



Recommendations for the Safe Use and Handling of Oral Anti-Cancer Drugs (OACDs) in Community Pharmacy: A Pan-Canadian Consensus Guideline

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Summary

This evidence-informed consensus guideline was developed to address the safe handling of oral anti-cancer drugs (OACDs) in community pharmacies across the medication lifecycle, from manufacturer packaging to waste management and incident reporting. The primary target audience is community pharmacy staff, from the most senior decision makers who have the authority to influence organization wide policy and practice, to front line pharmacists and pharmacy assistants/technicians. However, because the recommendations will also be relevant to manufacturers, distributors, and third parties involved in packaging, distribution, or removal of OACDs to or from community pharmacies, there are many other groups and individuals for whom this document will be relevant. This consensus guideline was informed by existing published and grey literature, key informant interviews with executive level community and specialty pharmacy leaders, and an iterative modified Delphi consensus process to review, revise, and achieve consensus for each recommendation. The draft consensus guideline was subject to an external review by more than thirty organizations with a mandate in patient or medication safety, occupational health and safety, transportation of hazardous drugs, and/or pharmacy practice. The entire process was guided by a Task Force comprised of individuals with expertise in medication and patient safety, pharmacy practice in the commercial and cancer agency settings, health system design, and most importantly, individuals who represented patients and families.

Introduction

Availability and access to OACDs is increasing and expected to continue given the number of oral forms of therapy currently in development¹ and the use of these agents for non-malignant indications (i.e., rheumatologic and immunologic disease). In spite of this trend, few guidelines, if any, target the safe use and handling of OACDs in the community pharmacy setting. Moreover, in spite of the potential for serious patient harm if OACDs are used in error, fewer safeguards are in place to ensure the safe use and handling of OACDs than for intravenous (IV) forms of cancer drugs.² While this may be because of a general misconception that the risks associated with OACDs are lower than for IV chemotherapy, the hazards of occupational exposure through inhalation, dermal and/or oral contamination, require appropriate controls to reduce risk. Moreover, OACDs are considered [high-alert medications](#) because of the harm introduced when an error occurs.

This consensus guideline complements existing provincial and national legislation, regulation and professional practice standards, and is intended to supplement mandatory legislative requirements. In the event of inconsistency or conflict between the recommendations in this document and any mandatory or more restrictive requirements, the latter shall prevail. All applicable/mandatory legislative requirements must be adhered to.

Finally, it is recommended that a self-assessment of safety practices, with a specific focus on handling, be conducted at baseline (if this has not been done previously) and at regular intervals. The [Medication Safety Self-Assessment for Community/Ambulatory Pharmacy tool](#) from the Institute for Safe Medication Practices Canada may be used for this purpose. Results from the self-assessment should be used to identify areas for quality improvement to ensure safe practices in community pharmacy settings.

Scope and Relevance

Exposure to OACDs can occur at any point along the medication lifecycle. As a result, this consensus guideline addresses packaging, labeling, receiving and unpacking, storage, drug preparation and handling, verification and dispensing, transportation, personal protective equipment (PPE), disposal, waste management and cleaning, and incident reporting.

Environmental monitoring and medical surveillance were determined to be out of scope for this document but may be revisited if compelling evidence emerges for their relevance in these often low-volume settings.

While it is believed that these recommendations are likely of relevance to healthcare providers working in settings other than community pharmacy, such as long-term care, compounding centres, penitentiaries, respite, and other day facilities where OACDs may be used to treat cancer and other non-malignant diseases, they are designed to address safe handling issues in the community pharmacy setting specifically. Individuals working in other environments with OACDs that are used for other non-malignant indications, or who handle other types of hazardous drugs, are encouraged to assess the relevance of these recommendations in their own practice settings and to implement those that are relevant and applicable.

Hazardous drug definition

Drugs that are considered hazardous to humans or animals are associated with one of the following characteristics: 1) carcinogenicity; 2) teratogenicity or other developmental toxicity; 3) genotoxicity; 4) reproductive toxicity; 5) organ toxicity at low doses; and 6) structure and toxicity profiles of new drugs that mimic existing drugs determined by the above criteria. While there is no single list of hazardous drugs that is accepted worldwide, the National Institute of Occupational Safety and Health (NIOSH) produces and updates a list periodically that can be used as a guide from which to develop a workplace or setting-specific hazardous drug list based on an inventory of the drugs handled and the potential for exposure. Guidance on how these workplace-specific lists should be developed is available through [NIOSH](#). Development of these lists may require additional training for corporate community pharmacy staff and/or pharmacy owners. OACDs are among the many drugs that are considered hazardous.

Definition of Oral Anti-Cancer Drugs

For the purpose of these recommendations, an OACD is a drug that is used to treat cancer (or other indications) and is given by mouth and includes some hormonal agents. The health risks associated with exposure to individual OACDs is typically assessed based on their potential for carcinogenicity, teratogenicity, genotoxicity, reproductive toxicity, or organ toxicity. In addition, exposure risk should be evaluated based on modifying factors including the packaging of the agent for oral consumption (i.e., blister vs. loose), formulation (i.e., coated vs. uncoated tablet; tablet or capsule vs. liquid) and frequency of exposure, although the latter can be difficult to quantify. Information on the potential hazard level of a drug may be found in resources such as the safety data sheets produced by drug manufacturers and the list of hazardous drugs maintained by NIOSH.

Types of Exposure and Hazard Control

Exposure to OACDs can vary but typically occur by inhalation of dust, particles, and/or droplets (if a product is aerosolized or if product vapour exists); dermal contact through direct primary contact with the drug or drug powders present on the outside of containers or on contaminated surfaces during preparation; administration or disposal of OACD waste; and/or oral contact through hand-to-mouth exposure or inadvertent ingestion.

Currently, there are no recommended exposure limits for OACDs, permissible exposure limits, or threshold limit values established for hazardous drugs in general (e.g., by groups such as NIOSH, OSHA, or American Conference of Governmental Industrial Hygienists, respectively). The likelihood that a worker will experience adverse effects from hazardous drugs increases with the amount and frequency of hazardous drug exposure and the lack of proper work practices.

Protection from hazardous drug exposure depends on adherence to safety programs established by employers and followed by workers. A comprehensive approach to eliminate or minimize worker exposure should be part of a safety and health program that includes safe work practices, proper engineering controls, PPE, as well as training appropriate to the employee's job function, skill, and knowledge.

There is limited literature to quantify the magnitude of contamination within the various workspaces of a community pharmacy. Similarly, the long-term health effects on those working in the community setting is largely unknown because the focus has traditionally been on staff within a hospital pharmacy where the frequency and volume of exposure is substantially greater. Until evidence specific to the community pharmacy setting is available, a basic occupational health approach applying a hierarchy of controls to eliminate or minimize exposure should be applied. This includes, in order of hierarchy, limiting exposure through elimination of the hazard or substitution to replace the hazard with a less hazardous drug (often not feasible in healthcare); engineering controls to isolate workers from the hazard (i.e., containment cabinet, use of unit-dose packaging); administrative controls to change the way people interact with their environment (i.e., storing OACDs in a segregated, labeled space to visually remind workers that special handling precautions are required); and finally, as the last line of protection, PPE (i.e., chemotherapy gloves, chemotherapy gowns, respiratory protection if risk of inhalation exists). In developing this consensus guideline, the hierarchy of controls was carefully considered and incorporated.

Approach to the Development of a Consensus Guideline in Low-Volume Setting

There is a paucity of evidence regarding the potential health impacts associated with the often infrequent, short-term, and low-volume exposure to OACDs in the community pharmacy setting. Few, if any, minimum threshold for "safe" levels of occupational exposure of OACDs or other hazardous drugs has been established.

The recommendations in this consensus guideline were deliberately designed to be pragmatic and to introduce a moderate approach to encourage a system-wide and gradual change in community pharmacy policy and practice.

Recommendations

Packaging

The manner in which manufacturers or distributors package OACDs, as well as other hazardous drugs, may be an influence on the degree of exposure.

