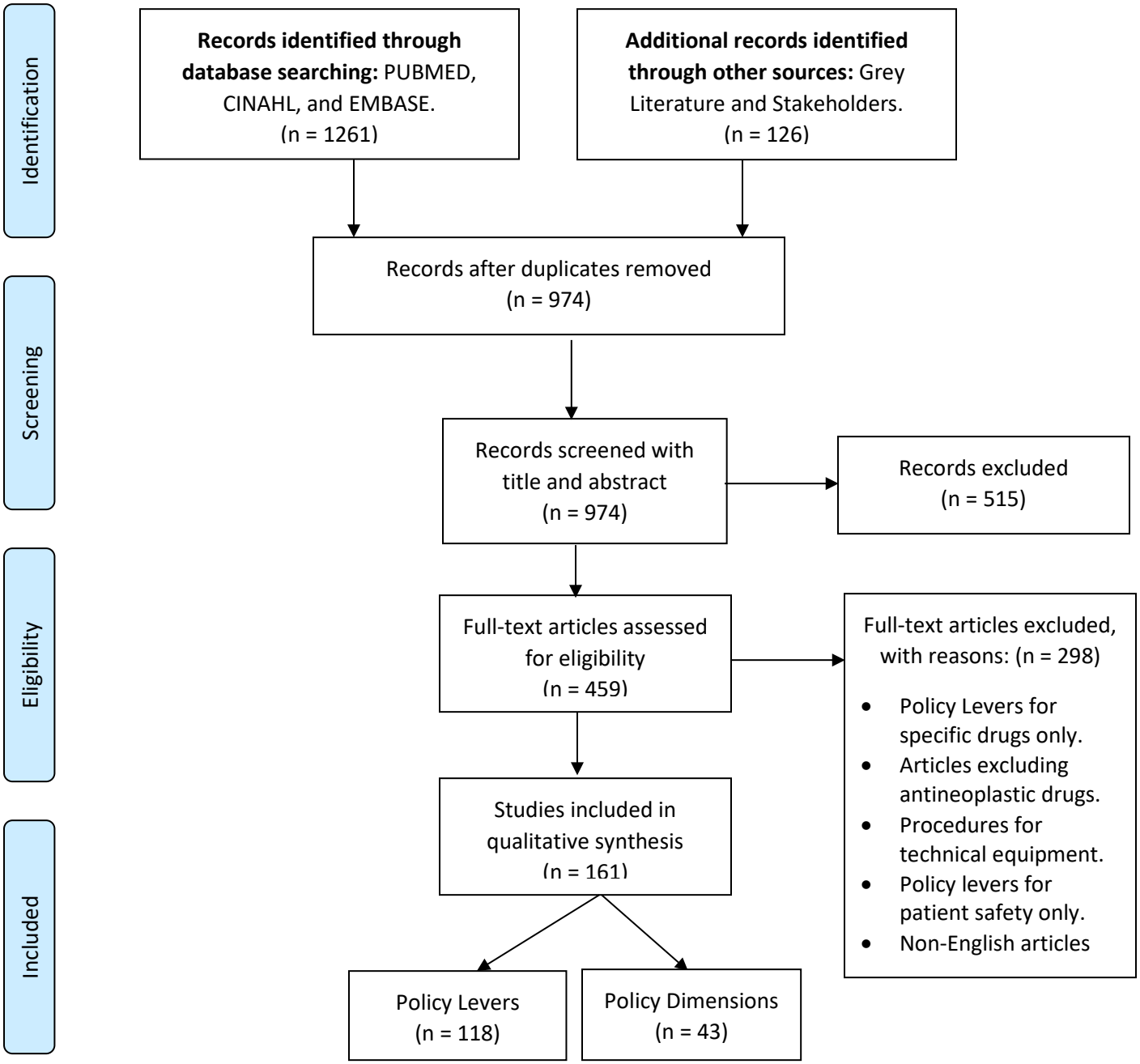
RESULTS

Documents and Participants

A total of 126 policy lever documents were collected - 92 from the environmental scan and 34 directly from stakeholders. The literature searches yielded 409, 185, and 667 published articles on PUBMED, CINAHL, and EMBASE, respectively, for a total of 1,261 articles. After duplicate removal, abstract screening, and eligibility assessment, 161 articles remained. Of these, 118 focused on policy levers and 43 on one or more of the five policy dimensions (Figure 1).

A total of 36 participants (31 interviews) were recruited for the deliberative process. The most common organization type represented was professional organizations (28%), followed by regional/provincial health authorities (25%), provincial cancer agencies (14%), provincial occupational health and safety organizations (11%), private healthcare providers (11%), community pharmacies (8%), and labour unions (3%). The most common sector represented was pharmacy (39%), followed by occupational health and safety (25%), home care (14%), nursing (11%), and veterinary (11%).

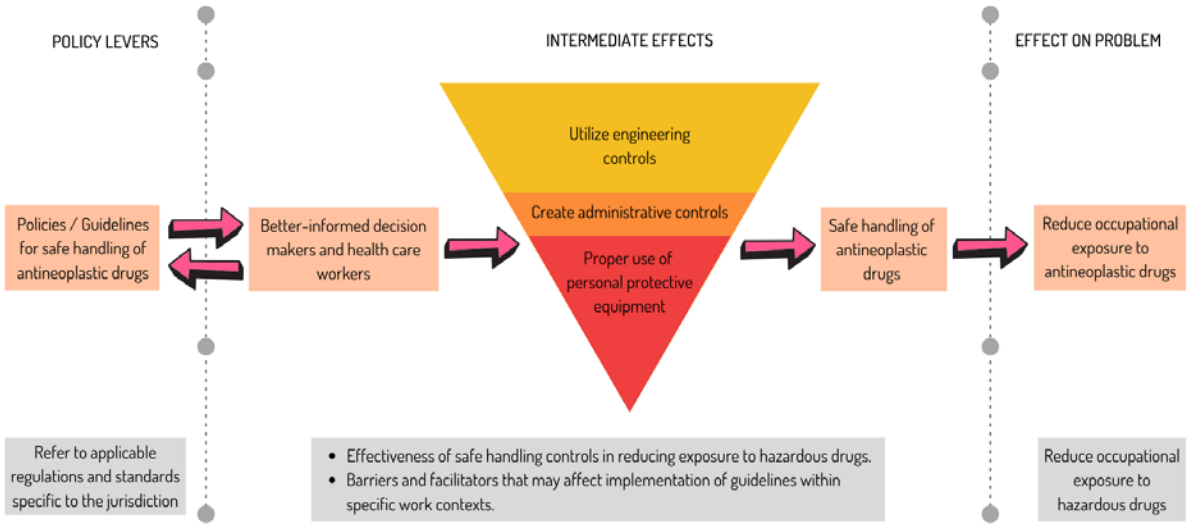
Figure 1: PRISMA Chart



Logic Model

The logic model is a graphic conceptualization linking a given policy for the safe handling of antineoplastic drugs to the effect of reducing occupational exposures to antineoplastic drugs (Figure 2). Intermediate effects include the hierarchy of controls that are recommended in the policy levers. The logic model also takes into account that antineoplastic drugs opting a policy may not necessarily lead to safe handling of hazardous drugs, as a result of controls being ineffective, barriers to implementation, and compliance issues.

Figure 2: Logic Model



Policy Dimensions (Barriers and Facilitators)

The literature review and deliberative process of the two policy dimensions (barriers and facilitators) were combined to create a broader understanding of the context influencing the safe handling of antineoplastic drugs.

Barriers

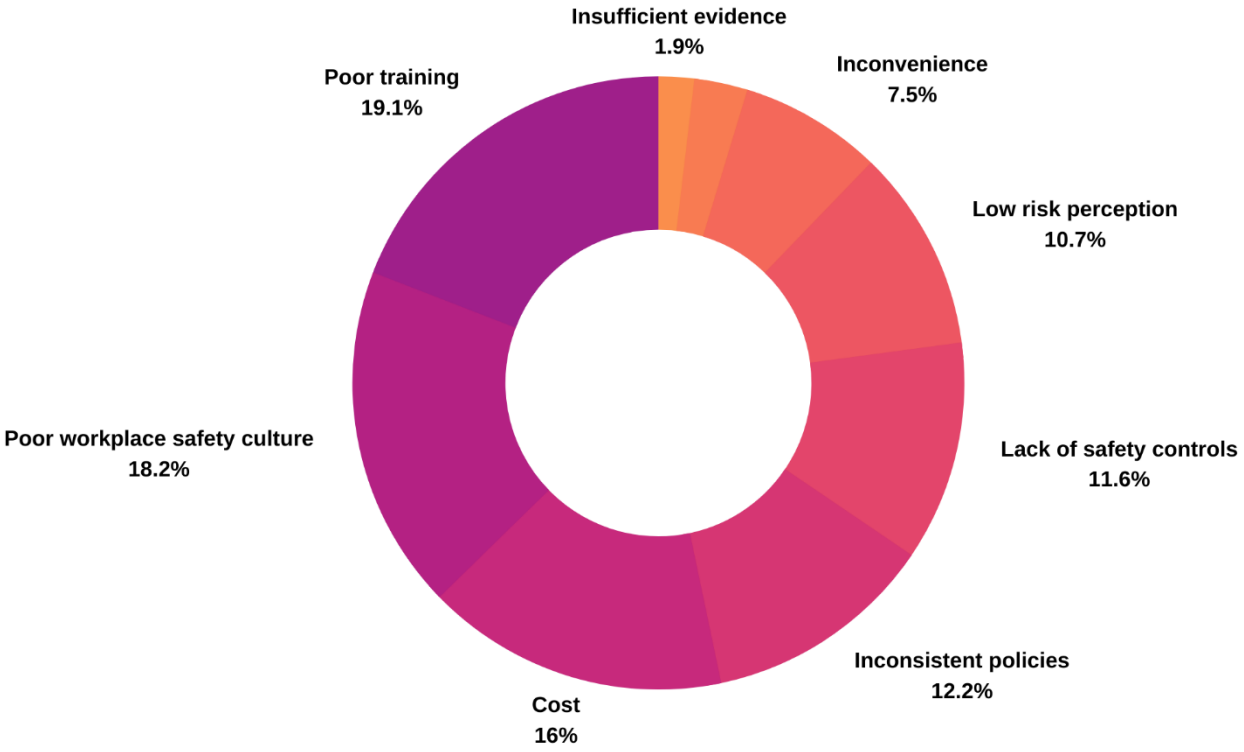
The most common barriers found in the literature review and stakeholder interviews were: (19%) poor training, (18%) poor workplace safety culture, (16%) cost, (12%) inconsistent policies, (12%) lack of safety controls, (11%) low risk perception, (8%) inconvenience, and (2%) insufficient evidence (Figure 3). Poor training affected workers disproportionately with nursing and pharmacy workers receiving more training than veterinarians or transport and homecare workers. Similarly, the quality of training varied widely between health care facilities due to a lack of standardized training for healthcare professionals. Poor training was found to negatively influence workers' risk perception and safety culture.

Poor workplace safety culture is a barrier that is influenced by a lack of support from management, high workload, poor communication, socio-cultural factors, poor training, and low risk perception. Several studies in the literature review pointed out the correlation between high workload and poor adherence to safe handling precautions (20–22). Some stakeholders pointed out the lack of safety knowledge among healthcare managers and administrators also causes poor workplace safety culture as managers are unaware of the hazards of antineoplastic drugs and hence, do not create safe handling strategies. Poor workplace safety culture is one cause of inconsistent and inadequate safe handling policies, and

lack of safety controls in healthcare institutions. Furthermore, the lack of a national, federal or international standard has led to the creation of several policies and guidelines that vary widely according to healthcare setting and region – this was also reported in a recent systematic review (23).

The high cost of safe handling equipment and lack of funding to purchase them was a barrier reported by many stakeholders. This study shows that the high cost and lack of government funding towards implementing engineering controls, renovating healthcare facilities, purchasing safe handling equipment, training staff, conducting medical surveillance, and employing health and safety professionals, all prohibit the safe handling of antineoplastic drugs in occupational settings.

Figure 3: Barriers to the safe handling of antineoplastic drug



Facilitators

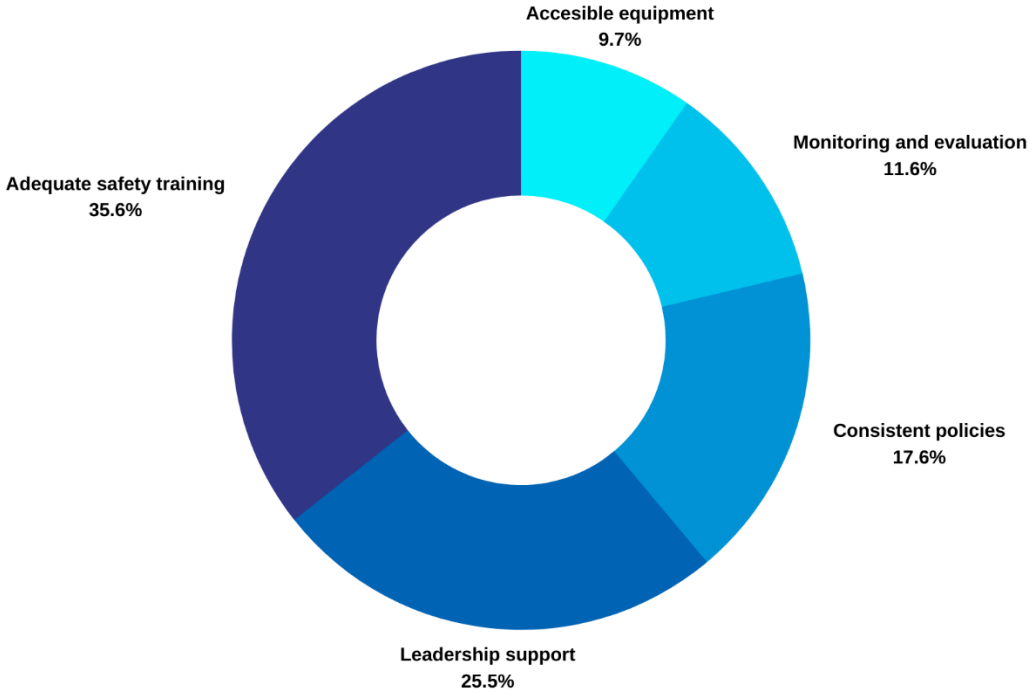
Facilitators are factors that positively influence the safe handling of antineoplastic drugs and/or mitigate the barriers. The most common facilitators found in the literature review and stakeholder interviews were: (36%) adequate safety training, (26%) leadership support, (18%) consistent policies, (12%) monitoring and evaluation, and (10%) accessible equipment (Figure 4). Similar to the barriers, facilitators are associated with one another and improving on one facilitator can positively affect another. Facilitators are also often diametrically linked to the barriers identified. For example, adequate safety training mitigates the most common barrier - poor training. It involves providing comprehensive and regular training for staff and managers alike. Some of the stakeholders interviewed mentioned that part of the barrier to safe handling of hazardous drugs is lack of management support. This is partly due to lack of knowledge and awareness among healthcare managers which can be mitigated by offering managers adequate training on the risks and best practices for safely handling hazardous drugs.

Adequate training was found to increase workers' risk perception and hence, positively influence them to comply with safe handling guidelines.

Leadership support is an important facilitator that includes management's commitment to safety by creating a safe work culture, allocating funding for equipment, and involving workers when creating a safe handling strategy. Leadership support influences several other facilitators including adequate safety training, consistent policies, accessible equipment, and monitoring and evaluation. In healthcare facilities, safety decisions are made by leaders and these decisions affect all aspects of a safe work environment. Leadership support is crucial in reducing barriers such as poor workplace safety culture, lack of safety controls, manufacturer contamination, and cost. When leaders understand the risks of hazardous drugs and the importance of safety for their staff, they will allocate sufficient funds for purchasing equipment and conducting training. In addition, leaders would communicate with manufacturers and regulatory authorities and address manufacturer contamination. Furthermore, leaders who are aware of the barriers towards safe handling controls will ensure they hire adequate staff to reduce high workload which can compromise safety. The provision of accessible equipment is another facilitator that mitigates the lack of safety controls and inconvenience barriers. It involves providing staff with easily-accessible high-quality equipment of all sizes to ensure compliance with safe handling best practices.

The barriers and facilitators outlined above have the ability to assist healthcare leaders and administrators to increase adherence to safe handling precautions and guidelines. A detailed manuscript regarding the barriers and facilitators will be submitted to an open access peer-reviewed journal this summer.