1.0 MANUFACTURER PACKAGING	
1.1	<p>Manufacturers of oral anti-cancer drugs should:</p> <ul style="list-style-type: none">• Package the exact number of tablets needed for one cycle of therapy, or if there are multiple strengths or concerns about rapidly changing treatment recommendations, in individual unit-use packages (i.e., blister package);³• Package oral anti-cancer drugs in durable packaging that is able to contain any accidental leakage during handling and transport of liquid formulations, and is tamper proof;• Provide instructions for compounding liquid formulations;³• Take all necessary precautions to reduce contamination on the outside of containers that contain oral anti-cancer drugs; and• Affix safe handling warning labels on all layers of packaging for oral anti-cancer drugs, indicating that special handling and disposal precautions are necessary. The labels should be recognizable to individuals who handle or come into physical contact with oral anti-cancer drugs, including those responsible for transportation from the manufacturer or distributor to hazardous waste disposal.^{4,5}
1.2	<p>Distributors of oral anti-cancer drugs should:</p> <ul style="list-style-type: none">• Take all necessary precautions to reduce contamination of oral anti-cancer drugs to surrounding containers to the lowest achievable level (e.g., packaging all oral anti-cancer drugs in a sealed plastic bag for shipping with other drugs); and• Affix safe handling warning labels on all layers of packaging for oral anti-cancer drugs, indicating that special handling and disposal precautions are necessary. The labels should be recognizable to individuals who handle or come into physical contact with oral anti-cancer drugs, including those responsible for transportation from the distributor to hazardous waste disposal.^{4,5}
1.3	<p>Those responsible for supply chain management and oral anti-cancer drug procurement in the community pharmacy setting may preferentially consider manufacturers and distributors whose practices promote delivery of a product that minimizes potential occupational exposure by handlers along the supply chain.⁶⁻⁸</p>

Receiving and unpacking

Within the community pharmacy setting, space is limited and pharmacy tasks may be shared among the pharmacy dispensary and non-dispensary staff. Pharmacy managers must take steps to develop and implement work practice policies and procedures to ensure that unintentional occupational exposure to OACDs is avoided. Education and tools (e.g., visual aids and/or checklists) must be provided so that receiving and unpacking occurs safely. Further, policies and procedures for managing damaged shipments must be developed to avoid confusion about whether the pharmacy or the manufacturer/distributor is responsible for the cost of replacement product if a product package has been damaged during transport.

2.0 RECEIVING AND UNPACKING	
2.1	Best practice recommends that receiving and unpacking of shipments that contain oral anti-cancer drugs should be in a separate room. If that is not possible, receiving and unpacking should be in a designated, low-traffic area. ^{6,7,9-11}
2.2	The task of receiving and unpacking drug deliveries that contain oral anti-cancer drugs should be the responsibility of specific individuals. These individuals should be given this responsibility only after completion of job-specific training. ^{6,9} A process should be in place to ensure adequate staff coverage in instances where the primary individual is absent.
2.3	The outside of cartons are examined for possible damage or leakage prior to unpacking in the event it contains an oral anti-cancer drug. ^{4-7,9,11}
2.4	Deliveries containing oral anti-cancer drugs where the integrity of the original manufacturer's package has been compromised, leading to the potential for occupational exposure to a hazardous drug, should be dealt with in the same manner as a spill. See Section 8.0 of this document. ^{6,7}
2.5	When an oral anti-cancer drug is received without appropriate warning labels, the pharmacy manager or other designated member of the pharmacy team should notify the originator (i.e., distributor, group purchasing agent, or other) and reinforce the importance of affixing warning labels to indicate to those handling the delivery that special handling precautions are required. ⁵

Storage

Distinctive labels and physical separation of OACDs from non-hazardous drugs is commonly recommended as an occupational health and safety measure to limit staff exposure, lower the risk of a medication error through incorrect selection of medication, and visually indicate that special handling precautions are required. Where separation in a different room is impractical, designating a specific area for OACDs and marking it clearly is a feasible alternative.

3.0 STORAGE	
3.1	Oral anti-cancer drugs should be stored in a designated area, separate from non-hazardous drugs, and labelled with warnings that indicate the need for special precautions. If stored in a separate room or area it should be clearly marked. ^{3,5-10,13,14}

3.2	Access to areas where oral anti-cancer drugs are stored should be restricted to staff who have received appropriate training. See Section 9.2 of this document. ^{6,9}
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Drug preparation and handling

While the dispensing volume of OACDs in community pharmacies may be low, the potential for exposure supports the need for vigilance. Where exposure limits exist (i.e., American Conference of Governmental Industrial Hygienists, NIOSH, or province-specific resources such as Ontario *Regulation 833 – Control of Exposure to Biological and Chemical Agents*), the employer must ensure compliance.

Evidence-based standards vary regarding the use of containment cabinets and personal protective equipment (PPE) when the prescribed dose of an OACD is not commercially available and compounding of non-sterile hazardous drugs is required. The use of a containment cabinet is recognized as best practice in non-sterile compounding standards by the National Association of Provincial Regulatory Authorities (NAPRA), the United States Pharmacopeia, and NIOSH, and may be a legislative requirement in some jurisdictions. When these best practice standards are applied for the compounding of non-sterile hazardous drugs (such as OACDs), a Class I Biological Safety Cabinet (BSC) is deemed to be sufficient. However, a Class II (with preference for type B2), III, or Compounding Aseptic Containment Isolator (CACI) is required for sterile compounding of hazardous drugs.^{26,28} Additional recommendations provided by NIOSH state that in the absence of a containment cabinet, the compounding of non-sterile hazardous drugs may be performed using alternative safe-work practices while wearing PPE in a low-traffic, designated area of the pharmacy.

Finally, the use of any other readily available material or equipment to further reduce inadvertent OACD exposure or spread should be considered very carefully along all points in the dispensing process, especially activities related to non-sterile compounding without the use of a containment cabinet (e.g., Dissolve-a-Dose™ containers, crushing tablets (using a mortar) and splitting tablets inside an enclosed clear, re-sealable bag, wetting a tablet prior to crushing to minimize aerosolization of particles).

4.0 PREPARATION AND HANDLING	
4.1	Employers must take every reasonable precaution to limit individual staff member exposure to oral anti-cancer drugs so as not to exceed occupational exposure limits when these limits exist or, when they do not, to levels as low as reasonably achievable. ^{8,26}
4.1.1	<p>Non-sterile compounding of oral anti-cancer drugs should be done in a Class I Biological Safety Cabinet (BSC) (or Class II, III Compounding Aseptic Containment Isolator [CACI]).^{26, 28} When non-sterile compounding of oral anti-cancer drugs in a containment cabinet is not possible, community pharmacies not equipped with a containment cabinet should consider:</p> <ul style="list-style-type: none"> • Redirecting the patient or transferring the prescription to a pharmacy where compounding in a containment cabinet is possible;^{10,15} or • Contacting the prescriber to round doses up or down according to available strengths and body surface area/weight requirement, or to determine if alternate day dosing to make up the total weekly dose would be appropriate.^{8,16}

4.0 PREPARATION AND HANDLING	
	If it is not feasible to redirect or change the dose and the non-sterile compounding of a drug is deemed to be necessary and in the best interest of the patient, prepare the drug using personal protective equipment (PPE) (see Appendix C) including two pairs of chemotherapy gloves (ASTM standard, see Appendix C), a non-permeable gown, and respiratory protection (i.e., N95 or better) in a low-traffic area. If there is a risk of splashing, eye protection should also be used. ^{3,8-13,17-19,33}
4.1.2	Dedicated preparation equipment (i.e., counting trays) shall be used to count oral anti-cancer drugs that do not require compounding. This equipment shall be labelled for anti-cancer agent use only. ⁹
4.1.3	The following shall not be used when dispensing oral anti-cancer drugs: <ul style="list-style-type: none"> • Blister pack filling machines for uncoated tablets;¹⁴ • Automated counting machines;^{3,4,8,9,11,13,14,17-19,21} or • An open mortar, if crushing tablets unless performed in a containment cabinet (e.g., BSC or CACI)¹⁸ or additional measures are taken to limit exposure (e.g., enclosing open mortar in a plastic bag).
4.1.4	A list of hazardous drugs, including oral anti-cancer drugs, shall be readily accessible to any individual who may come in contact with them in their work environment. ³ This list should be reviewed and updated periodically to ensure continued relevance.

Verification and dispensing

The dispensing of OACDs should be accomplished in a manner that minimizes contamination to the surrounding area. This includes dispensing these agents in original packaging if tablets are packaged by the manufacturer or distributor in full-cycle packaging or individual unit dosing. When this is not available, package in a manner that prevents/minimizes contamination or access by unintended individuals (e.g., children). This includes the use of childproof lids (unless otherwise requested) and additional packaging (e.g., sealable plastic bag) to contain inadvertent spills.

In addition to safe handling dispensing practices below, considerations should be made to other parameters that promote patient safety, including those outlined in the Canadian Association of Provincial Cancer Agencies' (CAPCA) document, [Oral Cancer Drug Therapy Safe Use and Safe Handling Guidelines](#).²² Pharmacy team members should be aware of and follow recommended practices including, but not limited to, dispensing only one cycle of OACDs at a time and ensuring that both dispensing and cognitive verification checks are conducted by individuals who are trained and knowledgeable to accept responsibility for the clinical safety of the prescription.