Figure 4: Facilitators for the safe handling of antineoplastic drugs



Policy Comparison (Alberta, Manitoba, and British Columbia)

In Canada, responsibility for occupational health and safety (OHS) is laid out in labour legislation, which falls under provincial authority. Generally, this legislation includes the *Occupational Health and Safety Act*[1] and the *Workers' Compensation Act*[2], along with their related subordinate regulations. In most jurisdictions, responsibility for OHS is either held by a single branch of government (typically the Ministry of Labour or similar organization) or by the agency responsible for the delivery of the workers' compensation system. In some jurisdictions, responsibility is shared between these two entities. Because labour legislation falls under provincial jurisdiction, responsibility for OHS and prevention varies by province.

In Canada, organizations and institutions in the healthcare sector can seek accreditation[3] from Accreditation Canada, which assesses organizations against standards developed by the Health Standards Organization (HSO). Accreditation Canada has two standards that include elements relevant to the safe handling and management of antineoplastic drugs: the Cancer Care Standard and the Medication Management Standard. While Accreditation Canada has not categorized the recommendations for the safe handling of antineoplastic drugs in these standards as "required organizational practice", they have categorized some as "high priority". There is no legal requirement for health care facilities to gain accreditation but many facilities in Canada do comply with Accreditation Canada standards.

There are numerous similarities and differences between the policy levers for the safe handling of antineoplastic drugs in Alberta, Manitoba, and British Columbia. One significant difference found in the provinces is the way that occupational health and safety is managed. British Columbia was the only province with specific requirements pertaining to the safe handling of antineoplastic drugs in the Occupational Health and Safety Regulations. Alberta and Manitoba did not have specific regulations for antineoplastic drugs and instead covered them in the general occupational health and safety terminology. Similarly, provincial and regional health agencies had their own respective policies and did not refer to a single standard.

Nurses and pharmacists in all three provinces referred to a set of universal guidelines adapted by their respective professional bodies. This was not the same for health care workers in the homecare and veterinary practices. Another standard that was consistent across the provinces was Accreditation Canada's standards, despite being non-compulsory and not used by all healthcare facilities.

There is wide variability in the policy levers in the three provinces and creating pan-Canadian policy levers that can be adopted by all provinces is vital for the protection of workers. Lessons can be learned from the National Association of Pharmacy Regulatory Authorities, which has created standards for compounding sterile products. These standards were adopted and/or adapted by the respective colleges of pharmacy for the three provinces. The full report has been attached separately as Appendix C. It is

[1] OHS legislation generally sets out the rights and duties of all workplace parties, as well as how workers are to be protected from health and safety hazards (i.e., prescriptive or performance-based procedures; education and training programs; inspection and monitoring requirements; and how laws and regulations are enforced in the absence of voluntary compliance).

[2] Workers' compensation legislation delegates authority for the delivery of workers compensation programs and sets out responsibilities in the spheres of prevention, rehabilitation, and compensation.

[3] Defined as "an ongoing process of assessing health and social services organizations against standards of excellence to identify what is being done well and what needs to be improved". Its purpose is to "provide health care and service organizations an independent, third-party assessment of their organization using standards built upon best practices used and validated by similar organizations around the world".

also published online and can be viewed here:
https://www.carexcanada.ca/CAREX_ANTINEOPLASTIC_POLICY_LEVER_COMPARISON_FEB_2020.pdf

Policy Levers Inventory

One of the main objectives of this research was to create a compendium of policy levers regarding the safe handling of antineoplastic drugs in different health settings including healthcare centres, veterinary clinics, home care, hospitals, and community pharmacies. Policy levers include statutes, regulations, policies, guidelines, and standards from Canadian and International organizations were collected. The policy levers is a tool that can be utilized by policy makers to create and update their own respective policies. The compendium has been attached separately as Appendix D. It is also published online and can be viewed here:
https://www.carexcanada.ca/CAREX_ANTINEOPLASTIC_POLICY_LEVERS_JAN_2020.xlsx

Prevention Framework

The prevention framework for antineoplastic drugs was designed to help organizations assess and audit their own procedures and plans for the safe handling of antineoplastic agents. It was developed by applying internationally accepted approaches to auditing occupational health and safety management systems. This framework allows healthcare leaders to develop checklists and assess their progress in regard to the safe handling of antineoplastic drugs. The prevention framework has been attached separately as Appendix E. It is also published online and can be viewed here:
https://www.carexcanada.ca/CAREX_ANTINEOPLASTIC_PREVENTION_FRAMEWORK_FEB_2020.pdf

DISCUSSION

Limitations

Our study had several limitations. Firstly, we collected policies and guidelines for the safe handling of antineoplastic drugs in the English language and may have missed guidelines created in other languages. Second, while we had representation among stakeholders from various sectors, the study could be improved by increasing the number of community pharmacists and labour union representatives interviewed. Third, our policy comparison report focused mainly on Alberta, British Columbia and Manitoba - comparing policies of other provinces would have further enriched the results. Despite, the limitations above, this study added to the literature by identifying the gaps in research and presenting recommendations on addressing the challenges in regard to the safe handling of antineoplastic drugs.

Knowledge Translation

This project utilized an integrated knowledge translation approach throughout the study. We involved stakeholders in the knowledge transfer process by asking them what approaches they felt were best to disseminate the research study. We then compiled this information and used it to create a thorough end of grant knowledge translation (KT) plan.

The goal of the knowledge transfer was twofold. Firstly, we wanted to raise awareness among healthcare leaders, researchers, and frontline workers regarding strategies to reduce occupational exposure to hazardous drugs (dissemination goal). Second, we wanted to facilitate the uptake of our research by healthcare leaders to implement a policy in the workplace/jurisdiction to reduce occupational exposure to hazardous drugs (implementation policy goal).

We further divided our KT activities based on the different target audiences, namely: healthcare leaders and policy makers, frontline workers, and researchers.

<u>Healthcare leaders and policy makers</u>

The aim of targeting healthcare leaders and policy makers is to use research to inform policy and practice. To achieve this we had three approaches:

- Conduct a webinar for healthcare leaders and stakeholders. *(complete)*
    - On February 20, 2020 we offered a webinar where participants from a variety of organizations were invited. There were a total of 115 registrants which included policy makers, OHS officers, and representatives of various provincial agencies with relevance to healthcare workers.
    - The webinar detailed the barriers and facilitators that influence the safe handling of antineoplastic drugs, and highlighted the resources that stakeholders can find on the CAREX website.
    - A survey was sent out after a week to evaluate the webinar. Participants from the webinar were from Alberta, Manitoba, British Columbia, Ontario, Saskatchewan and Nova Scotia. The feedback from participants was largely positive. Over 50% of participants stated that the webinar was helpful in increasing their skills to reduce the risk of exposures to antineoplastic drugs, and addressed a challenge they are facing in their organization. Similarly over 50% of attendees stated that they will encourage their organization to adopt a new strategy/approach (e.g. best practice), use the information presented to assist in decision making, and cite the information in reports and briefing notes. The detailed responses to the webinar survey is attached in Appendix B.

- Create an interactive website containing resources that would assist leaders and policy makers implement policy changes. *(complete)*
    - We created a special topics webpage on the CAREX Canada website that contains information on the current and previous studies conducted by CAREX Canada regarding antineoplastic drugs.
    - The website was launched on March 11th 2020 and shared with the stakeholders and webinar attendees. The website also contains a link to the webinar recording and other resources that stakeholders can access easily and download as needed.
    - During the study, we had three stakeholders reach out to us with requests to use the policy levers compendium for updating their respective policies. We are using the policy impact tracking method used by CAREX Canada to track the policy impacts of the research by reaching out to stakeholders periodically – this is currently ongoing and will continue till the end of 2020. Information about how the three stakeholders utilized the research is presented in the 'Applications for policy and prevention' section above. We will also be tracking the number of website views and downloads.

- Create a report summarizing the study and disseminate it to stakeholders. *(in progress)*
    - We are currently creating a summarized report of the entire study and will share it with stakeholders when we reach out to them later in the summer to further understand how they used the resources provided to inform policy and practice. Any development will be updated on the CAREX Canada's policy impact tracking sheet.

We identified several key messages that are important to share with this audience:

- Importance of Hazardous Drugs Safety
- Summary of Barriers and Facilitators for safe handling of antineoplastic drugs
- Resources for taking action: Comparison of policy levers between provinces, compendium of policy levers regarding the safe handling of antineoplastic drugs, prevention framework for handling antineoplastic drugs.

<u>Frontline Workers</u>

The goal of targeting frontline workers is to increase awareness on the adverse effects of handling hazardous drugs and to highlight recommendations that facilitate safe handling. This objective was not included in our initial project scope, but was developed after stakeholders indicated the importance of disseminating information on the safe handling of antineoplastic drugs to frontline staff. We plan to achieve this objective by collaborating with organizations such as the British Columbia Nurses Union, the Alberta Pharmacists' Association, and the Canadian Union of Public Employees among many others and creating easy-to-read info sheets that they can then disseminate to their members. We have had preliminary discussions with these organizations concerning this and will continue this part of KT in 2020 and beyond. We will evaluate the effectiveness of the info-sheets at creating and/or raising awareness by requesting feedback from the leaders of the organizations and conducting a survey among the members.

<u>Researchers</u>

The goal of transferring knowledge to researchers is to increase awareness of the findings and inform future research in the safe handling of antineoplastic drugs. To achieve this we used two approaches:

- Present a poster at a large cancer-related conference *(complete)*
    - In November 2019, we presented a poster highlighting the barriers and facilitators regarding the safe handling of antineoplastic drugs to researchers at the Canadian Cancer Research Conference (CCRC) held in Ottawa. The CCRC brings together over 1200 attendees every two years from research funding programs/agencies, provincial research agencies, provincial cancer care agencies, cancer charities, and other voluntary associations.
- Publish the research in an open-access high-impact factor journal (*in progress, nearly complete)*
    - We are currently revising our manuscript among the study co-investigators and plan to submit it to the Journal of Occupational and Environmental Hygiene this summer 2020. The Journal of Occupational and Environmental Hygiene is a monthly peer-reviewed journal covering occupational and environmental medicine with an impact factor of 1.46. Publishing the results of our paper in this journal will inform future research by highlighting areas that need further study.

CONCLUSION

This project has far-reaching implications for decision makers and workers in Alberta. The tools and resources created will be utilized by policy makers and healthcare leaders to create a safer environment for handling hazardous drugs. The resources have been shared with all stakeholders, some of whom have already begun using the policy compendium to update their own respective policies. In particular, the Alberta Veterinary Medical Association and the Canadian Union of Public Employees have each indicated that they will use the policy levers compendium in order to update their respective policies and guidelines. This project will allow policy makers to update their respective occupational health and safety regulations to meet current best practices in a consistent manner. Furthermore, our plan to create resources for frontline workers will increase their awareness on this topic and motivate behavior change towards the safe handling of antineoplastic drugs.

In addition, this study adds to the growing body of literature regarding the safe handling of hazardous drugs by incorporating results from the grey literature, peer-reviewed articles, and key informant interviews. The study highlights the importance of considering barriers and facilitators that influence adherence to occupational health and safety policies and guidelines. In addition, this research demonstrated the benefit of utilizing a knowledge to action framework by involving stakeholders throughout the entire study process in order to create tools and resources that are relevant and useful in healthcare settings. Furthermore, this study has outlined that there is a research need to investigate various interventions to support healthcare workers' adherence to occupational health and safety policies and guidelines. Finally, this study uses a unique methodology by Morestin et al. for conducting policy research and applies it in the context of occupational health. We hope this successful application of a novel model will encourage future researchers to consider the benefits of this approach.

We will continue to liaise with various stakeholders and policy makers across Canada and share the resources created in order to create a safer environment for the safe handling of antineoplastic drugs.

APPENDIX A: INTERVIEW QUESTIONS FOR KEY INFORMANT INTERVIEWS.

The interviews will focus on the following domains:

- Legislative and regulatory context to verify completeness of the scan (policy makers only).
- Verify completeness and appraisal of guidelines specific to the workplace setting.
- Feedback on the logic model.
- Perceived barriers and facilitators to successful control of exposure in these settings.
- Knowledge mobilization approach.

Questions will include:

A. Key informant information

1. What organization do you work with and what is the organizations jurisdiction / mandate?
2. What is your primary role?
3. How does your work relate to occupational exposures to antineoplastic drugs?
4. What work have you done in this area (past, present)?
    a. Have you been involved in developing or implementing workplace policies or exposure control plans related to antineoplastic drugs?
5. How are exposures to antineoplastic drugs controlled in your workplace setting (or the setting you represent)? And more broadly, your jurisdiction?
   (Engineering controls, administrative controls, PPE, training)
6. Is there anyone specific you suggest we also speak with as part of this project research? (someone who either works with antineoplastic drugs or develops policies for handling antineoplastic drugs)

B. Policy scan (for policy makers only)

7. Please refer to the policy section of the environmental scan. Is there any legislation or regulation missing from this scan?
8. Is our appraisal of the individual policies accurate?

C. Best practices for controlling exposure

9. Please refer to the guidelines section of the environmental scan. Are there any guidelines missing from this scan?
10. Is our appraisal of the individual practices accurate and complete?
    a. Are you aware of any additional evidence to indicate which of these controls should be deemed best practice?

D. *Logic Model*

11. Please refer to the logic model that analyzes the guidelines/policies. Has the logic model accurately deconstructed the guidelines/policy into the chain of effects that links the policy or guideline to the intended outcome?

E. Barriers and facilitators

12. Based on your experience, are there any barriers to successful control of exposure to antineoplastic drugs in your workplace setting (or the setting you represent)? And more broadly, your jurisdiction? (What are the barriers to safe handling of antineoplastic drugs in your workplace?)

13. Are there any facilitators to successful control of exposure in your workplace setting (or the setting you represent)? And more broadly, your jurisdiction? (What are the facilitators to safe handling of antineoplastic drugs in your workplace?)

F. <u>Knowledge mobilization</u>

14. The results of this project will be disseminated via a report and a national webinar. Are there any stakeholders you think should receive the report? And be invited to the webinar?
15. What do you think will be important to the successful dissemination and uptake of these project results?
16. How will you use this information (compendium) in your organization?

APPENDIX B: RESULTS OF THE WEBINAR SURVEY

The knowledge translation plan for this project included a webinar. On February 20, 2020 we conducted a webinar for 115 participants that included policy makers, OHS officers, and representatives of various provincial agencies with relevance to healthcare workers. The webinar detailed the barriers and facilitators that influence the safe handling of antineoplastic drugs, and highlighted the resources that stakeholders can find on the CAREX website. We then sent out a post-webinar survey to all the participants a week after the webinar for their feedback. The results of the webinar are shown below.

Demographic

A total of 18 registrants participated in the survey. The most common profession (38%) was other, followed by (25%) pharmacists, (13%) policy makers, (13%) occupational health and safety officers, (6%) pharmacy technicians, and (6%) health system decision makers.

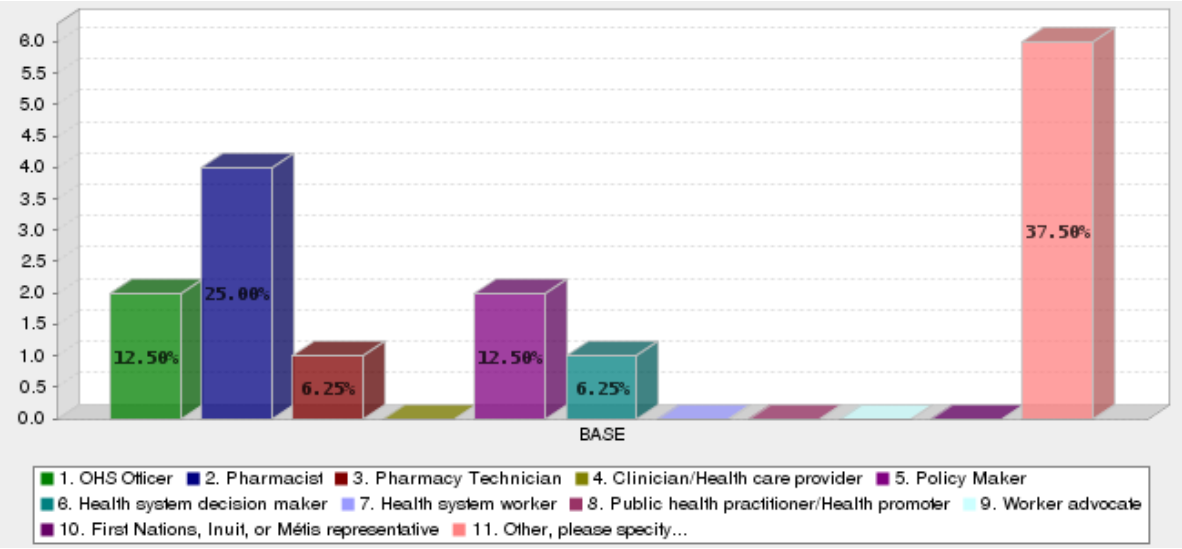


Figure 1: This figure displays the profession of registrants who participated in the survey.