Clinical verification of OACDs in community pharmacy settings can be a difficult task to fully complete. Often community pharmacies have limited, if any, access to patient medical records. They may also have limited training related to cancer treatment, and little exposure to OACDs due to low dispensing volumes. As a result, it is recommended that OACD prescriptions be reviewed by a pharmacist with experience and training in cancer treatment. When this is not possible, it is important that a network be established such that a pharmacist with experience and training in cancer treatment is available for consultation and the use of a checklist be implemented to facilitate clinical verification.^{23,24} Additionally,

telephone orders should not be allowed as they can introduce errors especially if a pharmacist is not familiar with cancer treatment regimens.

Concerns about the safe handling of OACDs by community pharmacists may multiply when prescriptions are delivered directly to a patient without the benefit of any in-person pharmacist and patient interaction. While direct-to-patient delivery offers advantages for patients, including fewer visits, less travel, and improved convenience, it simultaneously reduces the opportunity for face-to-face education, toxicity and adherence assessment, among other relevant and important issues. While there are programs designed to offer telephone counselling to patients or caregivers prior to direct-to-patient courier prescription delivery, and call back programs to provide adherence and toxicity monitoring after delivery, these programs are not consistently available and may be inadvertently omitted if patients are on multiple medications, including non-OACDs. Without this additional due diligence, direct-to-patient courier delivery is not considered ideal, and is not recommended until after the initial OACD prescription is dispensed to the patient in person.

Finally, OACDs should be dispensed in a manner that eliminates or minimizes exposure in the home. This includes appropriate labeling, packaging, and education. The quantity of OACDs dispensed should be done in consultation with the patient and healthcare team to ensure safe and convenient practice. In situations where more than one cycle of OACD is dispensed, it is imperative that patients and caregivers are aware of how to take their medication(s) and under what circumstances they should not proceed without first checking with their oncology team (e.g., when blood work or other tests are required before the next cycle).

5.0 VERIFICATION AND DISPENSING	
5.1	<p>When dispensing oral anti-cancer drugs, community pharmacy staff should:</p> <ul style="list-style-type: none"> • Dispense them in original packaging if tablets are packaged by the manufacturer or distributor in full-cycle packaging or individual unit dosing.^{8,26} When tablets have not been provided in either of these formats, dispense in containers with childproof lids;^{8,10,13,16} • If easy-open lids are required, reinforce the importance of avoiding inadvertent exposure to children or pets;¹⁶ • Count and repackage tablets/capsules in a manner that avoids skin contact, minimizes aerosolization, and cross-contamination of other drugs;^{8-10,13,16,18} • Dispense liquids in bottle or vial packaged in a clear, closed, re-sealable plastic bag;⁴ • Dispense in ready-to-use formulation (no crushing or splitting required on the part of the patient);^{4,19} and • Label oral anti-cancer drugs as “do not cut or crush.”¹⁰
5.2	<p>When oral anti-cancer drugs cannot be dispensed in person and direct-to-patient courier delivery is being considered, the dispensing pharmacy shall recommend that at least the initial filled prescription is reviewed in person to enable provider-to-patient discussion, training, and education to supplement that provided by the patient’s cancer care team.</p>

5.0 VERIFICATION AND DISPENSING	
5.2.1	<p>When direct-to-patient courier delivery does occur, all national and provincial standards must be met. In addition, the delivery of an oral anti-cancer drug should only occur when it has been confirmed that someone is available to receive the delivery. The receiver of the delivery should be able to assume accountability for the delivered package.</p> <p>The delivery process should include a chain of signatures to assist with delivery tracking. Delivery of oral anti-cancer drugs shall not be left on a doorstep or in a mailbox. As best practice, a documented follow-up call should occur to confirm the patient has received their delivery, understands how to take the medicine, and to answer any questions that arise.</p>
5.3	<p>Ensure the traceability of a dispensed product that are aligned with legislative requirements, where they exist. At minimum, the batch/lot number along with expiry date (and other required information) should be documented in the medication management system in the event of a product recall. The use of barcoding may assist with this process.</p>

Personal Protective Equipment (PPE)

Hazards exist in most workplaces and in a pharmacy environment, whether community or otherwise, workers are likely to come in contact with hazardous drugs. Although there are other more effective controls to protect against exposure to hazardous drugs (e.g., controlling a substance at its source [elimination]; substitution; engineering controls and administrative controls), PPE remains the last, and possibly the *only* line of defense when other controls are not in existence or are not obtainable; are rendered ineffective because of a temporary breakdown; or as an interim control measure while engineering and administrative controls are being implemented. There exists provincial and national legislation pertaining to the use of PPE in specific instances. This legislation provides guidance on what is expected when handling specific hazardous drugs and shall be incorporated into pharmacy practice.

There are some differences between NAPRA and NIOSH pertaining to the PPE required for certain activities. When unpacking containers with OACDs, NAPRA recommends two pairs of chemotherapy gloves (i.e., American Society for Testing and Materials [ASTM] standard) whereas NIOSH recommends only one pair of chemotherapy gloves. A pragmatic approach was taken in this case and this consensus guideline recommends two pairs of chemotherapy gloves to avoid confusion when trying to recall the number of gloves to wear when handling OACDs (see Appendix C). Additionally, this also ensures protection to the individual handling the OACD in the event that there is a damaged product inside the shipment container. There is insufficient evidence to recommend that the outside of every bottle or box received be wiped down (cleaned) prior to placing it into storage as the contamination on the external of the bottle/box has not been quantified. The use of gloves is not necessary when handing out products in their final dosage form (e.g., original bottles, vials, or blister packages) to the public (i.e., patients and caregivers) to avoid unnecessarily alarming the public.

Gloves

The gloves used to handle hazardous drugs must be powder-free, made of latex or nitrile (polyurethane or neoprene are also acceptable), and comply with ASTM standard D-6978-05 (standard for chemotherapy gloves). Due to the allergenic properties of latex, other materials are often used. Vinyl gloves are not recommended, as they are more permeable to hazardous drugs. Gloves may be sterile or

non-sterile. Workers should change both sets of gloves every 30 minutes, or less in the event of contamination, spillage, or breakage of oral solutions. All gloves have some degree of permeability to hazardous drugs. This permeability increases over time but 30 minutes is an appropriate average time that ensures protection.⁷

Gown

The gowns used when handling hazardous drugs should be disposable, made of lint-free, low-permeability fabric, have long sleeves with adjustable cuffs, and tie or fasten in the back. Polypropylene gowns coated with polyethylene or vinyl are recommended when handling oral solutions. Workers should change gowns in the event of contamination, spillage, or breakage of containers with oral solutions. The supplier must be able to certify that the gown protects against hazardous drugs. It is not recommended to reuse gowns.⁷

6.0 PERSONAL PROTECTIVE EQUIPMENT (PPE)	
6.1	Appropriate personal protective equipment (PPE) shall be available and worn wherever oral anti-cancer drugs are handled (i.e., unpacking, storing, dispensing, and disposing). PPE shall be removed before leaving the dispensary. ^{6,7,10-13,18}
6.1.1	No PPE is required: <ul style="list-style-type: none"> • During transport or receiving as long as there is no evidence of an exposure hazard (e.g., leak, powder residue); • When handling oral anti-cancer drugs in their final dosage form (i.e., original bottles, prescription vials, or blister packages); and • If boxes are stored as received (not opened).
6.2	When unpacking or placing oral anti-cancer drugs into storage area, two pairs of chemotherapy gloves (ASTM standard, see Appendix C) should be worn. ^{6,28}
6.3	During collection and transport of hazardous waste and when waste is in an open container, a protective gown (i.e., impermeable) should be worn in addition to two pairs of chemotherapy gloves (ASTM standard, see Appendix C), and, if there is a risk of a splash or spill, a protective gown, respiratory protective equipment (i.e., N95 or better) and protective eye wear should be worn.
6.4	During cleaning of the designated preparation area or when repackaging non-sterile oral anti-cancer drugs (i.e., liquid oral solutions, uncoated tablets), two pairs of chemotherapy gloves should be worn (ASTM standard, see Appendix C), and if there is a risk of a splash or spill, a protective gown, respiratory protective equipment (e.g., N95 or better), and protective eye wear should be worn. ^{6,7,22}
6.5	When cleaning the containment cabinet, two pairs of chemotherapy gloves (ASTM standard, see Appendix C), a protective gown, respiratory protective equipment (e.g., N95 or better), protective eye wear, a hair cover, and shoe covers should be worn. ^{6,7,28}
6.6	When handling damaged packages containing oral anti-cancer drugs, or if a spill occurs, full PPE shall be worn including two pairs of chemotherapy gloves (ASTM standard, see Appendix C), a protective gown, shoe covers, eye protection, as well as respiratory protective equipment (e.g., N95 or better) if there is a risk of aerosolization of drug

6.0 PERSONAL PROTECTIVE EQUIPMENT (PPE)	
	residue. ⁴ Facilities with access to a Biological Safety Cabinet (BSC) should open damaged packages inside the containment cabinet. ^{26,28}
6.7	All PPE should be changed in accordance with manufacturer's directions after use, immediately if contaminated, or if contamination is suspected. Disposable PPE should be disposed of in an appropriate hazardous waste container. Reusable PPE, such as protective eye wear, should be cleaned with soap and water after use, and allowed to air-dry before reuse or storage. ²⁷
6.8	Hands shall be washed with soap and water after removing PPE. ^{3,7,8,16,19,27}

Disposal and Waste Management

Notwithstanding the low-volume of OACDs dispensed by community pharmacies, the importance of disposing of hazardous waste in accordance with legislation, regulation, and best practice remains a vital operational issue not only for environmental reasons, but to ensure that worker exposure during this end process is also limited. Regardless of the low-volume of OACDs dispensed by community pharmacies, the corporate entities to which they belong should establish and internally disseminate organization-wide policies about disposal and waste management, and individual stores and individual practitioners should be expected to demonstrate compliance.

7.0 DISPOSAL & WASTE MANAGEMENT	
7.1	The dispensing pharmacist shall instruct the patient to return unused medication to dispensing or other pharmacy for disposal, and not to dispose with household waste. To minimize inappropriate disposal in the home, pharmacies should accept oral anti-cancer drugs for disposal EVEN IF dispensed at another pharmacy. This should be reinforced in written material given to the patient. ^{16,19}
7.2	Hazardous waste containers should: <ul style="list-style-type: none"> • Be placed in the receiving and unpacking area and in the dispensary;^{6,7} • Be rigid, leak, and puncture proof;^{6,7,9-11,13,16} • Be placed away from drains and areas where food is stored or eaten;²¹ • Have a sealable lid and foot pedal to open when needed;⁶ • Be double-bagged, sealed, and removed when $\frac{3}{4}$ full;^{10,7} and • Have a cytotoxic label affixed in a visible location on the outside of the container.^{6,7,13,27}
7.3	Segregate hazardous waste as soon as it is generated. ²¹
7.4	Hazardous waste pick-up should be scheduled for pick-up and delivery to a facility that incinerates hazardous waste, avoiding peak activity in the pharmacy. ^{6,7,10}
7.5	Dispensing equipment (e.g., tray, spatula) and hard surfaces (e.g., counter) that come in contact with oral anti-cancer drugs should be: <ul style="list-style-type: none"> • Cleaned after each use using soap and water, and allowed to air-dry before reuse;¹⁴ and

7.0 DISPOSAL & WASTE MANAGEMENT	
	<ul style="list-style-type: none"> Decontaminated periodically (at least once per month²⁸) with hypochlorite solution (e.g., 2.4% bleach) to denature hazardous drugs. After decontaminating and allowed to sit for a few minutes, surfaces should be washed with soap and water, and dried with a disposable towel.^{10,14,18} Sodium hypochlorite is not suitable for all oral anti-cancer drugs and will corrode stainless steel surfaces. Instead, sodium thiosulfate or a germicidal detergent (e.g., Surface Safe™) should be used to remove/neutralize these agents and surfaces.²⁸ <p>Isopropyl alcohol should NOT be used as a cleaning solution as it can dissolve and spread drug residue, instead of removing it.¹⁴</p> <p>Carpets are not easily cleaned and shall be avoided in the pharmacy area.⁴</p>

Spill Protocol

Spills may occur at any stage of the OACD process from receiving, storage, dispensing, to waste management. A policy, procedure, or guideline should be established to handle any spill situation. Additionally, a spill kit should be made available and accessible wherever OACDs are handled. There is insufficient evidence at this time to recommend a spill kit for patients taking OACDs only in the home.

8.0 SPILL PROTOCOL	
8.1	<p>A policy, procedure, or guideline should be in place that specifies:</p> <ul style="list-style-type: none"> Assignment of accountability for spill management to individuals with appropriate training; Spill simulation exercise (annual basis or more frequently);⁷ Appropriate personal protective equipment (PPE), as described in Section 6.6 of this document and in Appendix C;^{4,10,14} and Cleaning requirements that include instructions to: <ul style="list-style-type: none"> Clean from least to most contaminated;^{4,7,18} Absorb liquid spill with an absorbent towel or pad (e.g., Chemosorb pad) before cleaning with water and soap; Clean with detergent and water from area of most to least contaminated. Decontamination with sodium hypochlorite (left for approximately 10 minutes) may be considered for a large spill (>30 mL) followed by further cleaning of the area with detergent and water;^{7,14} Cover spills involving powder with a wet towel or pad to prevent aerosolization of the product. The absorbent side of a plastic-backed pad can be used to pick up most of the product;^{10,14} Dry the area with a disposable towel;¹⁰ Dispose of all materials used in spill management (including PPE) in a plastic bag labeled “cytotoxic” and dispose plastic bag in a hazardous waste container;^{4,7,10,14} and Wash hands with water and soap after the spill has been cleaned.^{4,10,18}

8.0 SPILL PROTOCOL	
	The safety data sheets for products used for cleaning and decontamination must be made available on site and be easily accessible. ⁷
8.2	Spill kits should be clearly labelled and available in all areas where oral anti-cancer drugs are handled and stored. ^{4,7,10,11,13,27}
8.3	<p>The spill kit located in community pharmacy should include:</p> <ul style="list-style-type: none"> • Policy, standard operating procedure, or guideline;^{13,14,18,29} • Cytotoxic/hazardous drug spill signage;^{7,13,14,18} • List of supplies and PPE;^{13,18,29} • Absorbent materials (disposable);^{13,14,29} • Small scoop or scraper to collect glass/other fragments;^{10,13,27} • PPE including two pairs of chemotherapy gloves (ASTM standard, see Appendix C), protective gown, respiratory protective equipment (e.g., N95 mask or better), protective eye wear, and shoe covers; • Sharps or robust puncture-proof container; • Hazardous/cytotoxic waste bags;^{13,14,18} • Cleaning agents (soap and water);^{13,18,29} • Incident report form(s);^{18,29} and • Outside label clearly identifying contents (i.e., “Spill Kit”).

Training and Education

Staff training and education on the safe handling of OACDs is critical to a safe practice. Policies and procedures should be developed centrally. Training programs should reflect these policies, procedures, and legislative requirements, and should be drug-specific where appropriate. Training programs should be current and standardized across pharmacies within a corporation. It is recommended that staff handling hazardous drugs are trained at the start of their job (appropriately detailed to their job function) and on a routine basis or when job functions change. Additionally, any staff member who may come into contact with OACDs should be trained at the start of their job (appropriately detailed to their job function) and/or given the opportunity to participate in continuing education programs appropriate to their knowledge, skill, and job function. Training should not be limited to a single event, but should be repeated on a routine basis or when job functions change.

Education for patients and caregivers must be provided according to professional practice standards and should include pertinent information to enable safe and effective use of OACDs in the home. This information should be assessed and reviewed at each dispensing encounter as appropriate.