Majority of the participants were from (20%) Non-governmental organization, (20%) health care facility, and (20%) provincial/territorial cancer agency. Other participants included those from provincial/regional health authorities, and provincial ministries. A large number of participants (27%) were from Alberta, followed by (20%) Manitoba, (13%) British Columbia, (13%) Ontario, and (13%) Nova Scotia. There were also participants from Quebec and Saskatchewan.

General Overview

Majority (60%) of the participants strongly agree and (40%) agree that they understood the purpose and objective of the presentation. Over 70% of participants strongly agree that the information was credible and easy to understand. When asked whether they found the information useful, over 80% of participants said that the presentation was relevant to a challenge they are currently facing in their organization. In addition, over 90% of participants said they found the information presented useful and that it helped increase their knowledge about exposures to antineoplastic drugs. More than half of the participants found the information helpful in increasing their skills to reduce the risk of exposure to antineoplastic drugs.

Majority of the participants (>80%) said they would discuss what they learnt in the presentation with colleagues, cite it in their briefing notes and reports, and collaborate with colleagues on addressing common issues. Similarly over 60% of the participants stated that they would encourage their organization to adopt a new strategy and use the information shared in decision making. Over 90% of participants mentioned that the webinar was worth their time attending.

Qualitative Feedback
The participants were asked two qualitative open-ended questions regarding the webinar.
The participants were asked what was the most significant or surprising information they learnt? Below are the responses.

The idea that some nurses didn't comply with the safety controls because they didn't perceive they had a high risk of becoming ill from their
The exposure to antineoplastic drugs was very surprising.
There is much work to be done regarding training and safety protocols as well as strong leadership in this area.
Good to have cohesive and concise information on what the barriers are and what the facilitators are to be able to work on each
That there needs to be coordination between provinces on the measures to keep workers safe from exposure to antineoplastic drugs.
That pharmacists had the highest rate of occupational exposure outside of the manufacturing sector.
The barriers to uptake were very helpful and well explained.
That workers will often not use PPE properly. I am not very familiar with this subject area, so the entire presentation was eye opening.
That organizations cut costs by not having the chemotherapy approved gloves and nurses are wearing normal double gloves.
That experienced nurses believe their skill level keeps them safe from antineoplastic drugs.
Some of the comments that were brought forward from front line workers etc. Needs to be more awareness about the impacts on workers

The participants were also asked to give their feedback about the presentation. Below are the responses.

The presentation was interesting and it was easy to ask questions. The webinar was well organized.
Good amount of time for questions
Very organized
Organized
Thank you so much for clearly stating what resources will be sent out in 2 weeks.
Well done. The Zoom platform worked well.
I liked that training is the solution to mitigate a lot of antineoplastic exposure and will be sharing the information presented with my colleagues
Very clear and precise
Nothing was mentioned on the role OH&S Committees have in the education and implementation or policies in hazardous medications.
Great webinar, was very interesting

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Appendix C: Policy Comparison Report

Comparison of policy levers for the safe handling of antineoplastic agents in Alberta, Manitoba, and British Columbia

February 2020

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Scope

This resource is part of a broader project conducted by CAREX Canada on reducing the occupational exposure to antineoplastic agents. The project analyzed the different dimensions that affect the safe handling of antineoplastic agents in health care settings. The outcomes of this project were four resources, including this report:

1. **Compendium of policy levers regarding the safe handling of antineoplastic agents in occupational settings:** This tool is a collection of policy levers for the safe handling of antineoplastic agents in different healthcare settings. It was designed to help policy makers create and update their own respective policies.

2. **Prevention framework for handling antineoplastic agents:** This tool was designed to help organizations assess and audit their own procedures and plans for the safe handling of antineoplastic agents. It was developed by applying internationally accepted approaches to auditing occupational health and safety management systems.

3. **Comparison of policy levers for the safe handling of antineoplastic agents in Alberta, Manitoba, and British Columbia:** This report details and compares the various statutes, regulations, policies, guidelines, and standards used in the safe handling of antineoplastic agents across three provinces. It outlines key similarities and differences that policy makers can use to create better-informed policies that protect the health and wellbeing of healthcare workers handling antineoplastic agents.

4. **Webinar: Reducing occupational exposure to antineoplastic agents:** This webinar presents the findings of our research on the barriers and facilitators that influence the safe handling of antineoplastic agents. It includes results from a literature review, environmental scan, and stakeholder interviews, and was designed to help decision makers and policy implementers create safer environments for workers handling antineoplastic agents.

The other resources developed as part of this project can be found at www.carexcanada.ca/special-topics/antineoplastic-agents/.

This study was funded by WorkSafeBC (Innovation at Work program) and Alberta Labour and Immigration (OHS Futures program).

Table of contents

1. Introduction

This document compares policy levers for the safe handling of antineoplastic agents in Alberta, Manitoba, and British Columbia. To synthesize the information, two lenses were applied. The first examines the policy levers through the lens of the levers' scope of application (e.g., province-wide *vs*. region-specific) and presents the findings by jurisdiction. The second examines the policy levers through the lens of profession and/or work setting (e.g., pharmacies *vs*. nursing) and presents the findings across jurisdictions.

The report is organized into the following sections:

Section 1 introduces the report and describes how the information is organized.

Section 2 defines key terms and provides background on occupational exposure to antineoplastic agents in Canada (i.e., routes of exposure, occupations exposed, numbers of workers exposed).

Section 3 describes the legislative and regulatory landscape for prevention in Canada, with a specific focus on workplace exposure to antineoplastic agents. It also briefly describes the accreditation process for healthcare organizations in Canada, whereby they are assessed against standards developed by the Health Standards Organization (HSO).

Section 4 compares key features of the relevant policy levers in each jurisdiction. Information is organized into three subsections, defined by the policy levers' scope of application (i.e., do they apply at all organizations in the province? do they apply to organizations only at the regional level? do they apply only in the institution in which they were developed?). In each subsection, jurisdiction-specific summaries of the policy levers are provided.

Section 5 concludes with a cross-cutting summary of policy levers developed by particular professional groups and/or for particular work settings. Information in this subsection is organized into four broad categories (nursing, pharmacies, veterinary clinics, and home care facilities) and compared across jurisdictions.

2. Background

2.1 Definition of antineoplastic agents

Antineoplastic agents, also referred to as chemotherapy drugs or cytotoxic drugs, are the most common type of systemic drug therapy used to treat cancer (1). These drugs interfere with the ability of cancer cells to grow and spread. As of 2016, the National Institute for Occupational Safety and Health (NIOSH) had classified over 100 antineoplastic agents as "hazardous" (2). The International Agency for Research on Cancer (IARC) has evaluated different antineoplastic agents for evidence of carcinogenicity (3-5). Based on animal and human evidence, as well as

mechanistic considerations, IARC has classified a number of antineoplastic agents as known, probable or possible human carcinogens (5).

2.2 Occupational exposure to antineoplastic agents in Canada

Occupational exposure to antineoplastic agents can occur directly via dermal contact, inhalation, ingestion, accidental injection, or indirectly via contact with contaminated surfaces, fluids, and objects (6, 7). Exposure can occur in hospitals, where antineoplastic agents are handled in shipping and receiving areas, prepared in pharmacies, administered to patients in wards, and contacted through sanitary services such as laundry, cleaning, and waste handling (8, 9). It can also occur outside of hospitals in workplaces such as community pharmacies, veterinary care facilities, and home care settings (2).

In 2016, CAREX Canada estimated that approximately 75,000 Canadians are exposed to antineoplastic agents at work (10, 11). Most exposures occur in the moderate category (low contact frequency with low exposure control or high contact frequency with high exposure control) (12). Over 75% of exposed workers are female (10, 11). Important jobs in terms of number of workers exposed include pharmacy technicians and nurses (12).

2.3 Definition of "policy levers"

In the context of this report, the term "policy levers" is used to refer to the range of tools that government and healthcare agencies have at their disposal to direct, manage, and shape change to protect workers from exposure to antineoplastic agents (13, 14). The two principal categories of policy levers included in this toolkit are governing instruments and policy/guidance documents.

Governing instruments: These are policy levers that can only be made by government and are legally enforceable. They include occupational health and safety statutes and any regulations made pursuant to them. These instruments are either prescriptive or performance-based (i.e., outcomes based). Prescriptive instruments are inflexible — they set out the standard that must be met, as well as the method by which it must be met. In contrast, outcomes- or performance-based instruments are more flexible. They set out the standard that must be met but allow the organization(s) being regulated to choose how they will meet the standard. Compliance with both prescriptive and outcomes-based instruments is mandatory and is enforced through inspections and statutory reporting requirements. However, outcomes-based instruments allow enforcement officers to exercise their discretionary powers.

Policy/guidance documents: These are instruments that provide cues to action by those who manage and deliver services within the affected sector. In the case of antineoplastic agents, they include policies, guidelines, standards, protocols, standard operating procedures (SOPs), etc. Because these types of policy levers are often developed by professional bodies and/or individual organizations/institutions, compliance may be

voluntary or mandatory. However, unlike governing instruments, compliance is not enforceable by law.

The government, organization, or institution with responsibility and oversight for worker protection may use an individual lever or a combination of levers to achieve a particular prevention outcome.

3. The context for prevention of exposure to antineoplastic agents in Canada

3.1 Legislation and regulations

In Canada, responsibility for occupational health and safety (OHS) is laid out in labour legislation, which falls under provincial authority. Generally, this legislation includes the *Occupational Health and Safety Act*[1] and the *Workers' Compensation Act*[2], along with their related subordinate regulations. In most jurisdictions, responsibility for OHS is either held by a single branch of government (typically the Ministry of Labour) or by the agency responsible for the delivery of the workers' compensation system. In some jurisdictions, responsibility is shared between these two entities. Because labour legislation falls under provincial jurisdiction, responsibility for OHS and prevention varies by province (Table 1).

Table 1: Responsibility for prevention, by jurisdiction

Jurisdiction	Prevention	Regulations	Enforcement	Training & Education
Alberta	Ministry of Labour & Immigration – Occupational Health & Safety	Ministry of Labour & Immigration	Ministry of Labour & Immigration – Occupational Health & Safety	Ministry of Labour & Immigration – Occupational Health & Safety
Manitoba	SAFE Work Manitoba	Labour and Regulatory Services – Workplace Health & Safety Branch	Labour and Regulatory Services – Workplace Health & Safety Branch	SAFE Work Manitoba
British Columbia	WorkSafeBC – Prevention Services	WorkSafeBC – Policy, Research & Regulation Division	WorkSafeBC – Prevention Services	WorkSafeBC – Prevention Services, Worker & Employer Services

Source: Jurisdictional websites and the Association of Workers Compensation Boards of Canada.

[1] OHS legislation generally sets out the rights and duties of all workplace parties, as well as how workers are to be protected from health and safety hazards (i.e., prescriptive or performance-based procedures; education and training programs; inspection and monitoring requirements; and how laws and regulations are enforced in the absence of voluntary compliance).

[2] Workers' compensation legislation delegates authority for the delivery of workers compensation programs and sets out responsibilities in the spheres of prevention, rehabilitation, and compensation.

3.2 Accreditation by national bodies

In Canada, organizations and institutions in the healthcare sector can seek accreditation[3] from Accreditation Canada, which assesses organizations against standards developed by the Health Standards Organization (HSO). Accreditation Canada has two standards that include elements relevant to the safe handling and management of antineoplastic agents: the Cancer Care Standard (15) and the Medication Management Standard (16). While Accreditation Canada has not categorized the recommendations for the safe handling of antineoplastic agents in these standards as "required organizational practice", they have categorized some as "high priority". There is no legal requirement for health care facilities to gain accreditation but many facilities in Canada do comply with Accreditation Canada standards.

4. Inter-jurisdictional comparison of policy levers

Across the three jurisdictions, the safe handling of antineoplastic agents is governed by a range of policy levers. As previously noted, most of the safe handling policy levers identified in the environmental scan fall into the second category defined above – namely, standards, policies, guidelines, protocols and procedures developed by either a professional body (e.g., the Alberta College of Pharmacists), an individual organization (e.g., the Winnipeg Regional Health Authority), or a specific institution (e.g., the BC Cancer Agency). Depending on the mandate of the organization that developed them, these policy levers may apply to certain occupations in all work settings in the province (e.g., nurses in hospitals, pharmacists in hospital or community pharmacies) or just to particular workplaces within a region, organization or institution (e.g., workers employed in companies delivering home care services).

This section of the document is organized into three subsections:

Provincial-level policy levers: This subsection summarizes the policy levers identified in the scan that were provincial in scope.

Regional-level policy levers: This subsection summarizes the policy levers identified in the scan that were regional in scope. Included are all levers created by organizations that operate at the regional level (e.g., a health authority) or at multiple locations throughout a jurisdiction (but that do not have a broad provincial mandate).

[3] Defined by Accreditation Canada as “an ongoing process of assessing health and social services organizations against standards of excellence to identify what is being done well and what needs to be improved”. Its purpose is to “provide health care and service organizations an independent, third-party assessment of their organization using standards built upon best practices used and validated by similar organizations around the world”.

Institution-level policy levers: This subsection summarizes the policy levers identified in the scan that were developed by specific institutions and apply only to their particular work settings.

4.1 Provincial-level policy levers

4.1.1 Governing instruments

In all three jurisdictions, the occupational health and safety statutes and regulations include a general duty clause stipulating that all work must be carried out without undue risk of injury or occupational disease to any person. This clause applies whether or not hazard-specific requirements exist. Of the three jurisdictions, the only one with specific – and legally enforceable – requirements for antineoplastic agents is British Columbia.

- **British Columbia:** Sections 6.42 to 6.58 of the *Occupational Health and Safety Regulation* (*OHSR*) set out minimum requirements for hazardous drugs (17). Specific requirements include: the need for an exposure control plan, hazard communication (including labelling and signage), written policies and safe work procedures, training and education, supervision, recordkeeping, drug preparation and administration, equipment, engineering controls, personal protective equipment, personal hygiene, waste disposal and waste management, and spill control (17).

  Guidelines are also available that interpret the following requirements and assist with compliance: the definition of a cytotoxic drug, required elements of an exposure control plan, information on biological safety cabinets (including key design features), and a list of practices that constitute safe work procedures for the administration of cytotoxic drugs (18). Sections 6.42 to 6.58 apply to all employers, workers and all other persons working in or contributing to the production of any industry within the scope of Part 3 of the *Workers Compensation Act*. As a result, all organizations using antineoplastic agents in British Columbia (i.e., hospitals, cancer agencies, pharmacies, veterinary clinics, and other healthcare facilities) must, at a minimum, comply with these regulations.

4.1.2 Policy/guidance documents

This category includes all levers created by agencies and professional organizations in the healthcare sector with a provincial focus and/or mandate (e.g., cancer agencies, colleges of pharmacists). Examples of these types of provincial-level policy levers exist in all three jurisdictions. None of these policy levers are legally enforceable, although there may be an expectation of compliance across all organizations in the province.

- **British Columbia:** Several organizations with a provincial mandate have developed their own policies and guidelines that meet or exceed the requirements mandated by the *OHSR*. Some are broader in focus, while others are specifically focused on a particular

profession. Examples include: BCCA Pharmacy Practice Standards for Hazardous Drugs (19), Hazardous Drugs Safe Handling Standards (Number V-10) (20) and Hazardous Drug Spill Management (Number V-30) (21), all developed by BC Cancer.

- **Alberta:** Examples of levers developed and implemented by organizations with a provincial mandate include: Hazardous Medication Personal Protective Equipment (PPE) Guide and List: Reducing Occupational Exposure to Hazardous Medication for All Staff (22) and Cytotoxic Drug Manual Administration and Handling Guidelines Version 3.5 (23), both of which were developed by Alberta Health Services, in collaboration with Covenant Health.

- **Manitoba:** Provincial-level policy levers have been developed for the safe handling of antineoplastic agents for all labs in the province (e.g., "Safe Handling of Cytotoxic and Non-Cytotoxic Waste and Specimens" (24), developed by Diagnostic Services Manitoba).

4.2 Regional- or organization-level policy levers

4.2.1 Governing instruments

No legislation or regulations exist at the regional level in any of the three jurisdictions.

4.2.2 Policy/guidance documents

This category includes all levers created by organizations that operate at the regional level (e.g., a health authority) or at multiple locations throughout a jurisdiction (but that do not have a broad provincial mandate). Examples of these types of policy levers exist in all three provinces. None of these policy levers are legally enforceable, although there may be an expectation of compliance across all organizations in a particular region or institutions within an organization with multiple worksites.

- **British Columbia:** Some regional health authorities or organizations have created guidelines that are specific to their context (but which may not be consistent across the province as a whole). For example, some guidelines specify the use of closed system transfer devices (CSTD), while others do not.

- **Alberta:** No policies or guidelines have been developed and implemented by organizations with a regional mandate in Alberta.