9.0 TRAINING AND EDUCATION	
9.1	Policies, procedures, and/or guidelines regarding safe handling of oral anti-cancer drugs should be developed, implemented, and regularly revised and evaluated. ^{6,13,30}
9.2	All members of the community pharmacy team involved in handling, or who may come in contact with oral anti-cancer drugs or related waste products, shall have training and education that is appropriately detailed to their job function, prior to commencement of

9.0 TRAINING AND EDUCATION	
	assigned duties and when new classes of oral anti-cancer drugs are introduced or procedures change. Standardized competency testing and regular re-evaluation, would be beneficial. ^{9,10,18}
9.2.1	<p>Initial and regular training for dispensing pharmacists and pharmacy technicians should include, but not be limited to, information about:^{3,9,10,18,21}</p> <ul style="list-style-type: none"> • Safe work practices and procedures when handling or disposing of oral anti-cancer drugs including appropriate use of personal protective equipment (PPE) as detailed in Section 6.0 and Appendix C of this document; • Work hazards and potential risks of exposure to oral anti-cancer drugs and related waste; • Legislative requirements for waste management; • Management of a spill (including potential spill simulation exercises); • Mandatory reporting for accidental exposures, where required; and • Any other legislative training (e.g., Workplace Hazardous Materials Information System [WHMIS]). Supplemental resources should be made accessible on site, either online or in print.
9.2.2	Training programs should be regularly evaluated and updated. ^{9,10,21}
9.3	<p>In addition to professional practice standards, when dispensing oral anti-cancer drugs, community pharmacies shall provide patient education including, at a minimum: ^{3,7,8,10,13,16,18,19,20,22,25,27,31}</p> <ul style="list-style-type: none"> • Special storage, handling, and disposal instructions. Specifically, patients should be made aware of any recommendations regarding PPE use when opening dispensed packaging and administering or applying medication; storing medication away from children and pets; and return of unused medication to a pharmacy, ideally the dispensing pharmacy; and • Instructions for use, handling missed doses, managing side-effects, importance of adherence, breastfeeding and reproductive precautions (as applicable) for men or women thinking of, or preparing to have children. <p>In addition, early and periodic adherence monitoring and toxicity assessment either by phone or other means of communication is important.</p> <p>If feasible and where appropriate, before each refill the same information should be reviewed with the patient.</p>

Staffing

The responsibility for determining appropriate pharmacy staffing levels is the responsibility of pharmacy managers and is beyond the scope of this document. However, there are fundamental principles that should be carefully considered in determining the optimal and appropriate staffing mix or size. It is well known from the field of human factors, that workplaces and work processes have a profound effect on the risk of medication incidents. Given the busy environment, frequent distractions and complex processes within a community pharmacy, pharmacy managers and individual pharmacy team members should be aware of the impact of things like prolonged periods of work without break and frequent interruptions when working with high-alert medications. Human factors experts may be called upon to

assist with the design of pharmacy work processes with changes, such as segregating OACDs in a pharmacy. Finally, there is little data to confirm that the time required to provide patient education regarding OACDs may be longer than the time required for other dispensed products, and it is a reasonable area to explore. If correct, a process to evaluate current dispensing fees for OACD products, even if only for the initial dispense, should be explored.

10.0 STAFFING	
10.1	Factors and work processes that influence how safely pharmacy staff perform their work, including frequent rest breaks, task rotation, and opportunities for uninterrupted work space when dispensing high-alert medications (e.g., oral anti-cancer drugs), should be carefully considered and implemented wherever possible. ⁹
10.2	Community pharmacies that employ staff who are planning parenthood, and pregnant and/or breastfeeding women, should consider policy options to limit exposure to oral anti-cancer drugs, including the possibility of protective reassignment. Information or counseling regarding the potential reproductive health risks from exposure to hazardous drugs should also be provided. ^{6,9,18,27}

Incident Reporting

When OACDs are prescribed, the responsibility for administration and assessment of toxicity and side-effects falls to the patient rather than a team of trained healthcare providers. As a result, medication errors may go undetected. In comparison, when errors occur in an acute care setting they are typically identified by a member of the healthcare team, reported to a hospital or province-wide reporting system, and measures to reduce the risk of reoccurrence are assessed by a risk management specialist or multi-disciplinary team. With the exception of Nova Scotia, where it is mandatory to report incidents that occur within a community pharmacy to the [Community Pharmacy Incident Reporting System](#), jurisdictional incident reporting requirements vary widely from no reporting, to store-only reporting, and occasionally to corporate office. There is no aggregate comparison of incidents across the community pharmacy system as a whole. Without this data, it is difficult to identify root causes and patterns, especially given that incidents are likely to occur infrequently. In this largely data-free zone, identifying and implementing approaches to mitigate the risk of further events will remain a difficult, if not impossible, task.

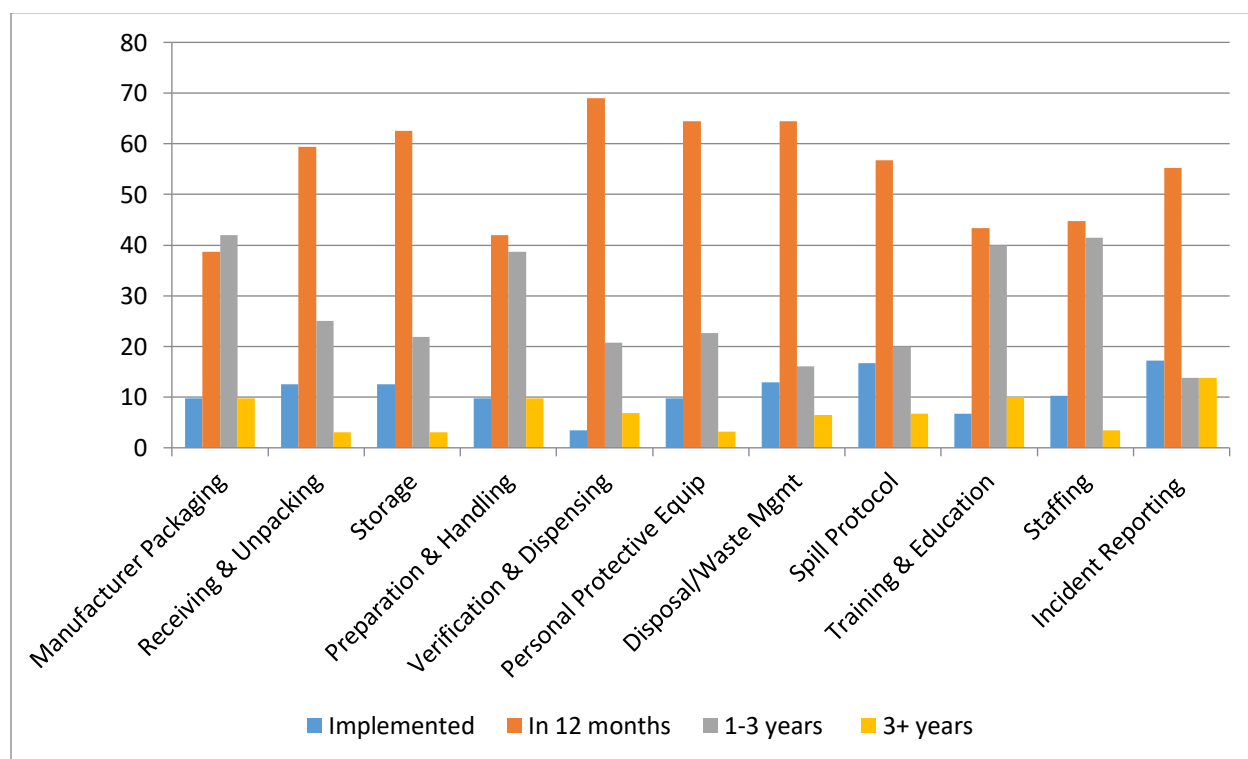
11.0 INCIDENT REPORTING	
11.1	All medication incidents and close calls should be reported through incident reporting systems, such as the National System for Incident Reporting (NSIR), safemedicationuse.ca , <i>Individual Practitioner Reporting Program</i> , and/or <i>Community Pharmacy Incident Reporting (CPhIR) System</i> . If incidents are reported through a corporate community pharmacy incident reporting system, anonymized data should be shared by the company with ISMP Canada or other expert group to ensure opportunities to learn and reduce the risk of future events. ^{22,39,40}

Implementation

It is anticipated that full adoption of these recommendations may be challenging because of the complexity of some recommendations, the novelty with respect to established practice and the infrastructure to support it.³² When considering implementation pacing, the most important factor should be ensuring the safety of pharmacy staff and patients. Practically, the speed of implementation will depend on a number of factors. The more than thirty individuals and organizations that responded to the external review of this consensus guideline commented on the anticipated speed of implementation (Figure 1). While it is understood that existing legislative requirements shall already be in place, the variable pacing of recommendations included in this consensus guideline will create opportunities to learn from and build on implementation efforts across the system. Given how important local factors are in determining implementation pacing, these timelines are intended to provide a starting point for discussion.

The external review process validated the assumption that accessible tools (e.g., pharmacy verification checklist, patient information regarding safe handling and disposal of OACDs, spill management training video) and information will be invaluable. Further consideration should be given to ensuring that this kind of support and resources are available.

Figure 1: Expected Implementation by External Review Respondents (n=32)



Limitations

This consensus guideline was informed by both evidence and expert opinion. A systematic review of literature was conducted, however it is recommended that literature, guidance documentation, or other

information released since the publication of this consensus guideline should be reviewed and considered as part of a comprehensive approach to addressing OACD safe use and handling.