- **Manitoba:** The Winnipeg Regional Health Authority (WRHA), in collaboration with the Cancer Care Manitoba (which has a provincial mandate), developed a policy entitled "Safe Handling of Hazardous Medications (Cytotoxic and Non-Cytotoxic) Policy" (25). While it applies specifically to organizations within the WRHA, it is also used by other health authorities in Manitoba.

One home care organization, which operates in all three jurisdictions, has developed internal policies and guidelines on the safe use of antineoplastic agents in all its facilities (see "Home Care" on page 9).

4.3 Institution-specific policy levers

4.3.1 Governing instruments

None of the three jurisdictions have created institution-specific legislation or regulations.

4.3.2 Policy/guidance documents

This category includes all levers created by specific institutions for their particular work setting. Examples of these types of policy levers exist in Alberta and British Columbia, but not in Manitoba.

- **British Columbia:** Four examples were identified in British Columbia: Hazardous Drugs: Handling Precautions (Policy # PTN.02.021) (26) and Medication Administration: Cytotoxic Chemotherapy and Biotherapy (27), developed by BC Children's Hospital; and "Clinical Policies and Procedures: Chemotherapy, Biotherapy and other Hazardous Drug Administration" and "Clinical/Operations Policy and Procedure: Safe Drug Handling Decisions" (28, 29), developed by Bayshore Healthcare (which also has facilities in other jurisdictions).
- **Alberta:** The two identified in Alberta ("Personal Safety Precautions for Chemotherapy Patients Protocol" (30) and "Policy & Procedure for the Safe Handling of Hazardous Drugs" (31)) were developed for a veterinary clinic and a home care facility, respectively.
- **Manitoba:** No policy levers were identified that had been developed for specific hospitals or healthcare facilities.

5. Cross-cutting summary of policy levers, by selected professional settings

This section of the document provides a brief cross-cutting summary of the policy levers identified in the scan that were developed by particular professional groups and/or for particular work settings. Included are levers created for pharmacies, veterinary clinics and home care facilities, as well as levers created for nurses.

5.1 Nursing

The Canadian Association of Nurses in Oncology (CANO/ACIO) has published guidelines on the safe chemotherapy work practice (Standards and competencies for cancer chemotherapy nursing practice) (32). In the absence of provincial-, regional-, and/or institution-specific

guidelines, hospital and home care nurses in each of the three jurisdictions reported that they followed the CANO/ACIO guidelines.

- **British Columbia:** In addition to complying with the requirements of the *OHSR*, hospital and home care nurses follow the guidelines and policies of their respective facilities (where they exist). Examples include: Hazardous Drug Safe Handling Standards (Number V-10) (20) and Hazardous Drug Spill Management (Number V-30) (21), both created by BC Cancer; and, "*Clinical Policies and Procedures: Chemotherapy, Biotherapy and other Hazardous Drug Administration*"(28) and "*Clinical/Operations Policy and Procedure: Safe Drug Handling Decisions*" (29), developed for home care nurses by Bayshore Healthcare.

- **Alberta:** Hospital and home care nurses follow the guidelines and policies of their respective facilities (where they exist). Examples include: Hazardous Medication Personal Protective Equipment (PPE) Guide and List: Reducing Occupational Exposure to Hazardous Medication for All Staff (22), published by Alberta Health Services, in collaboration with Covenant Health; and, "*Provincial Guide: Community Based Services Waste Disposal*" (33), created by Alberta Health Services.

- **Manitoba:** Hospital and home care nurses follow the guidelines and policies of their respective regional authorities or facilities (where they exist). Examples include: "*Cytotoxic and Non-Cytotoxic Hazardous Medications Home Care Guidelines*" (34) and Safe Handling of Hazardous Medications (Cytotoxic and Non-Cytotoxic) Policy (25), both created by the Winnipeg Regional Health Authority.

5.2 Pharmacies

Provincial-level guidelines exist in all three jurisdictions for pharmacy compounding of hazardous sterile and non-sterile drugs. The College of Pharmacists in British Columbia and Manitoba have adopted the National Association of Pharmacy Regulatory Authorities (NAPRA) standards for both sterile and non-sterile preparations (35, 36). The Alberta College of Pharmacy uses the NAPRA model standards for sterile preparations but has developed its own standard for non-sterile preparations (37).

- **British Columbia:** All hospital and community pharmacies that compound hazardous drugs use the compounding guidelines noted above. All pharmacies also comply with the minimum requirements for safe handling and dispensing set out in the *OHSR*.

- **Alberta:** All hospital and community pharmacies in Alberta that compound hazardous drugs use the same compounding guidelines as the College of Pharmacy. Some, but not all, community pharmacies have an internal policy for handling and dispensing hazardous drugs. Hospital pharmacies comply with internal policies and guidelines for the preparation, handling, and dispensing of antineoplastic agents. One example is the guideline prepared by Alberta Health Services, in collaboration with Covenant Health

(Hazardous Medication Personal Protective Equipment (PPE) Guide and List: Reducing Occupational Exposure to Hazardous Medication for all Staff (22)).

- **Manitoba:** All hospital and community pharmacies that compound hazardous drugs use the compounding guidelines noted above. No information was available on guidelines for dispensing or handling of hazardous drugs for community pharmacies in Manitoba. Hospital pharmacies either follow guidelines published by the Pharmaceutical Association of Manitoba ("*Hospital Standards of Practice and Guidelines on Practice in Hospital Pharmacy*" (38)) or by the Winnipeg Regional Health Authority (Safe Handling of Hazardous Medications (Cytotoxic and Non-Cytotoxic) Policy (25)).

5.3 Veterinary clinics

Provincial-level guidelines exist in Alberta and British Columbia. In Alberta, they were created by the Alberta Veterinary Medical Association and are not enforceable; in British Columbia, the requirements were created by WorkSafeBC and are enforceable. No provincial-level guidelines have been created by the Manitoba Veterinary Medical Association.

- **British Columbia:** All veterinary clinics comply with the requirements for safe handling and dispensing set out in the *OHSR*. In addition, some veterinary practices follow their own internal guidelines (e.g., VCA Canada).
- **Alberta:** Veterinary practices adhere to the following policies created by the Alberta Veterinary Medical Association: *Practice Inspection and Practice Standards Bylaw* (39) and "*Safety Handbook for Alberta Veterinary Facilities"* (40) . In addition, some veterinary practices follow their own internal guidelines (e.g., Calgary Animal Referral & Emergency Centre, VCA Canada).
- **Manitoba:** Veterinary practices may have their own internal policies and/or guidelines.

5.4 Home Care

Provincial-level guidelines for home care exist in Alberta and British Columbia, but not in Manitoba. They are similar to those described above for veterinary practices in that none are legally enforceable, except the requirements for antineoplastic agents set out in British Columbia's *OHSR*. Manitoba is the only jurisdiction that requires all medication for personal care homes be dispensed from one central pharmacy. The rationale is that centralized dispensing of medications leads to more consistency and better control of labelling and packaging.

- **British Columbia:** Home care organizations comply with the requirements for safe handling and dispensing set out in the *OHSR*. In addition, home care workers follow their organization's internal policies and guidelines (where they exist) on the safe use of antineoplastic agents. Examples include: "Clinical Policies and Procedures: Chemotherapy, Biotherapy and other Hazardous Drug Administration" (28) or

"Clinical/Operations Policy and Procedure: Safe Drug Handling Decisions" (29), developed by Bayshore Healthcare (for use in all of their facilities across the country). There is a provincial health and safety association dedicated to ensuring injury free, safe working conditions for continuing care workers in British Columbia (SafeCareBC); however, it does not publish guidelines on the safe handling of antineoplastic agents.

- **Alberta:** Home care workers follow their organization's internal policies and guidelines (where they exist) on the safe use of antineoplastic agents. One example is the waste disposal guideline prepared by Alberta Health Services ("Provincial Guide: Community Based Services Waste Disposal" (33)). Other examples include policies developed by Bayshore Healthcare for use in all of their facilities across the country. In Alberta, some home care workers expressed that they were often unaware whether a patient is taking hazardous drugs as not all pharmacies label oral antineoplastic agents as "hazardous".

- **Manitoba:** Home care workers follow their organization's internal policies and guidelines (where they exist) on the safe use of antineoplastic agents. Examples include: "Cytotoxic and Non-Cytotoxic Hazardous Medications Home Care Guidelines" (34), developed by the Winnipeg Regional Health Authority; and policies developed by Bayshore Healthcare for use in all of their facilities across the country.

6. Conclusion

There are numerous similarities and differences between the policy levers for the safe handling of antineoplastic agents in Alberta, Manitoba, and British Columbia. One significant difference found in the provinces is the way that occupational health and safety is managed. British Columbia was the only province with specific requirements pertaining to the safe handling of antineoplastic agents in the Occupational Health and Safety Regulations. Alberta and Manitoba did not have specific regulations for antineoplastic agents and instead covered them in the general occupational health and safety terminology. Similarly, provincial and regional health agencies had their own respective policies and did not refer to a single standard.

Nurses and pharmacists in all three provinces referred to a set of universal guidelines. This was not the same for health care workers in the homecare and veterinary practices. Another standard that was consistent across the provinces was Accreditation Canada's standards, despite being non-compulsory and not used by all healthcare facilities.

In summary, there is a lot of variation between the policy levers in the three provinces and creating pan-Canadian policy levers that can be adopted by all provinces is vital. Lessons can be learned from the National Association of Pharmacy Regulatory Authorities, which has created standards for compounding sterile products. These standards were adopted and/or adapted by the respective colleges of pharmacy for the three provinces.

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Appendix D: Policy Levers Compendium

CAREX Canada's compendium of policy levers regarding the safe handling of antineoplastic agents in occupational settings

Last updated: January 2020

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Objective: This compendium of policy levers regarding the safe handling of antineoplastic agents was created as a resource to support healthcare leaders and policy makers as a reference and when developing their own respective policy levers. This resource is part of a broader project conducted by CAREX Canada and funded by WorkSafeBC and Alberta Ministry of Labour and Immigration.

Other resources developed as part of this project can be found at: www.carexcanada.ca/special-topics/antineoplastic-agents/

Inclusion Criteria: The inclusion criteria included all policy levers (statutes, regulations, policies, guidelines, best practices, and procedures), outlined in both grey and peer-reviewed literature regarding the safe handling of antineoplastic agents in healthcare settings (hospital, homecare, community pharmacy, veterinary care).

Limitations: Policy levers that apply only to specific antineoplastic agents or specific devices were not included. Similarly, this compendium may not contain policy levers created by individual groups and organizations. Policy levers that provide guidance on reducing exposure to antineoplastic agents for patients were out of scope.

Contents: This Compendium is divided into three sections:

If you're aware of a policy lever regarding the safe handling of antineoplastic agents in occupational settings that has not been included in this compendium, please email it to info@carexcanada.ca with the subject Antineoplastic policy levers or [click here].

Definition of Statutes and Regulations: These are policy levers that can only be made by government and that are legally enforceable. These instruments are either prescriptive or performance-based (i.e., outcomes based). Prescriptive instruments are inflexible — they set out the standard that must be met, as well as the method by which it must be met. In contrast, outcomes- or performance-based instruments are more flexible. They set out the standard that must be met but allow the organization(s) being regulated to choose how they will meet the standard. Compliance with both prescriptive and outcomes-based instruments is mandatory and is enforced through inspections and statutory reporting requirements.

Title	Year	Author / Institution	Country	Type of Hazardous Substance	Work Setting	Method	Brief Outline
Safety Standards for General Occupational Health Standards (c. WAC 296-62-500, Hazardous drugs)	2019	Washington State Department of Labor & Industries	U.S.A	Hazardous Drugs	All Healthcare Facilities	N/A	This statute provides minimum requirements for developing a hazardous drugs control program. It includes: disposal and waste management, engineering controls, personal protective equipment, preparation and handling, spill control, storage and transport, training.
Occupational Health and Safety Regulation, BC Reg 296/97, s 6.42-6.58.	2018	Government of British Columbia	Canada	Cytotoxic Drugs	All Healthcare Facilities	N/A	This legislation provides minimum requirements for hazardous drugs in relation to: administration, disposal and waste management, engineering controls, personal protective equipment, preparation and handling, recordkeeping, spill control, storage and transport, training, protective reassignment.
Health care and residential facilities regulation, O Reg. 67/93, s. 97.	2018	Government of Ontario	Canada	Antineoplastic Drugs	All Healthcare Facilities	N/A	This legislation provides minimum requirements for handling hazardous drugs in relation to: accidental exposure and contamination, disposal and waste management, engineering controls, personal protective equipment, preparation and handling, spill control, storage and transport, training.
Hazardous Drug Safe Handling Act	2017	State of New Jersey	U.S.A	Hazardous Drugs	All Healthcare Facilities	N/A	This document provides recommendations on: administration, disposal and waste management, engineering controls, monitoring and surveillance, personal protective equipment, preparation and handling, recordkeeping, spill control, storage and transport, training.
Occupational Health and Safety Regulations, Nu Reg 003-2016, s 466.	2016	Government of Nunavut	Canada	Cytotoxic Drugs	All Healthcare Facilities	N/A	This legislation provides minimum requirements for hazardous drugs in relation to: accidental exposure and contamination, administration, disposal and waste management, engineering controls, personal protective equipment, preparation and handling, spill control, storage and transport, training.
Occupational Health and Safety Regulations, NWT Reg 039-2015, s 466.	2015	Government of Northwest Territories	Canada	Cytotoxic Drugs	All Healthcare Facilities	N/A	This legislation provides minimum requirements for hazardous drugs in relation to: accidental exposure and contamination, administration, disposal and waste management, engineering controls, personal protective equipment, preparation and handling, spill control, storage and transport, training.
The Occupational Health and Safety Regulations, 1996, RRS c O-1.1 Reg 1	1996	Government of Saskatchewan	Canada	Cytotoxic Drugs	All Healthcare Facilities	N/A	This legislation provides minimum requirements for hazardous drugs in relation to: accidental exposure and contamination, administration, disposal and waste management, engineering controls, personal protective equipment, preparation and handling, spill control, storage and transport, training.

Definition of Policies: These are instruments that provide cues to action by outlining the objectives, roles, and responsibilities for specific programs and tasks. The majority of the policies are mandatory for the staff / workers within that specific organization or occupation, and failure to comply usually results in consequences. Most of these policies are developed by healthcare institutions, professional colleges, and associations. They are usually high-level statements that are supplemented with procedures or guidelines.