In an attempt to ensure that the recommendations remained relevant, the community pharmacy sector was actively involved in every step of this consensus guideline development process. However, because we were unable to engage 100% of the community pharmacy chains in Canada, and because we were unable to find an adequate mechanism to engage with independent pharmacy store owners, it is possible that there are views that have not been incorporated.

Next Steps

Feedback submitted during the external review of this consensus guideline suggest that pharmacy team members would benefit from the availability of tools (e.g., verification check lists) and that patients and their caregivers would value additional information not only about the drugs they are taking, but the questions they may wish to consider asking their community pharmacy team. Organizations that have a mandate in pharmacy practice and in patient and medication safety should explore how to address these opportunities. Furthermore, an evaluation of the degree of congruence between this consensus guideline and community pharmacy practice should be undertaken at regular intervals.

Conclusion

Safe delivery of care must be the constant in an ever-changing, always improving cancer delivery system. Regardless of whether patients are treated in an outpatient environment or receive and self-administer their OACDs in the community, the safeguards should be as similar as would be considered reasonable and prudent. Similarly, whether a care provider is working in a hospital, outpatient setting, or community pharmacy, they have the right to know that their employer adheres to existing legislation regarding workplace health and safety and that they are taking every reasonable precaution under the circumstances to protect their occupational health and wellbeing. The growth in availability and use of OACDs when combined with preliminary and self-reported data from the community pharmacy sector, suggests a wide degree of variation in terms of the safe use of these drugs. This finding warranted the development of a setting-specific set of recommendations that are practical and, relatively speaking, easy to follow. This consensus guideline, developed through partnership with the community pharmacy sector, demonstrates a commitment to strive for best practice. In reality, the ability to implement will be tempered by several factors, including space, business planning, and the ability to pace recommendations to focus on those with the greatest impact first while working towards fuller implementation over time. Uneven pacing is expected, and as long as the perspective of addressing these recommendations is focused on a journey of quality improvement and safe care, rather than a destination, we should all be reassured that the system is moving in the right direction on behalf of patients and all Canadians.

Appendix A – Safe Use and Handling of Oral Anti-Cancer Drugs in Community Pharmacy Consensus Guideline Recommendations

The following is the full list of recommendations included in this consensus guideline document. References and introductory text have been removed for readability.

1.0 MANUFACTURER PACKAGING	
1.1	<p>Manufacturers of oral anti-cancer drugs should:</p> <ul style="list-style-type: none"> • Package the exact number of tablets needed for one cycle of therapy, or if there are multiple strengths or concerns about rapidly changing treatment recommendations, in individual unit-use packages (i.e., blister package); • Package oral anti-cancer drugs in durable packaging that is able to contain any accidental leakage during handling and transport of liquid formulations, and is tamper proof; • Provide instructions for compounding liquid formulations; • Take all necessary precautions to reduce contamination on the outside of containers that contain oral anti-cancer drugs; and • Affix safe handling warning labels on all layers of packaging for oral anti-cancer drugs, indicating that special handling and disposal precautions are necessary. The labels should be recognizable to individuals who handle or come into physical contact with oral anti-cancer drugs, including those responsible for transportation from the manufacturer or distributor to hazardous waste disposal.
1.2	<p>Distributors of oral anti-cancer drugs should:</p> <ul style="list-style-type: none"> • Take all necessary precautions to reduce contamination of oral anti-cancer drugs to surrounding containers to the lowest achievable level (e.g., packaging all oral anti-cancer drugs in a sealed plastic bag for shipping with other drugs); and • Affix safe handling warning labels on all layers of packaging for oral anti-cancer drugs, indicating that special handling and disposal precautions are necessary. The labels should be recognizable to individuals who handle or come into physical contact with oral anti-cancer drugs, including those responsible for transportation from the distributor to hazardous waste disposal.
1.3	<p>Those responsible for supply chain management and oral anti-cancer drug procurement in the community pharmacy setting may preferentially consider manufacturers and distributors whose practices promote delivery of a product that minimizes potential occupational exposure by handlers along the supply chain.</p>
2.0 RECEIVING AND UNPACKING	
2.1	<p>Best practice recommends that receiving and unpacking of shipments that contain oral anti-cancer drugs should be in a separate room. If that is not possible, receiving and unpacking should be in a designated, low-traffic area.</p>
2.2	<p>The task of receiving and unpacking drug deliveries that contain oral anti-cancer drugs should be the responsibility of specific individuals. These individuals should be given this responsibility only after completion of job-specific training. A process should be in place to ensure adequate staff coverage in instances where the primary individual is absent.</p>

2.0 RECEIVING AND UNPACKING	
2.3	The outside of cartons are examined for possible damage or leakage prior to unpacking in the event it contains an oral anti-cancer drug.
2.4	Deliveries containing oral anti-cancer drugs where the integrity of the original manufacturer's package has been compromised, leading to the potential for occupational exposure to a hazardous drug, should be dealt with in the same manner as a spill. See Section 8.0 of this document.
2.5	When an oral anti-cancer drug is received without appropriate warning labels, the pharmacy manager or other designated member of the pharmacy team should notify the originator (i.e., distributor, group purchasing agent, or other) and reinforce the importance of affixing warning labels to indicate to those handling the delivery that special handling precautions are required.
3.0 STORAGE	
3.1	Oral anti-cancer drugs should be stored in a designated area, separate from non-hazardous drugs, and labelled with warnings that indicate the need for special precautions. If stored in a separate room or area it should be clearly marked.
3.2	Access to areas where oral anti-cancer drugs are stored should be restricted to staff who have received appropriate training. See Section 9.2 of this document.
4.0 PREPARATION AND HANDLING	
4.1	Employers must take every reasonable precaution to limit individual staff member exposure to oral anti-cancer drugs so as not to exceed occupational exposure limits when these limits exist or, when they do not, to levels as low as reasonably achievable.
4.1.1	<p>Non-sterile compounding of oral anti-cancer drugs should be done in a Class I Biological Safety Cabinet (BSC) (or Class II, III Compounding Aseptic Containment Isolator [CACI]). When non-sterile compounding of oral anti-cancer drugs in a containment cabinet is not possible, community pharmacies not equipped with a containment cabinet should consider:</p> <ul style="list-style-type: none"> • Redirecting the patient or transferring the prescription to a pharmacy where compounding in a containment cabinet is possible; or • Contacting the prescriber to round doses up or down according to available strengths and body surface area/weight requirement, or to determine if alternate day dosing to make up the total weekly dose would be appropriate. <p>If it is not feasible to redirect or change the dose and the non-sterile compounding of a drug is deemed to be necessary and in the best interest of the patient, prepare the drug using personal protective equipment (PPE) (see Appendix C) including two pairs of chemotherapy gloves (ASTM standard, see Appendix C), a non-permeable gown, and respiratory protection (i.e., N95 or better) in a low-traffic area. If there is a risk of splashing, eye protection should also be used.</p>
4.1.2	Dedicated preparation equipment (i.e., counting trays) shall be used to count oral anti-cancer drugs that do not require compounding. This equipment shall be labelled for anti-cancer agent use only.
4.1.3	The following shall not be used when dispensing oral anti-cancer drugs:

4.0 PREPARATION AND HANDLING	
	<ul style="list-style-type: none"> • Blister pack filling machines for uncoated tablets; • Automated counting machines; or • An open mortar, if crushing tablets unless performed in a containment cabinet (e.g., BSC or CACI) or additional measures are taken to limit exposure (e.g., enclosing open mortar in a plastic bag).
4.1.4	A list of hazardous drugs, including oral anti-cancer drugs, shall be readily accessible to any individual who may come in contact with them in their work environment. This list should be reviewed and updated periodically to ensure continued relevance.
5.0 VERIFICATION AND DISPENSING	
5.1	<p>When dispensing oral anti-cancer drugs, community pharmacy staff should:</p> <ul style="list-style-type: none"> • Dispense them in original packaging if tablets are packaged by the manufacturer or distributor in full-cycle packaging or individual unit dosing. When tablets have not been provided in either of these formats, dispense in containers with childproof lids; • If easy-open lids are required, reinforce the importance of avoiding inadvertent exposure to children or pets; • Count and repackage tablets/capsules in a manner that avoids skin contact, minimizes aerosolization, and cross-contamination of other drugs; • Dispense liquids in bottle or vial packaged in a clear, closed, re-sealable plastic bag; • Dispense in ready-to-use formulation (no crushing or splitting required on the part of the patient); and • Label oral anti-cancer drugs as “do not cut or crush.”
5.2	When oral anti-cancer drugs cannot be dispensed in person and direct-to-patient courier delivery is being considered, the dispensing pharmacy shall recommend that at least the initial filled prescription is reviewed in person to enable provider-to-patient discussion, training, and education to supplement that provided by the patient’s cancer care team.
5.2.1	<p>When direct-to-patient courier delivery does occur, all national and provincial standards must be met. In addition, the delivery of an oral anti-cancer drug should only occur when it has been confirmed that someone is available to receive the delivery. The receiver of the delivery should be able to assume accountability for the delivered package.</p> <p>The delivery process should include a chain of signatures to assist with delivery tracking. Delivery of oral anti-cancer drugs shall not be left on a doorstep or in a mailbox. As best practice, a documented follow-up call should occur to confirm the patient has received their delivery, understands how to take the medicine, and to answer any questions that arise.</p>
5.3	Policies and procedures should be developed to ensure the traceability of a dispensed product that are aligned with legislative requirements, where they exist. At minimum, the batch/lot number along with expiry date (and other required information) should be documented in the medication management system in the event of a product recall. The use of barcoding may assist with this process.