Title	Year	Author / Institution	Country	Type of Hazardous Substance	Work Setting	Method	Brief Outline
Systemic Therapy Program: Policy / Procedure – Administration of Cancer Chemotherapy	2019	Cancer Care Nova Scotia	Canada	Cytotoxic Drugs	Healthcare Centre	N/A	This policy provides recommendations on: accidental exposure and contamination, administration, disposal and waste management, personal protective equipment, preparation and handling, protective reassignment, spill control, storage and transport, training.
Saskatchewan Veterinary Medical Association Practice Standards	2019	Saskatchewan Veterinary Medical Association	Canada	Cytotoxic Drugs	Veterinary Practices	N/A	This practice standard briefly provided information on: disposal and waste management, preparation and handling, and storage and transport.
Clinical Policies and Procedures: Chemotherapy, Biotherapy and other Hazardous Drug Administration	2019	Bayshore Healthcare	Canada	Hazardous Drugs	Home Care	This policy was developed after reviewing current statutory requirements and guidelines.	This policy provides recommendations on: administration, disposal and waste management, engineering controls, personal protective equipment, preparation and handling.
Model Standards for Pharmacy Compounding of Non-Sterile Preparations	2018	National Association of Pharmacy Regulatory Authorities	Canada	Non-Sterile Hazardous Drugs	Pharmacies	The standards were created using recommendations from the Ordre des pharmaciens du Québec, USP 795 and consultation with experts.	This document provides recommendations on: accidental exposure and contamination, disposal and waste management, engineering controls, personal protective equipment, storage and transport.
Standards for Pharmacy Compounding of Non-Sterile Preparations	2018	Alberta College of Pharmacy	Canada	Non-Sterile Hazardous Drugs	Pharmacies	The standards in this document are based on the Model Standards for Pharmacy Compounding of Non-Sterile Preparations developed by the National Association of Pharmacy Regulatory Authorities.	This document provides recommendations on: accidental exposure and contamination, disposal and waste management, engineering controls, personal protective equipment, storage and transport.
Chemical Hazard: Cytotoxic Drug Exposure Policy (51-003)	2018	Saskatchewan Health Authority	Canada	Cytotoxic Drugs	Healthcare Centre	N/A	This policy provides brief information on: accidental exposure and contamination, disposal and waste management, engineering controls, personal protective equipment, training.
Clinical/Operations Policy and Procedure: Safe Drug Handling Decisions	2018	Bayshore Healthcare	Canada	Hazardous Drugs	Home Care	This policy was developed after reviewing current statutory requirements and guidelines.	This policy provides recommendations on: disposal and waste management, engineering controls, personal protective equipment.
Safe Handling of Hazardous Drugs	2018	Duke University Hospital	U.S.A	Hazardous Drugs	Hospital, Research Laboratory	This policy was developed using recommendations from the Occupational Safety and Health Administration	This policy provides recommendations on: administration, disposal and waste management, engineering controls, packaging and labelling, personal protective equipment, preparation and handling, spill control, training.
Chemotherapy and Biotherapy Agents: Administration, Safe Handling and Disposal Policy	2017	Alberta Health Services	Canada	Cytotoxic Drugs	Healthcare Centre	N/A	This policy provides information on spill control and personal protective equipment.
Hazardous IV Drugs – Safe Handling Clinical Standards	2017	Sunnybrook Health Sciences Centre	Canada	Hazardous Drug	Healthcare Centre	N/A	This policy provides recommendations on: accidental exposure and contamination, administration, disposal and waste management, packaging and labelling, personal protective equipment, spill control.
USP General Chapter <800> Hazardous Drugs - Handling in Healthcare Settings	2017	United States Pharmacopeia	U.S.A	Hazardous Drugs	All Healthcare Facilities	N/A	This document provides recommendations on: accidental exposure and contamination, administration, dispensing, disposal and waste management, engineering controls, hazard communication, monitoring and surveillance, packaging and labelling, personal protective equipment, physical layout, preparation and handling, recordkeeping, spill control, storage and transport, training.
Model Standards for Pharmacy Compounding of Hazardous Sterile Preparation	2016	National Association of Pharmacy Regulatory Authorities	Canada	Sterile Hazardous Drugs	Pharmacies	The standards were created using recommendations from the Ordre des pharmaciens du Québec, USP 797, USP 800, and consultation with experts.	This document provides recommendations on: accidental exposure and contamination, disposal and waste management, engineering controls, packaging and labelling, personal protective equipment, physical layout, storage and transport. It also provides information on the roles and responsibilities of various personnel when compounding sterile hazardous drugs.
BCCA Pharmacy Practice Standards for Hazardous Drugs	2016	British Columbia Cancer	Canada	Hazardous Drugs	Pharmacies	The recommendations in this manual were created based on best practice standards set forth by the College of Pharmacists of BC, WorkSafe BC, Accreditation Canada, NAPRA, USP 797, USP 800, CSHP, CAPhO, ISMP Canada, and NIOSH.	This manual provides recommendations on: accidental exposure and contamination, disposal and waste management, engineering controls, packaging and labelling, personal protective equipment, preparation and handling, recordkeeping, spill control, storage and transport. The manual also includes information on protective reassignment. It also includes checklists for various processes in safe handling of hazardous drugs.
Safe Handling of Cytotoxic and Non-Cytotoxic Waste and Specimens	2016	Diagnostic Services Manitoba	Canada	Cytotoxic Drugs	Healthcare Centre	N/A	This policy provides guidance on handling cytotoxic drugs and waste contaminated with cytotoxic drugs. It includes: disposal and waste management, packaging and labelling, personal protective equipment, spill control, and training.
Hazardous Drugs: Handling Precautions (Policy # PTN.02.021)	2016	BC Children's Hospital	Canada	Hazardous Drugs	Hospital	N/A	This policy includes information on: administration, disposal and waste management, packaging and labelling, personal protective equipment, preparation and handling, record keeping, spill control.
Medication Management Policy/Procedure: Safe Handling of Hazardous Drugs (Number 7.02)	2016	IWK Health Centre	Canada	Hazardous Drugs	Hospital	N/A	This policy provides recommendations on: administration, disposal and waste management, monitoring and surveillance, personal protective equipment, preparation and handling, spill control, storage and transport, training. It also provides references to other IWK Health Centre policies that provide specific guidance for the safe handling of hazardous drugs.
Controlling Occupational Exposure to Hazardous Drugs	2016	Occupational Safety and Health Administration	U.S.A	Hazardous Drugs	All Healthcare Facilities	N/A	This document provides recommendations on: accidental exposure and contamination, administration, disposal and waste management, engineering controls, monitoring and surveillance, packaging and labelling, personal protective equipment, preparation and handling, recordkeeping, spill control, storage and transport, training.
Safe Handling of Hazardous Medications (Cytotoxic and Non-Cytotoxic) Policy	2015	Winnipeg Regional Health Authority and CancerCare Manitoba	Canada	Hazardous Drugs	Healthcare Centre	N/A	This policy provides recommendations on: administration, disposal and waste management, engineering controls, personal protective equipment, preparation and handling, spill control, storage and transport.
Policy & Procedure for the Safe Handling of Hazardous Drugs	2015	Pidsadowski Pharmacy	Canada	Hazardous Drugs	Community Pharmacy	This policy was developed by a community pharmacy based on the NIOSH guidelines.	This brief policy provides recommendations on personal protective equipment, preparation and handling, spill control, storage and transport.
Preventing occupational exposure to cytotoxic and other hazardous drugs: European Policy Recommendations	2015	European Parliament	European Union	Cytotoxic Drugs	All Healthcare Facilities	N/A	This policy provides recommendations on: engineering controls, monitoring and surveillance, personal protective equipment, preparation and handling, training.
Safe Handling of Cytotoxic Drugs/Waste	2014	Capital District Health Authority	Canada	Cytotoxic Drugs	Healthcare Centre	N/A	This policy provides recommendations on: administration, disposal and waste management, personal protective equipment, preparation and handling, spill control, storage and transport.
Hazardous Drug Safe Handling Standards (Number V-10)	2014	British Columbia Cancer	Canada	Hazardous Drugs	Healthcare Centre	N/A	This policy elaborates the responsibilities of managers and employees when handling hazardous drugs. It also provides recommendations on: administration, disposal and waste management, packaging and labelling, personal protective equipment, preparation and handling, recordkeeping, spill control, storage and transport, training.
Medication Management Policy and Procedure Manual: Parenteral administration of cytotoxic agents for oncological indications	2014	IWK Health Centre	Canada	Cytotoxic Drugs	Healthcare Centre	N/A	This policy provides recommendations on: administration, disposal and waste management, personal protective equipment, training.
Practice Inspection and Practice Standards Bylaw	2014	Alberta Veterinary Medical Association	Canada	Antineoplastic drugs	Veterinary Practices	N/A	This bylaw includes information on: administration, disposal and waste management, personal protective equipment, preparation and handling, spill control, storage and transport.
Policy for the safe handling and administration of cytotoxic drugs in adults with cancer	2013	Thames Valley Cancer Network	U.K.	Cytotoxic Drugs	Healthcare Centre	N/A	This policy elaborates the responsibilities of various employee groups when handling hazardous drugs. It also provides recommendations on: accidental exposure and contamination, administration, dispensing, packaging and labelling, personal protective equipment, preparation and handling, spill control, storage and transport.
Personal Safety Precautions for Chemotherapy Patients Protocol	2011	Calgary Animal Referral & Emergency (CARE) Centre	Canada	Anticancer Drugs	Veterinary Practices	The recommendations in this protocol are based on: OSHA, ONS, NIOSH, and ASHP.	This protocol briefly includes information on: administration, disposal and waste management, personal protective equipment.

Systemic Therapy Program: Policy & Procedure – Preparation of Cancer Chemotherapy	2009	Cancer Care Nova Scotia	Canada	Cytotoxic Drugs	Healthcare Centre	The policies and procedures were adapted from CAPhO and ASHP guidelines.	This policy provides recommendations on: accidental exposure and contamination, administration, disposal and waste management, engineering controls, monitoring and surveillance, packaging and labelling, personal protective equipment, preparation and handling, recordkeeping, spill control, storage and transport, training.
Hazardous Drug Spill Management (Number V-30)	2009	British Columbia Cancer	Canada	Hazardous Drugs	Healthcare Centre	N/A	This policy provides information on handling various types of hazardous drug spills as well as accidental exposures and contamination.
Safe Handling of Cytotoxic Agents: A Team Approach	2009	Willemson-mcbride et al.	Canada	Cytotoxic Drugs	Hospital	This policy was developed using policies from other institutions and opinions from experts working in a hospital	This policy document provides hospitals with information on creating cytotoxic policies and procedures. It includes: administration, disposal and waste management, spill control, storage and transport.
USP General Chapter <797> Pharmaceutical Compounding - Sterile Preparations	2008	United States Pharmacopeia	U.S.A	Sterile Hazardous Drugs	All Healthcare Facilities	N/A	This document provides brief recommendations on: engineering controls, monitoring and surveillance, personal protective equipment, recordkeeping, training.

Note: Some policy levers such as protocols and standards have been included in the 'Policies' section and 'Guidelines and Best Practices'. They have been categorized into two different sections based on whether they are mandatory or voluntary. The "Policies" section contains mandatory instruments while the "Guidelines and Best Practices" section contains voluntary instruments.

Definition of Guidelines and Best Practices: Our definition of Guidelines and Best Practices includes an array of instruments including guidance documents, standards, and procedures. Guidance documents outline recommended advice and methods for achieving the safe handling of antineoplastic agents and are usually based on evidence from research and practice. Procedures outline detailed instructions on the various steps and tasks in the safe handling of antineoplastic agents Standards outline a measurable quality or outcome which can be used to assess the various steps and tasks related to safe handling of antineoplastic agents These instruments are usually not enforceable and act as a guide to enable workers and institutions to meet the requirements of a policy, statute, or regulation.

Title	Year	Author / Institution	Country	Type of Hazardous Substance	Work Setting	Method	Brief Outline
Cytotoxic Drugs Health and Safety Fact Sheet	2019	Canadian Union of Public Employees	Canada	Cytotoxic Drugs	Healthcare Centre	N/A	The recommendations provided in this webpage include: disposal and waste management, engineering controls, personal protective equipment, spill control, storage and transport, training.
Hazardous Medication Personal Protective Equipment (PPE) Guide and List: Reducing Occupational Exposure to Hazardous Medication for All Staff	2019	Alberta Health Services, Covenant Health	Canada	Hazardous Drugs	Healthcare Centre	N/A	This guide provides comprehensive recommendations on using personal protective equipment when in contact with hazardous drugs in various scenarios. It also includes a hazardous medication handling risk assessment and information on: disposal and waste management, packaging and labelling.
Guidance Document for Pharmacy Compounding of Non-Sterile Preparations	2019	Prince Edward Island College of Pharmacists	Canada	Non-sterile Hazardous Drugs	Pharmacies	The guidance in this document is based on the Model Standards for Pharmacy Compounding of Non-Sterile Preparations and its associated Guidance Document developed by the National Association of Pharmacy Regulatory Authorities. This guidance is not standalone, it is associated with the “Standards for Pharmacy Compounding of Non-Sterile Preparations”	This guideline provides recommendations on: accidental exposure and contamination, disposal and waste management, engineering controls, monitoring and surveillance, personal protective equipment, preparation and handling, recordkeeping, spill control, storage and transport, training. It also provides information on risk assessment and a diagram on receiving, unpacking and storage of hazardous drugs.
Cancer Care Standard	2019	Accreditation Canada	Canada	Antineoplastic Drugs	Hospital	N/A	This document provides recommendations on: administration, dispensing, disposal and waste management, preparation and handling, personal protective equipment, recordkeeping, spill control, storage and transport, training.
Medication Management Standard	2019	Accreditation Canada	Canada	Antineoplastic Drugs	Hospital	N/A	This document provides recommendations on: engineering controls, disposal and waste management, personal protective equipment, recordkeeping, spill control, storage and transport.
Provincial Guide: Community Based Services Waste Disposal	2019	Alberta Health Services	Canada	Hazardous Drugs	Home Care	N/A	This guideline provides information on: disposal and waste management
Hazardous and Cytotoxic Drugs: Administration and Handling - CHW	2018	the children's hospital at Westmead	Australia	Cytotoxic Drugs, Hazardous Drugs	Hospital	N/A	This document provides recommendations on: administration, disposal and waste management, monitoring and surveillance, packaging and labelling, preparation and handling, personal protective equipment, recordkeeping, spill control, storage and transport, training.
Chemical Hazard: Cytotoxic Drug Exposure Procedure (51-003)	2018	Saskatchewan Health Authority	Canada	Cytotoxic Drugs	Healthcare Centre	This procedure document is not standalone, it is associated with “Chemical Hazard: Cytotoxic Drug Exposure Policy (51-003)”	This procedure provides recommendations for: accidental exposure and contamination.
Cytotoxic Drug Manual Administration and Handling Guidelines Version 3.5	2018	Alberta Health Services, Covenant Health	Canada	Cytotoxic Drugs	Healthcare Centre, Home Care	N/A	The main elements of this guideline include the following: accidental exposure and contamination, administration, disposal and waste management, packaging and labelling, personal protective equipment, preparation and handling, recordkeeping, spill control, storage and transport.
Guidance Document for Pharmacy Compounding of Non-sterile Preparations	2018	National Association of Pharmacy Regulatory Authorities	Canada	Non-sterile Hazardous Drugs	Pharmacies	The standards were created using recommendations from the Ordre des pharmaciens du Québec, USP 795, and consultation with experts. This guidance is not standalone, it is associated with “Model Standards for Pharmacy Compounding of Non-Sterile Preparations”	This document provides recommendations on: accidental exposure and contamination, disposal and waste management, engineering controls, monitoring and surveillance, personal protective equipment, recordkeeping, spill control, storage and transport, training. It also provides a decision algorithm for risk assessment.
Guidance Document for Pharmacy Compounding of Non-sterile Preparations	2018	Alberta College of Pharmacy	Canada	Non-sterile Hazardous Drugs	Pharmacies	The guidance in this document is based on the Model Standards for Pharmacy Compounding of Non-Sterile Preparations and its associated Guidance Document developed by the National Association of Pharmacy Regulatory Authorities. This guidance is not standalone, it is associated with the “Standards for Pharmacy Compounding of Non-Sterile Preparations”	This document provides recommendations on: accidental exposure and contamination, disposal and waste management, engineering controls, monitoring and surveillance, personal protective equipment, recordkeeping, spill control, storage and transport, training. It also provides a decision algorithm for risk assessment.
Handling of Hazardous Drugs: Risk Prevention by Personal Protective Equipment	2018	Braun	Germany	Hazardous Drugs	Healthcare Centre	N/A	This document provides recommendations on: engineering controls, personal protective equipment, Training.
Guidance on Handling of Injectable Cytotoxic Drugs in Clinical Areas in NHS Hospitals in the UK	2018	NHS Pharmaceutical Quality Assurance Committee	U.K.	Injectable Cytotoxic Drugs	Hospital	N/A	This guideline is a reference for pharmacists, nurses, decision makers and cleaners in the hospital. It includes information on: administration, disposal and waste management, personal protective equipment, training
Safe Handling of Hazardous Drugs	2018	Oncology Nursing Society	U.S.A	Hazardous Drugs	All Healthcare Facilities	N/A	This document provides recommendations on: administration, disposal and waste management, engineering controls, monitoring and surveillance, personal protective equipment, preparation and handling, recordkeeping, spill control, training. It also includes information on handling of linen soiled with hazardous drugs.
ASHP Guidelines on Handling Hazardous Drugs	2018	Power et al. (American Society of Health-System Pharmacists)	U.S.A	Hazardous Drugs	Healthcare Centre	The recommendations were based on available research and the opinions of thought leaders.	The main elements of this guideline include the following: accidental exposure and contamination, administration, disposal and waste management, engineering controls, monitoring and surveillance, packaging and labelling, personal protective equipment, preparation and handling, spill control, storage and transport, training.
Chemotherapy and Other Hazardous Drugs Safe Use Guidelines	2018	University of Washington	U.S.A	Hazardous Drugs	Research Laboratory	N/A	The main elements of this guideline include the following: administration, disposal and waste management, engineering controls, personal protective equipment, preparation and handling, spill control.
Chemotherapy and Other Hazardous Drugs Safe Use Guidelines	2018	University of Washington	U.S.A	Hazardous Drugs	Hospital, Research Laboratory	N/A	This guideline includes information on: administration, disposal and waste management, engineering controls, personal protective equipment, preparation and handling, spill control.
ACVIM small animal consensus statement on safe use of cytotoxic chemotherapeutics in veterinary practice	2018	Smith et al. (American College of Veterinary Internal Medicine)	U.S.A	Cytotoxic Drugs	Veterinary Practices	The recommendation in this document are based on: OSHA, NIOSH, USP and other published regulations.	This study includes information on: administration, disposal and waste management, personal protective equipment, preparation and handling, spill control, storage and transport, training.
Cytotoxic Drugs and Related Waste-Risk Management	2017	SafeWork NSW	Australia	Cytotoxic Drugs	All Healthcare Facilities	This guide was created by a variety of stakeholders and health care practitioners	This comprehensive guide contains recommendations on the following: administration, dispensing, disposal and waste management, engineering controls, monitoring and surveillance, packaging and labelling, personal protective equipment, preparation and handling, recordkeeping, spill control, storage and transport, training. It also includes information on developing a risk control plan and handling cytotoxic contaminated laundry.
Standards and competencies for cancer chemotherapy nursing practice	2017	Canadian Association of Nurses in Oncology	Canada	Chemotherapy Drugs	All Healthcare Facilities	This standard was derived from literature reviews, environmental scans, and expert opinion.	This Standard provides a brief outline on: administration, disposal and waste management, engineering controls, personal protective equipment, preparation and handling, spill control. It also includes a toolkit.
Medication Administration: Cytotoxic Chemotherapy and Biotherapy	2017	BC Children’s Hospital	Canada	Cytotoxic Drugs	Hospital	N/A	This procedure document includes information on: administration, personal protective equipment.

Safe procedure development to manage hazardous drugs in the workplace	2017	Carreño et al.	Spain	Hazardous Drugs	Hospital	The procedure was developed using documents published by NIOSH and INSHT	This procedure elaborates the safe handling of hazardous drugs in general as well as for specific drugs. It includes information on: accidental exposure and contamination, administration, dispensing, disposal and waste management, personal protective equipment, preparation and handling, spill control, storage and transport, training.
Hazardous Drug Spill Response (Updated) Guidelines	2017	Kaiser Permanente	U.S.A	Hazardous Drug	Healthcare Centre, Pharmacies	N/A	This guideline contains information on: spill control, disposal and waste management.
Handling of Hazardous Drugs (Procedure No: HM-08-005)	2017	University of Toledo	U.S.A	Hazardous Drugs	Hospital, Research Laboratory	This procedure was formed using best practices from NIOSH, OSHA and USP.	This brief procedure document includes information on: administration, disposal and waste management, engineering controls, personal protective equipment, preparation and handling, spill control, storage and transport, training.
Recommendations for the Safe Use and Handling of Oral Anti-Cancer Drugs (OACDs) in Community Pharmacy : A Pan-Canadian Consensus Guideline	2016	Canadian Association of Provincial Cancer Agencies & Cancer Care Ontario	Canada	Oral Antineoplastic Drugs	Community Pharmacy, Manufacturer, Healthcare Centre	This consensus guideline was informed by published and grey literature and key informant interviews with executive level community and specialty pharmacists.	The guideline focuses on a community pharmacy setting. It includes information on the following processes: packaging and labelling, storage and transport, dispensing, preparation and handling, disposal and waste management, training, personal protective equipment, spill control. It also includes information on: protective reassignment.
Guideline on the Safe Handling & Use of Cytotoxic Drugs	2016	National Health and Safety Function	Ireland	Cytotoxic Drugs	Hospital	N/A	This guideline elaborated the responsibilities of managers and employees when handling hazardous drugs. It includes a cytotoxic drug risk assessment form and provides recommendations for: engineering controls, monitoring and surveillance, protective equipment, preparation and handling, recordkeeping, training.
NIOSH list of antineoplastic and other hazardous drugs in healthcare settings, 2016	2016	National Institute for Occupational Safety and Health	U.S.A	Hazardous Drugs	All Healthcare Facilities	N/A	This document contains a detailed list of hazardous drugs. It also contains information on developing a hazardous drugs list and recommendations for engineering controls and personal protective equipment.
Best practice safety tools for pharmacy personnel handling hazardous drugs	2016	Washington State Pharmacy Association	U.S.A	Hazardous Drugs	Pharmacies	The recommendations in this document were based on available national and international best practices such as NIOSH Alert, SHPA standards, ISOPP standards, BC Cancer Agency, etc.	This document contains a hazardous drugs exposure risk algorithm that is meant to guide pharmacists and pharmacy managers. It also includes recommendations on: dispensing, engineering controls, personal protective equipment, spill control, storage and transport.
2016 AAHA Oncology Guidelines for Dogs and Cats	2016	Biller et al. (American Animal Hospital Association)	U.S.A	Hazardous Drugs	Veterinary Practices	This guideline was prepared using clinical experience and a consensus of expert opinion. It was also subject to an external review process.	This guideline includes information on: engineering controls, packaging and labelling, personal protective equipment, preparation and handling, spill control, storage and transport, training.
Safe Handling - Cytotoxic Drugs and Related Waste - A Risk Management Guide for South Australian Health Services	2015	SA Health	Australia	Cytotoxic Drugs	All Healthcare Facilities	N/A	This guideline provides recommendations for: accidental exposure and contamination, administration, disposal and waste management, engineering controls, monitoring and surveillance, packaging and labelling, personal protective equipment, preparation and handling, spill control, storage and transport, training. This guide also includes information on handling of linen soiled with hazardous drugs, developing a risk control plan, risk assessment tools, and health surveillance questionnaires.
Best Practices for the Safe Handling of Hazardous Drugs	2015	WorkSafe BC	Canada	Hazardous Drugs	All Healthcare Facilities	N/A	This document provides recommendations on: administration, disposal and waste management, engineering controls, hazard communication, monitoring and surveillance, personal protective equipment, preparation and handling, recordkeeping, spill control, storage and transport, training. It also includes information on assessing risk, work area design, and a spill kit checklist.
Oral Cancer Drug Therapy Safe Use and Safe Handling Guidelines	2015	Canadian Association of Provincial Cancer Agencies	Canada	Oral Antineoplastic Drugs	All Healthcare Facilities	This guideline was informed by published and grey literature.	This guide includes recommendations on personal protective equipment.
Safe handling of cytotoxics: Guideline recommendations	2015	Eatsy et al. (Cancer Care Ontario)	Canada	Cytotoxic Drugs	Healthcare Centre, Home Care	These recommendations were developed using systematic reviews and existing guidelines.	This article provides recommendations for: accidental exposure and contamination, administration, disposal and waste management, monitoring and surveillance, packaging and labelling, personal protective equipment, preparation and handling, spill control, storage and transport. This article also indicates whether a recommendation is required by legislation.
EMS Section 21 Guidance Note 4: EMS Worker Exposure to Hazardous Drugs	2015	Ontario Emergency Medical Services - Section 21 Sub Committee	Canada	Hazardous Drugs	Emergency Medical Services	The guidance document was informed by available literature	The main elements of this guidance note include the following: accidental exposure and contamination, disposal and waste management, engineering controls, personal protective equipment, preparation and handling, training.
London Integrated Care Systems (ICSs) Guidelines for Safe Prescribing, Handling and Administration of Systemic Anti- Cancer Therapy	2015	London Integrated Care Systems	U.K.	Cytotoxic Drugs	Healthcare Centre	N/A	This guideline contains recommendations on the following: accidental exposure and contamination, administration, disposal and waste management, personal protective equipment, preparation and handling, recordkeeping, spill control, storage and transport.
Safe Handling of Hazardous Medications in the Home Procedure	2015	University of Michigan Hospitals and Health Centers	U.S.A	Hazardous Drugs	Home Care	N/A	This brief procedure document includes information on: accidental exposure and contamination, personal protective equipment, disposal and waste management, spill control.
Workplace Safety and Health for the Veterinary Health Care Team	2015	Gibbins et al.	U.S.A	Hazardous Drugs	Veterinary Practices	N/A	This article includes information on: recordkeeping, hazard communication, personal protective equipment, spill control, training.
Guide for handling cytotoxic drugs and related waste	2014	Workplace Health and Safety Queensland	Australia	Cytotoxic Drugs	All Healthcare Facilities	N/A	This comprehensive guide contains recommendations on the following: administration, disposal and waste management, engineering controls, packaging and labelling, personal protective equipment, preparation and handling, recordkeeping, spill control, storage and transport, training. It also includes information on developing SOPs and handling cytotoxic contaminated laundry.
Personal Protective Equipment	2014	Cancer Care Nova Scotia	Canada	Cytotoxic Drugs	Healthcare Centre		This article provides recommendations for: personal protective equipment, spill control.
Compounding: Guidelines for Pharmacies	2014	Canadian Society of Hospital Pharmacists	Canada	Hazardous Drugs	Pharmacies	This guideline was informed by published and grey literature.	This guideline provides recommendations on: accidental exposure and contamination, disposal and waste management, engineering controls, monitoring and surveillance, packaging and labelling, personal protective equipment, preparation and handling, spill control, storage and transport, training. The guideline also includes information on protective reassignment.
Pharmacy Practice Guide: Safe Handling - Cancer Medications in the Community Pharmacy	2014	Cancer Care Nova Scotia	Canada	Cytotoxic Drugs	Community Pharmacy	N/A	This guide includes recommendations for: personal protective equipment, preparation and handling, spill control, storage and transport, training.
Pharmacy Safe Handling of Hazardous Medications (Cytotoxic and Non-Cytotoxic)	2013	Winnipeg Regional Health Authority	Canada	Hazardous Drugs	Pharmacies		This directive provides recommendations on: disposal and waste management, engineering controls, packaging and labelling, personal protective equipment, preparation and handling, spill control, storage and transport.
Cytotoxic and Non-Cytotoxic Hazardous Medications Home Care Guidelines	2013	Winnipeg Regional Health Authority	Canada	Hazardous Drugs	Home Care	This document was developed based on the Winnipeg Regional Health Authority's Safe Handling of Hazardous Medications Policy	This guideline provides recommendation on: disposal and waste management, packaging and labelling, personal protective equipment, spill control, training. It also includes information on responsibilities of home care staff and precautions to be taken when carrying out various home care activities with patients on hazardous medications.
Safe Handling of Hazardous Chemotherapy Drugs in Limited-Resource Settings	2012	Pan American Health Organization	International	Hazardous Chemotherapy Drugs	All Healthcare Facilities	N/A	This guideline includes tools such as surveys and checklists. It provides recommendations for: accidental exposure and contamination, administration, disposal and waste management, engineering controls, monitoring and surveillance, personal protective equipment, preparation and handling, spill control, storage and transport, training.

Safe handling of cytotoxic drugs and related waste: standard operating procedure	2012	Massey University Veterinary Teaching Hospital	New Zealand	Cytotoxic Drugs	Veterinary Practices	N/A	This guideline includes information on: accidental exposure and contamination, administration, disposal and waste management, dispensing, engineering controls, personal protective equipment, spill control, preparation and handling, packaging and labelling, recordkeeping, storage and transport, training. It also includes an information sheet for people with pets receiving cytotoxic drugs.
Safe Handling and Administration Considerations of Oral Anticancer Agents in the Clinical and Home Setting	2012	Joanne Lester	U.S.A	Oral Antineoplastic Drugs	Home Care, Healthcare Centre	The recommendations in this paper were compiled by carrying out a literature review.	This guideline includes information on the administration, preparation and handling of oral antineoplastic agents.
Occupational health and safety risks in the healthcare sector: Guide to prevention and good practice	2011	European Commission	European Union	Cytotoxic Drugs	All Healthcare Facilities	N/A	This guide includes recommendations on the following: disposal and waste management, engineering controls, packaging and labelling, personal protective equipment, preparation and handling, recordkeeping, storage and transport.
Safe Handling of Oral Chemotherapeutic Agents in Clinical Practice: Recommendations from an International Pharmacy Panel	2011	Goodin et al.	International	Oral Antineoplastic Drugs	Pharmacy, Manufacturer, Home Care	This guideline was formed by a team of international pharmacists from North America and Europe who reviewed existing guidelines and identified gaps in recommendations that are important for safe handling.	The main elements of this guideline include the following: packaging and labelling, disposal and waste management, preparation and handling, storage and transport, training.
The safe handling of hazardous drugs	2010	Huber et al.	U.S.A	Hazardous Drugs	Healthcare Centre	N/A	This article provides recommendations for: administration, disposal and waste management, personal protective equipment, spill control, storage and transport.
Safe handling of Hazardous Drugs for Veterinary Healthcare Workers	2010	NIOSH	U.S.A	Hazardous Drugs	Veterinary Practices	N/A	This document includes recommendations on: administration, disposal and waste management, preparation and handling, storage and transport, Spill control, monitoring and surveillance, training.
Safe Handling of Parenteral Cytotoxics: Recommendations for Ontario	2009	Green et al. (Cancer Care Ontario)	Canada	Injectable Cytotoxic Drugs	Healthcare Centre	The recommendations were developed using systematic reviews, recent guidelines and expert opinion. They were then approved by health care practitioners	This article provides recommendations for: engineering controls, monitoring and surveillance, packaging and labelling, personal protective equipment, storage and transport, training.
Chemotherapy: Managing side effects and safe handling	2009	Valerie MacDonald	Canada	Anticancer Drugs	Veterinary Practices	N/A	This article briefly includes information on: administration, disposal and waste management, engineering controls, personal protective equipment.
Guidelines for the safe prescribing, handling and administration of hazardous drugs	2009	Northern Ireland Cancer Network	Ireland	Hazardous Drugs	Healthcare Centre	N/A	The main elements of this guideline include the following: accidental exposure and contamination, administration, dispensing, packaging and labelling, personal protective equipment, preparation and handling, spill control, storage and transport, training.
Personal Protective Equipment for Health Care Workers Who Work with Hazardous Drugs	2009	National Institute for Occupational Safety and Health	U.S.A	Hazardous Drugs	All Healthcare Facilities	N/A	This guide includes recommendations on personal protective equipment.
Safe Handling of Hazardous Drugs: Are You Protected?	2009	Nixon et al.	U.S.A	Hazardous Drugs	Healthcare Centre	N/A	This article provides recommendations for: administration, engineering controls, monitoring and surveillance, personal protective equipment, preparation and handling, spill control, training.
Prevention Guide: Safe Handling of Hazardous Drugs	2008	ASSTSAS	Canada	Hazardous Drugs	Healthcare Centre, Home Care	This recommendations in this guide were developed by reviewing the scientific literature and recent guidelines published in North America, Europe and Australia. In addition, expert opinion from health professionals were included.	This main elements of this comprehensive guide include the following: accidental exposure and contamination, administration, disposal and waste management, engineering controls, monitoring and surveillance, packaging and labelling, personal protective equipment, physical layout, preparation and handling, spill control, storage and transport. This guide also includes information on handling of linen soiled with hazardous drugs, and a rating scale that indicates the strength of the scientific evidence for each recommendation.
Safety Handbook for Alberta Veterinary Facilities	2008	Alberta Veterinary Medical Association	Canada	Cytotoxic Drugs	Veterinary Practices	N/A	This article briefly includes information on: administration, disposal and waste management, engineering controls, packaging and labelling, personal protective equipment, preparation and handling, spill control, storage and transport.
Occupational Health & Safety: Cytotoxic Drugs	2007	WorkSafe Saskatchewan	Canada	Cytotoxic Drugs	All Healthcare Facilities	This guideline is not standalone, it is associated with “The Occupational Health and Safety Regulations, 1996, RRS c O-1.1 Reg 1”	This guide includes recommendations on administration, disposal and waste management, engineering controls, personal protective equipment, preparation and handling, protective reassignment, spill control, training. It also describes the process of developing a safe handling policy.
Preventing occupational and environmental exposure to cytotoxic drugs in veterinary medicine	2007	European College of Veterinary Internal Medicine	Europe	Cytotoxic Drugs	Veterinary Practices	N/A	This document includes information on: accidental exposure and contamination, administration, engineering controls, personal protective equipment, preparation and handling, spill control, storage and transport. It also includes information for pregnant staff, and people with pets receiving cytotoxic drugs.
Safe Handling of Cytotoxic Agents in the Home	2007	Janice Barstow		Cytotoxic Drugs	Home Care	The recommendations in this paper were compiled by carrying out a literature review.	This guideline includes information on: Disposal and waste management, Preparation and Handling, Personal Protective Equipment, Spill control.
OHS Guidelines Part 6: Substance Specific Requirements	2006	WorkSafe BC	Canada	Cytotoxic Drugs	All Healthcare Facilities	This guideline is not standalone, it is associated with “Occupational Health and Safety Regulation, BC Reg 296/97, s 6.42.”	This guideline provides recommendations on: administration, engineering controls, preparation and handling.
Provincial Guidelines for the Safe Handling, Administration and Disposal of Antineoplastic Agents	2004	Pediatric Oncology Group of Ontario	Canada	Antineoplastic Drugs	Healthcare Centre	This guideline was developed by reviewing the literature and current policies for chemotherapy administration in Canada.	This main elements of this guide include the following: administration, disposal and waste management, personal protective equipment, preparation and handling.
Hospital Standards of Practice and Guidelines on Practice in Hospital Pharmacy	2004	Manitoba Pharmaceutical Association	Canada	Cytotoxic Drugs	Hospital Pharmacy		This document contains brief information on: accidental exposure and contamination, administration, disposal and waste management, engineering controls, monitoring and surveillance, packaging and labelling, personal protective equipment, preparation and handling, recordkeeping, spill control, storage and transport, training.
NIOSH Alert: preventing occupational exposures to antineoplastic and other hazardous drugs in health care settings.«	2004	National Institute for Occupational Safety and Health	U.S.A	Antineoplastic Drugs, Hazardous Drugs	All Healthcare Facilities	N/A	This document contains recommendations on the following: administration, disposal and waste management, engineering controls, monitoring and surveillance, personal protective equipment, preparation and handling, spill control, storage and transport.
Principles of Chemotherapy Safety Procedures	2003	Shawn Takada	U.S.A	Cytotoxic drugs	Veterinary Practices	N/A	This document includes information on: accidental exposure and contamination, administration, disposal and waste management, preparation and handling, storage and transport, personal protective equipment, spill control, preparation and handling.
Handling Cytostatic Drugs: A Practical Guide	2000	Eitel et al.	Germany	Cytostatic Drugs	Healthcare Centre, Home Care	N/A	The main elements of this guide include the following: administration, disposal and waste management, preparation and handling, spill control, training. It also includes a self-testing checklist.
SHPA Standards of Practice for the Safe Handling of Cytotoxic Drugs in Pharmacy Departments	1999	The Society of Hospital Pharmacists of Australia Committee of Specialty Practice in Oncology	Australia	Cytotoxic Drugs	Hospital	N/A	This article provides recommendations for: accidental exposure and contamination, disposal and waste management, engineering controls, monitoring and surveillance, packaging and labelling, personal protective equipment, recordkeeping, storage and transport, training.
Safe handling of cytotoxic drugs	1998	Lilian Daly	Australia	Cytotoxic Drugs	Healthcare Centre		This article provides recommendations for: administration, disposal and waste management, monitoring and surveillance, personal protective equipment, recordkeeping, storage and transport.