6.0 PERSONAL PROTECTIVE EQUIPMENT (PPE)	
6.1	Appropriate personal protective equipment (PPE) shall be available and worn wherever oral anti-cancer drugs are handled (i.e., unpacking, storing, dispensing, and disposing). PPE shall be removed before leaving the dispensary.
6.1.1	No PPE is required: <ul style="list-style-type: none"> • During transport or receiving as long as there is no evidence of an exposure hazard (e.g., leak, powder residue); • If there is no evidence of an exposure hazard (e.g., leak, powder residue); • When handling oral anti-cancer drugs in their final dosage form (i.e., original bottles, prescription vials, or blister packages); and • If boxes are stored as received (not opened).
6.2	When unpacking or placing oral anti-cancer drugs into storage area, two pairs of chemotherapy gloves (ASTM standard, see Appendix C) should be worn.
6.3	During collection and transport of hazardous waste and when waste is in an open container, a protective gown (i.e., impermeable) should be worn in addition to two pairs of chemotherapy gloves (ASTM standard, see Appendix C), and, if there is a risk of a splash or spill, a protective gown, respiratory protective equipment (i.e., N95 or better) and protective eye wear should be worn.
6.4	During cleaning of the designated preparation area or when repackaging non-sterile oral anti-cancer drugs (i.e., liquid oral solutions, uncoated tablets), two pairs of chemotherapy gloves should be worn (ASTM standard, see Appendix C), and if there is a risk of a splash or spill, a protective gown, respiratory protective equipment (e.g., N95 or better), shoe cover and protective eye wear should be worn.
6.5	When cleaning the containment cabinet, two pairs of chemotherapy gloves (ASTM standard, see Appendix C), a protective gown, respiratory protective equipment (e.g., N95 or better), protective eye wear, a hair cover, and shoe covers should be worn.
6.6	When handling damaged packages containing oral anti-cancer drugs, or if a spill occurs, full PPE shall be worn including two pairs of chemotherapy gloves (ASTM standard, see Appendix C), a protective gown, shoe covers, eye protection, as well as respiratory protective equipment (e.g., N95 or better) if there is a risk of aerosolization of drug residue. Facilities with access to a Biological Safety Cabinet (BSC) should open damaged packages inside the containment cabinet.
6.7	All PPE should be changed in accordance with manufacturer's directions after use, immediately if contaminated, or if contamination is suspected. Disposable PPE should be disposed of in an appropriate hazardous waste container. Reusable PPE, such as protective eye wear, should be cleaned with soap and water after use, and allowed to air-dry before reuse or storage.
6.8	Hands shall be washed with soap and water after removing PPE.
7.0 DISPOSAL & WASTE MANAGEMENT	
7.1	The dispensing pharmacist shall instruct the patient to return unused medication to dispensing or other pharmacy for disposal, and not to dispose with household waste. To minimize inappropriate disposal in the home, pharmacies should accept oral anti-cancer

7.0 DISPOSAL & WASTE MANAGEMENT	
	drugs for disposal EVEN IF dispensed at another pharmacy. This should be reinforced in written material given to the patient.
7.2	<p>Hazardous waste containers should:</p> <ul style="list-style-type: none"> • Be placed in the receiving and unpacking area and in the dispensary; • Be rigid, leak, and puncture proof; • Be placed away from drains and areas where food is stored or eaten; • Have a sealable lid and foot pedal to open when needed; • Be double-bagged, sealed, and removed when $\frac{3}{4}$ full; and • Have a cytotoxic label affixed in a visible location on the outside of the container.
7.3	Segregate hazardous waste as soon as it is generated.
7.4	Hazardous waste pick-up should be scheduled for pick-up and delivery to a facility that incinerates hazardous waste, avoiding peak activity in the pharmacy.
7.5	<p>Dispensing equipment (e.g., tray, spatula) and hard surfaces (e.g., counter) that come in contact with oral anti-cancer drugs should be:</p> <ul style="list-style-type: none"> • Cleaned after each use using soap and water, and allowed to air-dry before reuse; and • Decontaminated periodically (at least once per month) with hypochlorite solution (e.g., 2.4% bleach) to denature hazardous drugs. After decontaminating and allowed to sit for a few minutes, surfaces should be washed with soap and water, and dried with a disposable towel. Sodium hypochlorite is not suitable for all oral anti-cancer drugs and will corrode stainless steel surfaces. Instead, sodium thiosulfate or a germicidal detergent (e.g., Surface Safe™) should be used to remove/neutralize these agents and surfaces. <p>Isopropyl alcohol should NOT be used as a cleaning solution as it can dissolve and spread drug residue, instead of removing it.</p> <p>Carpets are not easily cleaned and shall be avoided in the pharmacy area.</p>
8.0 SPILL PROTOCOL	
8.1	<p>A policy, procedure, or guideline should be in place that specifies:</p> <ul style="list-style-type: none"> • Assignment of accountability for spill management to individuals with appropriate training; • Spill simulation exercise (annual basis or more frequently); • Appropriate personal protective equipment (PPE), as described in Section 6.6 of this document and in Appendix C; and • Cleaning requirements that include instructions to: <ul style="list-style-type: none"> ○ Clean from least to most contaminated; ○ Absorb liquid spill with an absorbent towel or pad (e.g., Chemosorb pad) before cleaning with water and soap; ○ Clean with detergent and water from area of most to least contaminated. Decontamination with sodium hypochlorite (left for approximately 10 minutes) may be considered for a large spill (>30 mL) followed by further cleaning of the area with detergent and water;

8.0 SPILL PROTOCOL	
	<ul style="list-style-type: none"> ○ Cover spills involving powder with a wet towel or pad to prevent aerosolization of the product. The absorbent side of a plastic-backed pad can be used to pick up most of the product; ○ Dry the area with a disposable towel; ○ Dispose of all materials used in spill management (including PPE) in a plastic bag labeled “cytotoxic” and dispose plastic bag in a hazardous waste container; and ○ Wash hands with water and soap after the spill has been cleaned. <p>The safety data sheets for products used for cleaning and decontamination must be made available on site and be easily accessible.</p>
8.2	Spill kits should be clearly labelled and available in all areas where oral anti-cancer drugs are handled and stored.
8.3	<p>The spill kit located in community pharmacy should include:</p> <ul style="list-style-type: none"> ● Policy, standard operating procedure, or guideline; ● Cytotoxic/hazardous drug spill signage; ● List of supplies and PPE; ● Absorbent materials (disposable); ● Small scoop or scraper to collect glass/other fragments; ● PPE including two pairs of chemotherapy gloves (ASTM standard, see Appendix C), protective gown, respiratory protective equipment (e.g., N95 mask or better), protective eye wear, and shoe covers; ● Sharps or robust puncture-proof container; ● Hazardous/cytotoxic waste bags; ● Cleaning agents (soap and water); ● Incident report form(s); and ● Outside label clearly identifying contents (i.e., “Spill Kit”).
9.0 TRAINING AND EDUCATION	
9.1	Policies, procedures, and/or guidelines regarding safe handling of oral anti-cancer drugs should be developed, implemented, and regularly revised and evaluated.
9.2	All members of the community pharmacy team involved in handling, or who may come in contact with oral anti-cancer drugs or related waste products, shall have training and education that is appropriately detailed to their job function, prior to commencement of assigned duties and when new classes of oral anti-cancer drugs are introduced or procedures change. Standardized competency testing and regular re-evaluation, would be beneficial.
9.2.1	Initial and regular training for dispensing pharmacists and pharmacy technicians should include, but not be limited to, information about:

9.0 TRAINING AND EDUCATION	
	<ul style="list-style-type: none"> • Safe work practices and procedures when handling or disposing of oral anti-cancer drugs including the use of personal protective equipment (PPE) as detailed in Section 6.0 and Appendix C of this document; • Work hazards and potential risks of exposure to oral anti-cancer drugs and related waste; • Legislative requirements for waste management; • Management of a spill (including potential spill simulation exercises); • Mandatory reporting for accidental exposures, where required; and • Any other legislative training (e.g., Workplace Hazardous Materials Information System [WHMIS]). Supplemental resources should be made accessible on site, either online or in print.
9.2.2	Training programs should be regularly evaluated and updated.
9.3	<p>In addition to professional practice standards, when dispensing oral anti-cancer drugs, community pharmacies shall provide patient education including, at a minimum:</p> <ul style="list-style-type: none"> • Special storage, handling, and disposal instructions. Specifically, patients should be made aware of any recommendations regarding PPE use when opening dispensed packaging and administering or applying medication; storing medication away from children and pets; and return of unused medication to a pharmacy, ideally the dispensing pharmacy; and • Instructions for use, handling missed doses, managing side-effects, importance of adherence, breastfeeding and reproductive precautions (as applicable) for men or women thinking of, or preparing to have children. <p>In addition, early and periodic adherence monitoring and toxicity assessment either by phone or other means of communication is important.</p> <p>If feasible and where appropriate, before each refill the same information should be reviewed with the patient.</p>
10.0 STAFFING	
10.1	Factors and work processes that influence how safely pharmacy staff perform their work, including frequent rest breaks, task rotation, and opportunities for uninterrupted work space when dispensing high-alert medications (e.g., oral anti-cancer drugs), should be carefully considered and implemented wherever possible.
10.2	Community pharmacies that employ staff who are planning parenthood, and pregnant and/or breastfeeding women, should consider policy options to limit exposure to oral anti-cancer drugs, including the possibility of protective reassignment. Information or counseling regarding the potential reproductive health risks from exposure to hazardous drugs should also be provided.
11.0 INCIDENT REPORTING	
11.1	All medication incidents and close calls should be reported through incident reporting systems, such as the National System for Incident Reporting (NSIR), safemedicationuse.ca , <i>Individual Practitioner Reporting Program</i> , and/or <i>Community Pharmacy Incident Reporting</i> (CPhIR) System. If incidents are reported through a corporate community

11.0 INCIDENT REPORTING

	pharmacy incident reporting system, anonymized data should be shared by the company with ISMP Canada or other expert group to ensure opportunities to learn and reduce the risk of future events.
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Appendix B – Glossary

Carcinogen: A substance or agent that can cause cancer.²⁹

Cleaning: The act of removing contaminants (e.g., soil, microbes, hazardous drug residue) from surfaces using detergent and water (solvents and other chemicals may also be used).⁴¹

Compounding: The act of preparing a pharmaceutical preparation, through preliminary work, to put it into a usable state. In terms of oral anti-cancer therapy, compounding includes crushing tablets, handling a powder, or using IV solutions to make a liquid oral formulation.⁴¹

Cycle: A course of treatment that is repeated on a regular schedule with periods of rest in between. For example, treatment given for one week followed by three weeks of rest is one treatment cycle.

Decontamination: The act of inactivating, neutralizing, or physically removing the hazardous drug residue from surfaces through the transfer to absorbent, disposable materials (e.g., cloths, wipes, pads). The choice of the decontamination agent should take into consideration the drug, surface compatibility, and facility requirements.⁴¹

Genotoxic: A substance or agent causing deleterious action on a cell's genetic material affecting its integrity; the degree to which something causes damage to or mutation of DNA.³³

Hazardous Drug: A drug that exhibits one or more of the following characteristics in humans or animals: carcinogenicity; teratogenicity or other developmental toxicity; organ toxicity at low doses; genotoxicity; and/or structure and toxicity profiles of new drugs that mimic existing drugs determined hazardous by the above criteria.³³

High-alert medication: Drugs that bear a heightened risk of causing significant patient harm when they are used in error.³⁴

Independent double check: A process in which a second practitioner conducts a verification. Such verification can be performed in the presence or absence of the first practitioner. In either case, the most critical aspect is to maximize the independence of the double check by ensuring that the first practitioner does not communicate what he or she *expects* the second practitioner to see, which would create bias and reduce the visibility of an error.³⁵

Medication Incident: Any preventable event that could cause or lead to inappropriate medication use or patient harm while the medication is in the control of the healthcare professional, patient, or consumer.

Oral anti-cancer drug: All anti-cancer agents to treat cancer (or for any other indication) that are given by mouth, including some hormonal agents. Individual agents should be assessed based on their potential for carcinogenicity, teratogenicity, genotoxicity, reproductive toxicity, or organ toxicity. In addition, exposure risk should be evaluated based on modifying factors including the packaging of the agent (e.g., blister vs. loose), formulation (i.e., coated vs. uncoated tablet; tablet or capsule vs. liquid), and frequency of exposure, although the latter is difficult to quantify. Information on the potential hazard level of a drug can be found in the safety data sheets (SDS) produced by the drug manufacturers (where available) and the list of hazardous drugs maintained by the National Institute for Occupational Safety and Health (NIOSH).

Personal Protective Equipment (PPE): Equipment worn by a worker to minimize exposure to specific occupational hazards. Examples of personal protective equipment (PPE) include respirators, eye protection, gloves, gowns, as well as hair and shoe covers. Using PPE is only one element in a complete safety program that would use a variety of strategies to maintain a safe and healthy occupational environment. PPE does not reduce the hazard itself nor does it guarantee permanent or total protection.³⁶

Regimen: A treatment plan that specifies the dosage, schedule, and duration of treatment.³⁷

Reproductive Toxicity: Adverse effects on the male and/or female reproductive systems caused by exposure to a toxic substance or agent. The adverse effects may be expressed as alterations in sexual behaviour, decreases in fertility, or fetal loss during pregnancy.²⁹

Teratogenic: A substance or agent capable of producing fetal malformation.²⁹

Unit-of-Use Packaging: A unit-of-use package is a container-closure system designed to hold a specific quantity of a drug product for a specific use and intended to be dispensed to a patient without any modification except for the addition of appropriate labeling.³⁸

Appendix C – Personal Protective Equipment (PPE) Recommendations

Personal Protective Equipment (PPE) Recommendations [†]						
	Gloves	Gown	Respiratory Protective Equipment**	Protective Eye Wear	Hair cover	Shoe Covers
	<i>Non-sterile, meet ASTM Standard 6978-05 or equivalent, disposable, and minimum of 4 mil thick, powder-free, made of latex, nitrile, neoprene or polyurethane. Should be long enough to cover gown sleeves when worn.</i>	<i>Non-linting, disposable, back-closing, long-sleeved gown with cuff, made of material sufficiently impermeable to hazardous drugs.</i>	<i>Particulate respirator NIOSH approved N-95 or better.</i>	<i>Clear, anti-fog, distortion free, close-fitting, and shielded at the side.</i>		
General Requirements						
Transport and receiving						
Unpacking and storage	✓ 2 pairs					
Waste management (collection and transport)	✓ 2 pairs	✓				
Cleaning preparation area (i.e., countertops, equipment)	✓ 2 pairs	✓		✓		
Cleaning containment cabinets [‡]	✓ 2 pairs	✓	✓	✓	✓	✓
Handling Chemotherapy Medications						
Non-sterile preparations (i.e., handling liquid oral solutions, preparing creams/ointments, and crushing tablets)	✓ 2 pairs	✓		✓		
Non-sterile repacking (i.e., opening stock bottles of solid oral forms to count pills, fill vials, fill blister packs)	✓ 2 pairs	✓*				
Handling oral chemotherapy in final dosage package form (i.e., unit dose)						
Damages and Spills						
Handling damaged packages containing oral chemotherapy	✓ 2 pairs	✓	✓	✓		✓
Handling spills	✓ 2 pairs	✓	✓	✓		✓

*If there is a risk of splash or spill

**Ideally, should be fit tested

[†] Table is adapted from the Quebec Safe Handling Guidelines (Institut de recherche Robert-Sauvé en santé et en Sécurité du travail (IRSST). (2007). Safe handling of hazardous drugs. Retrieved June 8, 2016, from <http://www.irsst.qc.ca/media/documents/pubirsst/CG-002.pdf>.

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