Oregon OSHA Technical Manual	1996	Oregon OSHA	U.S.A	Hazardous Drugs	Healthcare Centre, Home Care	N/A	This guideline includes recommendations for: accidental exposure and contamination, administration, disposal and waste management, engineering controls, hazard communication, monitoring and surveillance, packaging and labelling, personal protective equipment, preparation and handling, recordkeeping, spill control, storage and transport, training. It also includes information on handling of linen soiled with hazardous drugs.
Issues in Cytotoxic Drug Handling Safety	1987	Suzanne Miller	U.S.A	Cytotoxic Drugs	Home Care, Healthcare Centre	The recommendations in this paper were compiled by carrying out a literature review	This guideline includes information on: Preparation and handling, Disposal and waste management, Spill control.
Recommendations for handling cytotoxic drugs in hospitals	1983	Stolar et al.	U.S.A	Cytotoxic Drugs	Hospital	The recommendation were formed using published guidelines and unpublished procedures.	This article provides hospitals with three levels of exposure control methods; protective, elaborate and expensive. It includes information on: administration, disposal and waste management, engineering controls, monitoring and surveillance, personal protective equipment, preparation and handling, spill control, storage and transport, training.
Safe Handling of Chemotherapeutic Agents: A Report from The Mount Sinai Medical Center	1983	Jones et al.	U.S.A	Cytotoxic Drugs	Hospital	N/A	This brief report includes information on: disposal and waste management, engineering controls, preparation and handling.
Recommendations for the safe handling of injectable antineoplastic drug products	1981	Zimmerman et al.	U.S.A	Injectable Antineoplastic Drugs	Healthcare Centre	The recommendations in this guidelines was prepared by the NIH Division of Safety in collaboration with the NIH Clinical Center pharmacy and nursing staffs, and the National Cancer Institute.	The recommendations include information on the following: administration, disposal and waste management, engineering controls, personal protective equipment, preparation and handling.
Safety First: Handling Chemotherapy Drugs		Veterinary Oncology Consultants	Australia	Cytotoxic drugs	Veterinary Practices	N/A	This document contains information on: administration, disposal and waste management, engineering control, personal protective equipment, preparation and handling, storage and transport, spill control.
Safe Handling of Hazardous Drugs in Healthcare		Public Services Health & Safety Association	Canada	Hazardous Drugs	All Healthcare Facilities	The recommendation in this document were developed using existing literature	The brief recommendations in this document include: accidental exposure and contamination, disposal and waste management, engineering controls, monitoring and surveillance, personal protective equipment, preparation and handling, spill control, training.
Tools for Policy Development: Recommendations for handling linens exposed to hazardous drugs		National Association of Institutional Linen Management	U.S.A	Hazardous Drugs	Healthcare Centre	N/A	This article provides recommendations for handling of linen soiled with hazardous drugs. It also includes information on: monitoring and surveillance, personal protective equipment.
Health Care Clinic: Hazardous Drug Program Guide		Washington State Department of Labor and Industries	U.S.A	Hazardous Drugs	Healthcare Centre	N/A	This guide has templates that allows healthcare clinics to create their own comprehensive hazardous drug control program. It includes information on the following: administration, dispensing, disposal and waste management, engineering controls, personal protective equipment, preparation and handling, physical layout, recordkeeping, Spill control, storage and transport, packaging and labelling, training. It also includes information on drug hazard assessment.
Community Pharmacy: Hazardous Drug Program Guide		Washington State Department of Labor & Industries	U.S.A	Hazardous Drugs	Community Pharmacy	Not applicable	This guide has templates that allows community pharmacists to create their own comprehensive hazardous drug control program. It includes information on: training, preparation and handling, spill control, physical layout, engineering controls, personal protective equipment.
Hazardous drug handling and disposal SOP		University of Delaware	U.S.A	Hazardous Drugs	Hospital, Research Laboratory	N/A	This procedure document includes information on: accidental exposure and contamination, disposal and waste management, engineering controls, monitoring and surveillance, personal protective equipment, preparation and handling, spill control, storage and transport, training.
Veterinary: Hazardous Drug Program Guide		Washington State Department of Labor and Industries	U.S.A	Hazardous drugs	Veterinary Practices	N/A	This guide has templates that allows veterinary practices to create their own comprehensive hazardous drug control program. It includes information on the following: administration, dispensing, disposal and waste management, engineering controls, personal protective equipment, preparation and handling, physical layout, recordkeeping, Spill control, storage and transport, packaging and labelling, training. It also includes information on drug hazard assessment.

Note: Some of the instruments included in the 'Policies' section and 'Guidelines and Best Practices' include protocols and standards. They have been categorized into two different sections based on whether they are mandatory or voluntary. The "Policies" section contains mandatory instruments while the "Guidelines and Best Practices section contains voluntary instruments.

Appendix E: Prevention Framework Tool

Prevention framework for handling antineoplastic agents

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Scope

This resource is part of a broader project conducted by CAREX Canada on reducing the occupational exposure to antineoplastic agents. The project analyzed the different dimensions that affect the safe handling of antineoplastic agents in health care settings. The outcomes of this project were four resources, including this report:

1. **Compendium of policy levers regarding the safe handling of antineoplastic agents in occupational settings:** This tool is a collection of policy levers for the safe handling of antineoplastic agents in different healthcare settings. It was designed to help policy makers create and update their own respective policies.

2. **Prevention framework for handling antineoplastic agents:** This tool was designed to help organizations assess and audit their own procedures and plans for the safe handling of antineoplastic agents. It was developed by applying internationally accepted approaches to auditing occupational health and safety management systems.

3. **Comparison of policy levers for the safe handling of antineoplastic agents in Alberta, Manitoba, and British Columbia:** This report details and compares the various statutes, regulations, policies, guidelines, and standards used in the safe handling of antineoplastic agents across three provinces. It outlines key similarities and differences that policy makers can use to create better-informed policies that protect the health and wellbeing of healthcare workers handling antineoplastic agents.

4. **Webinar: Reducing occupational exposure to antineoplastic agents:** This webinar presents the findings of our research on the barriers and facilitators that influence the safe handling of antineoplastic agents. It includes results from a literature review, environmental scan, and stakeholder interviews, and was designed to help decision makers and policy implementers create safer environments for workers handling antineoplastic agents.

The other resources developed as part of this project can be found at www.carexcanada.ca/special-topics/antineoplastic-agents/.

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Introduction

This document provides explanatory information about the attached prevention framework for the safe handling and management of antineoplastic agents (Table 1). The framework was developed by applying internationally accepted approaches to auditing occupational health and safety management systems (OHSMS). This framework can be used as a starting point for discussion with healthcare leaders (hospital administrators, health care managers, professional colleges) to develop checklists for the safe handling and management of antineoplastic agents.

Background: Key concepts of an OHSMS

Essentially, an OHSMS is a preventive tool that helps an organization assess workplace practices and identify hazards that can expose a worker to harm. There are a number of national and international standards that set out requirements for developing and implementing OHSMS. The most commonly cited international standards are those published by the International Labour Organization (ILO), the International Organization for Standardization (ISO), and the Occupational Health and Safety Assessment Series (OHSAS). Many national standards are derived from these international standards. In Canada, the relevant national standard is Canadian Standards Association (CSA) Z1000-14 – Occupational Health and Safety Management, which was first published by the CSA in 2006 and then updated in 2014.

The definition of an OHSMS varies depending slightly on the source. The International Organization for Standardization (ISO) defines an OHSMS as a "management system or part of a management system used to achieve the occupational health and safety (OHS) policy". A management system is, in turn, defined as a "set of interrelated or interacting elements of an organization to establish policies and objectives and processes to achieve those objectives," and an OHS policy is defined as a "policy to prevent work-related injury and ill health to workers and to provide safe and healthy workplaces". The CSA adopts a similar definition of OHSMS in CAN/CSA-Z1000-14 – Occupational Health and Safety Management, but expands the definition of occupational health and safety as follows: "the promotion in the workplace of the physical, *mental, and social wellbeing* of workers and the protection of workers from, and the prevention of, workplace conditions and factors adverse to their health and safety" *[emphasis added]*.

The common (and core) feature of OHSMS approaches is that they incorporate the concept of continual improvement and all are built around the principles of the "Plan–Do–Check–Act" (PDCA) cycle. PDCA is an ongoing and iterative process designed to help organizations monitor performance, make decisions and achieve improvement on a continual basis[1]. In general, the

[1] In some versions of the PDCA cycle, an alternative version of the "A" is "adjust". Typically, this would take place after the process has been monitored multiple times, allowing for adjustments to be made and for evaluation of their impact, thereby ensuring that the cycle truly is one of continuous improvement. [Source: Wikipedia - PDCA cycle]

PDCA cycle involves the following four steps (Figure 1):

Plan: Identify goals, outputs, and expected outcomes. Identify how they are to be achieved.
Do: Implement the plan's objectives. Collect data to measure active and reactive performance.
Check: Compare "actuals" with targets. Analyze differences to determine root cause of deviation.
Act: Review performance. Take corrective action. Revisit plans and update/improve as necessary.

Figure 1: Canadian Standards Association's management system framework[2]

To demonstrate conformance with a given management standard, organizations must undergo an audit[3] in which they are awarded a certain number of points for meeting or exceeding the standard's mandatory requirements. Certification is awarded based on meeting or exceeding a minimum threshold of points. A number of organizations[4] have published guidelines on how to manage and conduct effective internal or external audits of management systems. These audit standards, which are also built around the core tenets of the PDCA cycle, provide guidelines on

[2] Adapted from: Canadian Standards Association. Psychological health and safety in the paramedic service organization (2018)

[3] Most OHSMS standards require that the audit be external for large organizations. However, allowance is made for small employers to conduct the audit internally.

[4] The ISO, the ILO, the Health and Safety Executive in the United Kingdom and the Health and Safety Authority in Ireland.

how to manage an effective audit program, how to conduct management system audits, and how to evaluate the competence of audit program managers, auditors and audit teams. While

none of these standards or guidelines are specific to OHSMS, the ISO recently published a technical specification that sets out the required skills and knowledge of individuals or bodies who provide auditing services to organizations that have implemented ISO 45001, its new international standard on OHSMS. The purpose of the technical specification is to guarantee that a harmonized auditing approach is used and that auditors have the necessary competence to both perform the audits and to make the decisions regarding accreditation and certification.[5]

How the proposed prevention framework is organized

The framework set out in Table 1 is organized into four columns:

1. **Elements:** These are the main elements of an effective OHS program and include: management leadership and commitment; planning; consultation and reporting; hazard identification, management and control; training and supervision; and monitoring and evaluation (which should lead to corrective actions being taken and a cycle of continuous improvement).
2. **Standards:** For each element, there is a list of 'standards' that describe the performance expected for that element.

   Example – training and supervision: One of the broad OHS 'standards' an organization is expected to achieve under "Training and supervision" is that they have an effective program to train, educate, and supervise workers. In most jurisdictions, having a program to educate and train workers is also a minimum requirement that must be met to comply with OHS legislation and regulations.
3. **Indicators:** For each 'standard', a list of indicators is provided. These indicators are used to measure the extent to which the 'standard' has been achieved.

   Example – indicator of an effective program to educate, train, and supervise workers: A formal orientation program is in place and is mandatory for all new workers and contractors. This program provides relevant instruction and information on the safe handling of antineoplastic agents (including legislation, codes of practice, policies, protocols, standard operating procedures, and guidelines).

[5] For more information on ISO/IEC TS 17021-10, Conformity assessment – Requirements for bodies providing audit and certification of management systems – Part 10: Competence requirements for auditing and certification of occupational health and safety management systems), see https://www.iso.org/obp/ui/ - iso:std:iso-iec:ts:17021:-10:ed-1:v1:en

4. **Examples of Evidence:** For each indicator, examples of the types of evidence that someone assessing a program, policy, practice, or guideline would look for to determine that a 'standard' has been achieved.

Examples of evidence:

- Workers able to confirm (typically via interview or survey) that a formal orientation and OHS training in their work area was provided
- Standardized written objectives for all training programs (including orientation, job-specific training) exist and are accessible
- Job observations confirm whether training and education information is transferable to workplace and that safe work procedures are followed on regular basis
- Workers able to demonstrate understanding of safe work practices and handling procedures (i.e., by describing key points or step-by-step procedures)

Table 1: A proposed prevention framework for safe handling of antineoplastic agents

Elements	Standards	Indicators	Examples of evidence
Management Leadership & Commitment	Organizational commitment to achieving high standards in the safe preparation, handling and dispensing of antineoplastic agents. Responsibility is clearly defined and there are clear lines of accountability	1. There is a written policy on the safe handling of antineoplastic agents that is reviewed on a regular basis. The policy is appropriate to the risk, supports/aligns with the organization's corporate vision, values and overall policy on OHS in the workplace, and complies with applicable legislation and regulations.	• Policy includes a commitment to comply with relevant OHS legislation and other legal and/or accreditation requirements to which the organization subscribes • Policy is signed by representative of senior management, is current (i.e., dated within last 12 months) and identifies responsible parties • Current policy is readily accessible • Policy includes a revision history to demonstrate regular review and update • Terms of reference available for how policy is developed and regularly updated • Relevant OHS/orientation/training manuals include current policy

	throughout the organization.	2. The policy on the safe handling of antineoplastic agents is available to workers, suppliers, and contractors (e.g. home care workers).	• Process in place to ensure and verify that workers and contractors are aware of the policy, have seen it, know what is in it and understand it • Policy is easily accessible for workers and contractors to read it again • Policy statement written into OHS plans • Policy is explained during orientation of new workers • Reviews of policy are circulated as "draft" documents to anyone affected by the policy to provide input and feedback • Policy is discussed at team meetings and joint health and safety committee meetings (particularly when a review of the policy is undertaken) • Policy is displayed on noticeboards or in areas of high visibility in the workplace

Elements	Standards	Indicators	Examples of evidence

		3. The organization identifies and monitors legislation, codes of practice, policies, protocols, standard operating procedures, and guidelines relevant to the safe handling of antineoplastic agents.	• All information on the safe handling of antineoplastic agents that is retained and utilized in the workplace is current and reflects not only all relevant legislation but also the most-up-to date knowledge on hazards and protective measures • Process in place to communicate all relevant information to affected workers • Consultative review of existing policy/practice/procedure is triggered by changes to legislation, codes of practice, policies, protocols, standards, and/or guidelines on the safe handling of antineoplastic agents
		4. There is a process that makes all parties aware of and accountable for their roles and responsibilities in relation to OHS more generally and to the safe handling of antineoplastic agents in particular.	• Individual management roles and responsibilities clearly documented • Participation/representation of senior management in joint occupational health and safety committees, in reviews and in evaluation of performance • Management attendance & involvement at OHS training courses • Orientation training records for managers, workers, contractors • Accountability for OHS included in all job descriptions (including managers, supervisors, workers) • Process in place for confirming with workers that the system is working at all levels
		5. There is organizational oversight for and coordination of OHS.	• Job description for role(s) with day-to-day responsibility of OHS activities • Process for planning job development • Measurable performance indicators for the role(s)

Elements	Standards	Indicators	Examples of evidence
			• Documented accountability and clear lines of reporting to senior management
		6. Necessary human, financial and physical resources are provided to ensure the handling of antineoplastic agents complies with relevant legislation and aligns with what is known about best practice.	• Annual (or project) budget for achieving OHS objectives as they pertain to safe handling of antineoplastic agents • Resources allocated to cover costs of providing appropriate control measures, of hiring trained OHS specialists, and of worker training. Should also include resources to cover the costs of keeping information up-to-date and enlisting/hiring people with necessary skill sets and competencies (may be internal or external to organization) • OHS budget disseminated to OHS representatives and joint OHS committees • Documentation of strategic processes
		7. All workers have sufficient time to complete tasks safely.	• Time allocated for toolbox/workplace OHS meetings and completion of OHS-related documentation • Retention of OHS training records, inspection and investigation reports • JOHS committee members & representatives provided with time to take accredited courses, consult with workers, conduct regular inspections

		8. Recommendations to improve handling of antineoplastic agents are acted upon in a timely way.	• Process to verify that recommendations arising from any source (e.g., annual assessments, investigations, inspections, worker reports, etc.) were acted on in a reasonable amount of time • Organization undertakes risk assessment and prioritization activities • Incident/accident/investigation reports and

Elements	Standards	Indicators	Examples of evidence
			minutes of JOHSC meetings retained, considered and remedial action taken
Planning	Systematic approach to planning processes used to establish and maintain an integrated OHS management system that is set up to continuously improve OHS performance across all operational activities	1. The organization's approach to the management of antineoplastic agents is planned and reviewed regularly.	• Current documents on file and readily accessible • Obsolete documents and data are promptly removed • Archival documents and data are retained for legal reasons or to preserve institutional memory • Evidence that previous outcomes (e.g., performance indicators not met) factored into future planning and gap analyses performed, where necessary

		2. Specific objectives and measurable targets have been established for relevant functions and levels within the organization.	• Written performance indicators exist; indicators are measurable, based on needs of the organization/unit and take into account organization's responsibilities for complying with all relevant legislation • Data on leading and lagging indicators collected • Indicator data fed into planning cycle • Means and time frame by which objectives and targets are to be achieved • Clearly designated responsibility for achieving objectives and targets throughout organization

Elements	Standards	Indicators	Examples of evidence
		3. Arrangements are in place for people with special needs (may include pregnancy, asthma. physical impairment, etc.)	• Training and education programs incorporate and address issues pertinent to workers with special needs • Tasks are assessed for suitability for workers with special needs • Policy and procedures appropriate to the risk developed and implemented (e.g., protective reassignment for pregnant workers)

		4. Potential emergency situations have been identified and relevant emergency preparedness and response procedures are in place.	• Workers can confirm that relevant procedures have been developed and implemented • Written emergency preparedness plans are appropriate to the work activities • Evacuation procedure developed and displayed on noticeboards or in high visibility locations • Personnel involved in coordinating emergency procedures or first aid have appropriate training • Appropriate number of qualified first aid personnel available on site (may be mandated by OHS legislation and regulations) • Regular drills to test the plans and procedures for deficiencies and corrective action taken, where deficiencies identified • Provision of necessary equipment (e.g., fire extinguishers, first aid kits, spill control kits, equipment to address accidental exposure), appropriate signage (e.g., escape routes, accidental spills, etc.) and emergency communication system (e.g., telephone, alarm) • Regular inspection, testing and maintenance of

Elements	Standards	Indicators	Examples of evidence
			all emergency/fire protection/spill response equipment • Up-to-date inventory of hazardous drugs

		5. The organization's procedures, work instructions and work practices reflect current OHS legislation, standards, codes of practice, policies, protocols, standard operating procedures, and guidelines relevant to handling of antineoplastic agents.	• Workers confirm that procedures/guidelines contain relevant OHS information • Safe work procedures developed and implemented in consultation with affected workers • Documentation (i.e., hazard identification, risk assessment and control) reflect current legislation, regulations, standards, codes of practice, etc.
		6. All workers have access to all necessary information that impacts their activities in relation to antineoplastic agents. This includes current legislation, standards, codes of practice, policies, protocols, standard operating procedures, guidelines, inspection reports, etc.	• Managers, supervisors, workers can confirm that they can obtain all required information in reasonable time (i.e., 24 hours or less) • Relevant information (i.e., legislation, regulations, standards, codes of practice, etc.) is readily available (and can be located) in workplace in hard copy or online via internet or organization's intranet • Information on health hazards (e.g., material safety data sheets) available and accessible • OHS information, JOHSC meeting minutes, etc. posted on noticeboards or areas of high visibility in the workplace
		7. The organization as a whole and affected individual workers satisfy all legal requirements governing the safe handling of antineoplastic agents. This includes any legal requirements related to the undertaking of specific activities, the performance of work duties or the operation of equipment.	• Organization and/or individuals satisfy relevant legal requirements (e.g., licenses, notifications, registrations, approvals, etc.) • Records are retained of relevant licenses, approvals, registrations for work being performed and/or equipment being utilized

Elements	Standards	Indicators	Examples of evidence

Consultation & Reporting	Effective mechanisms to consult with and empower workers, to document and report issues and, and to maintain necessary records.	1. There is an agreed upon process for involving and consulting with workers on issues pertaining to the safe handling of antineoplastic agents.	• Workers and OHS representatives confirm that the employer understands roles and accepts responsibilities for consulting and cooperating with them regarding OHS at the workplace • Workers represented at consultation planning meetings • Effectiveness of communication evaluated by surveys of workers • Procedure for issue resolution developed jointly by managers, supervisors, workers
		2. The process and procedures for consulting and engaging with workers are communicated to workers and are well understood.	• Workers and OHS representatives verify that they are consulted and that engagement process is effective • Orientation for new workers makes reference to consultation and engagement process • Procedures developed and implemented for communicating OHS issues
		3. Workers or their representatives are involved in the planning processes for the management of antineoplastic agents at the workplace.	• Minutes of meetings/consultations/planning sessions • Process for making worker feedback available to OHS representatives and JOHSC members • Workers confirm that they are consulted on OHS and issues related to the safe handling of antineoplastic agents • Workers surveyed about training requirements • Worker involvement in hazard management process • Worker involvement in selection of specialist OHS consultants, where required

		4. Workers or their representatives are consulted regarding proposed changes to the work environment processes or procedures and purchasing decisions that could affect their health and safety, particularly in relation to the	• Workers confirm they are consulted about changes to the work environment, processes or procedures and purchasing decisions that could affect OHS • Memos informing staff of changes affecting

Elements	Standards	Indicators	Examples of evidence
		use and management of antineoplastic agents.	OHS • Agendas and minutes (i.e., of planning meetings, JOHSC meetings)
		5. Workers or their representatives are consulted regarding the management of hazards related to the use of antineoplastic agents in the workplace.	• Workers confirm that they are consulted or that processes exist for them to have some input (and that those processes are effective) • Training records that verify workers understand principles of hazard management • Agendas and minutes (e.g., of consultations, focus groups, JOHSC meetings)
		6. There are arrangements in place for the acquisition, provision and exchange of information on the hazards of antineoplastic agents with external parties. This includes, but is not limited to, suppliers, contractors and relevant public authorities (e.g., workers' compensation boards, enforcement officers, etc.).	• Process for seeking, collecting and retaining relevant information from suppliers • Documented OHS complaints procedure for external parties
		7. The processes and procedures for consulting the workers and reporting back to them are regularly evaluated and modified where required.	• Workers confirm that they contribute relevant information as part of evaluation process • Worker surveys and dissemination of survey findings

Hazard Identification, Management & Control	Proactive system to identify hazards, assess and control risks. All hazards are identified and subject to dynamic assessment. Risk control measures	1. Requirements for reducing risks associated with antineoplastic agents are understood by management and workers. This includes all relevant legislation governing the safe handling of antineoplastic agents, as well as any internal documents prepared to protect workers (e.g., standards, codes of practice, policies, protocols, standard operating procedures, or guidelines).	• Workers confirm they are aware that the employer understands role and accepts responsibilities for reducing the risk of workrelated injuries and diseases • Workers verify that they participated in an effective process to increase their awareness and understanding • Training records for all personnel on risk management responsibilities

Elements	Standards	Indicators	Examples of evidence

	identified are implemented. There is monitoring and review to measure the effectiveness of the hazard identification and risk control processes.	2. Work environments where antineoplastic agents are stored, handled or disposed of are regularly inspected and hazards identified. This process should take into account people who are not handling and dispensing hazardous drugs (e.g., laundry workers) and should cover the human resources, physical resources and information needed for safe systems of working with antineoplastic agents, all work processes and the management of outputs (such as waste). The focus of inspections may be general workplace condition, hazardous substances, or specific hazards.	• Workers understand the process for inspections and identifying hazards and contribute relevant information • OHS representatives involved in inspections and hazard identification process • All relevant information and data sources are analyzed, including records of work-related injury and disease, inspection reports, hazard inventory, hazard reports, incident/accident reports • Hazard identification process documented and gives consideration to: situation or events or combination of circumstances that has the potential to give rise to injury or illness; the nature of potential injury or illness relevant to the hazard; the inspection, maintenance, testing repair and replacement of equipment; and hazards that arise from how work is organized and designed, work systems, procurement systems, and contractual arrangements • Hazard assessments undertaken as changes in work processes occur (i.e., when a new work process is introduced, when a work process or operation changes)
		3. Work activities are systematically analyzed, and hazards identified. The analysis of work activities identifies particular hazards associated with the work, assesses risk and leads to the development of safe working procedures where risks are controlled.	• Managers and supervisors, and workers confirm that they contribute relevant information when work activities are analyzed in their work area • Job hazard analyses • Safe work method statements • Safe operating procedures • Job observations • Use of references (such as standards, codes of

Elements	Standards	Indicators	Examples of evidence
			practice, regulations)
		4. Risk assessments are undertaken on identified hazards. Risk assessment undertaken by people who have experience, knowledge and skills to gather relevant information and make a reasonable decision about the degree of risk for particular hazards. Where there are intended changes to the workplace (e.g., purchase of new equipment), a detailed risk assessment should be conducted and form part of the planning procedures.	• Workers and contractors confirm that they contribute relevant information to risk assessments and the process is working properly in their work area • Hazard inventory • Risk assessment forms • Proposed changes to workplace or work activities include hazard/risk assessments

		5. Hazards are prioritized and controlled using the hierarchy of controls and having regard to the identified level of risk.	• Workers confirm that action has been taken to reduce the risk of work-related injury and disease in accordance with the hierarchy of controls in their work areas • Workers made aware of personal protective equipment requirements and provided with suitable training (which may be part of their orientation, job-specific training or when reviewing safe work procedures) • Budgeting, planning and investigation of control options and implementation • Written risk control objectives • Selection of controls appropriate to the risk (i.e., engineering controls, personal protective equipment) • All workers have access to basic personal protective equipment and specialized equipment available to workers where required • Written policy that references basic and specialized personal protective equipment

Elements	Standards	Indicators	Examples of evidence
			• Written procedures for proper selection, fitting, care and use of specialized personal protective equipment • Job observations to confirm risk controls properly implemented and correct personal protective equipment used when required • System in place to regularly inspect and maintain control systems (including basic and specialized personal protective equipment) • Inventory/records of corrective action

			• Reduction in accident/incident reports
		6. Periodic review and documentation of the effectiveness of the hazard identification, risk assessment and risk control process. The process should provide information on the extent to which the risk is reduced in accordance with original expectations. Recommendations should cover improvements to existing controls and suggestions for alternatives or other controls that can be added to further reduce risk.	• Workers confirm that that they contribute relevant information to the evaluation process and there is action to correct or improve the risk control measures within a reasonable time in their work area. • Monitoring and evaluation of risk controls • Job observations • OHS specialist reports
		7. Incidents, injuries and diseases are systematically reported, recorded and investigated (by a competent person or investigation team). Processes should be welldocumented, monitored, reviewed and continuously improved.	• Managers, supervisors, and workers understand the reporting and incident investigation process and confirm that they contributed to investigations where they were able to provide relevant information • Process for injury reporting and initiating an investigation • Register of first aid reports, completed injury/disease forms as required by legislation, and investigations (ongoing and completed) • Incidents, injuries and illnesses detailed in JOHSC minutes, investigation reports • Analysis of incident, injury and investigations

Elements	Standards	Indicators	Examples of evidence
			data • Process for selecting and training investigation team • Involvement of OHS representatives • System for capturing recommendations arising from investigations
Training & Supervision	Effective program to train, educate and supervise workers. Training is planned, systematic and assessed. Training could be a balance of structured on-the-job training and formal training sessions provided internally or externally. In many cases, safety training can be incorporated into skills and task training already provided by the organization.	1. A formal orientation program is in place and is mandatory for all new workers and contractors. This program provides relevant instruction and information on the safe handling of antineoplastic agents (including legislation, codes of practice, policies, protocols, standard operating procedures, and guidelines).	• Workers confirm that a formal orientation and OHS training in their work area was provided • Standardized written objectives for all training programs (including orientation, job-specific training) • Job observations to confirm whether training and education information is transferable to workplace and that safe work procedures are followed on regular basis • Workers able to demonstrate understanding of safe work practices and handling procedures (i.e., by describing key points or step-by-step procedures)
		2. All management and supervisory personnel have received training their role and responsibilities in ensuring a safe workplace (in general and specifically in relation to the handling and management of antineoplastic agents). Training may be provided in various ways, including formal training courses, mentoring and on-the-job training.	• Training for managers and supervisors is recorded and evaluated • Reviews of individual performance and followaction as necessary

		3. The training needs of all workers, in relation to performing their work activities competently and safely, have been identified.	• Workers confirm they are aware that the employer understands and accepts responsibility for the provision of safety and health training • Training needs analysis undertaken with worker involvement • All legislative training requirements for workers

Elements	Standards	Indicators	Examples of evidence
			have been identified • Workers confirm their participation in training and in training needs analysis • Records of training requirements and dates for completion or renewal are available for all workers • Allocation for OHS training in organization's annual budget
		4. Tasks are allocated according to capability, level of training and supervision of workers.	• Supervisory arrangements in place to ensure tasks are performed safely and work instruction and procedures are followed • Workers confirm that levels of training and supervision are appropriate for work activities undertaken • Job descriptions identify appropriate levels of skill and experience required • Refresher training is provided to ensure workers perform their tasks safely

		5. Training is delivered by people with appropriate knowledge, skills and experience.	• Records of qualifications and experience retained for external trainers and internal staff • Course outline, objectives and materials • Workers confirm that OHS training is delivered to a reasonable standard • Job observations to confirm whether training and education information is transferable to workplace
		6. The training program is evaluated and reviewed.	• Workers confirm that a process is in place to evaluate OHS training relevant to their work area • System in place for measuring knowledge and competency (includes, for example, evaluation forms, records, orientation/training exams and quizzes) • Process for collecting feedback from

Elements	Standards	Indicators	Examples of evidence
			supervisors and/or co-workers that training has provided worker with necessary competencies and that they are able to apply them to their work activities
		7. Supervision is undertaken by people with appropriate knowledge, skills and experience.	• Safety and health performance criteria established for managers and supervisors • Safety and health management training for managers and supervisors • Workers confirm that supervision is appropriate to the work activity being undertaken and the levels of skill and knowledge of individuals

Monitoring & Evaluation	Effective program to monitor and measure OHS performance as it relates to the safe handling and management of antineoplastic agents.	1. Organization regularly monitors and measures activities that may cause injury or illness, using equipment that is appropriately calibrated, maintained and stored.	• Process and procedures have been established, implemented, and maintained to measure and track organization's performance against OHS objectives, targets and key indicators • Process and procedures are appropriately documented and comply with relevant OHS legislation • Data collected to evaluate effectiveness of new processes, to determine gaps and modify processes as needed • Documented plan of action for workers who are non-compliant with safe handling procedures • Mechanism to provide feedback to all internal stakeholders (e.g., nursing, and ancillary staff; senior medical staff; and executive leadership) on level of compliance
		2. Monitoring program designed to collect data on leading and lagging indicators.	• Proactive monitoring of whether the organization has achieved its targets, established performance criteria and objectives • Systematic inspection of work systems,
Elements	**Standards**	**Indicators**	**Examples of evidence**

			premises, plant and equipment • Identification, reporting and investigation of the following: work-related injuries, ill health (including monitoring of aggregate sickness absence records), diseases and incidents; losses (e.g., damage to equipment, property); deficiencies in OHS performance and OHS program failures • Statistical reports generated; annual statistics analyzed and action plan(s) developed, communicated and implemented • Compliance with applicable laws and regulations, collective agreements and commitments on OHS that the organization has subscribed to
	Health surveillance	3. Organization has identified those situations where worker health surveillance should occur	• Health of workers exposed to specific hazards monitored, where appropriate or required by legislation, through suitable medical monitoring or follow-up of workers for early detection of signs and symptoms of harm to health, to determine the effectiveness of prevention and control measures • Compliance with applicable laws and regulations