

Hazardous Medication Personal Protective Equipment (PPE) Guide and List

REDUCING OCCUPATIONAL EXPOSURE TO HAZARDOUS MEDICATION
FOR **ALL STAFF**



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Preamble

The *Alberta Health Services (AHS) / Covenant Health (COV) Hazardous Medication Personal Protective Equipment (PPE) Guide – Reducing Occupational Exposure Risks to Hazardous Medication for Staff* has been developed to provide guidance for safe handling of hazardous medication in AHS and Covenant Health and to reduce occupational exposure of staff.

This document is intended to provide guidance to all AHS and COV Health employees, members of the medical and midwifery staffs, students, volunteers, and other persons acting on behalf of AHS or COV Health (including contracted service providers as necessary).

The AHS / COV Health Hazardous Medication PPE Guide in conjunction with the Hazardous Medication List provide general guidance for some of the possible scenarios that staff may encounter in AHS / COV Health, but may not cover all possible situations.

When in doubt, protect yourself from occupational exposure to hazardous medication.

Table of Contents

Preamble.....	ii
Hazardous Medication and Occupational Exposure	1
What is a Hazardous Medication?	1
What is Occupational Exposure?	1
Reducing Occupational Exposure in the Workplace	2
Spill Management	2
Hierarchy of Hazard Control	2
Hazard vs. Risk – What’s the Difference?	3
Who Does This Apply To?	4
Classification of Hazardous Medication.....	5
KNOWN Hazard Medication	5
POTENTIAL Hazard Medication.....	5
REPRODUCTIVE Hazard Medication.....	5
Reproductive Hazard Medication in AHS / COV Health.....	6
Labelling of Hazardous Medication	7
Personal Protective Equipment (PPE).....	8
Disposal of Used PPE and Hazardous Medication Waste	9
KNOWN Hazard Medication	9
POTENTIAL & REPRODUCTIVE Hazard Medication	11
Hazardous Medications Handling Risk Assessment (HMHRA).....	14
Chapter 1 KNOWN Hazard Medication	16
Pharmacy Services Staff.....	17
Receiving, Unpacking and Stocking of KNOWN Hazard Medication in Pharmacy.....	18
Delivery of KNOWN Hazard Medication within AHS / COV Facilities from Pharmacy	18
Handling, Packaging and Preparation of Non-Sterile Preparations: KNOWN Hazard Medication	19
Preparation of Compounded Sterile Preparations (CSPs): KNOWN Hazard Medication	20
Spill Management of KNOWN Hazard Medication in Pharmacy	21
Cleaning of Areas Involving KNOWN Hazard Medication in Pharmacy	22
Handling KNOWN Hazard Medication Waste Containers.....	22
Frontline Clinical Staff	23
Receiving, Storing and Delivery of KNOWN Hazard Medication in Patient Care Areas.....	24

Preparation and Administration of KNOWN Hazard Medication in Patient Care Areas	25
Spill Management of KNOWN Hazard Medication	26
Handling Human Waste	27
Handling Patient Specimens	27
Handling KNOWN Hazard Medication Waste Containers.....	27
Frontline Non-Clinical Staff.....	28
Receiving, Storage and Delivery of KNOWN Hazard Medication	29
Spill Management of KNOWN Hazard Medication	29
Handling Human Waste	29
Handling KNOWN Hazard Medication Waste Containers.....	29
Nutrition & Food Services and Linen & Environmental Services Staff	30
Spill Management of KNOWN Hazard Medication	31
Cleaning of Areas Involved in KNOWN Hazard Medication.....	31
Handling Soiled Linen within Linen Processing Area	31
Handling KNOWN Hazard Medication Waste Containers.....	31
Cleaning of Patient Care Areas and / or Handling Human Waste DURING the Precautionary Period When Signage is Posted.....	32
Handling Soiled Linen in Patient Care Areas DURING the Precautionary Period When Signage is Posted	32
Cleaning of Patient Care Areas and / or Handling Human Waste AFTER the Precautionary Period When Signage is No Longer Posted	33
Handling Soiled Linen in Patient Care Areas AFTER the Precautionary Period When Signage is No Longer Posted	33
Chapter 2 POTENTIAL & REPRODUCTIVE Hazard Medication.....	34
Pharmacy Services Staff.....	35
Receiving, Unpacking and Stocking of POTENTIAL & REPRODUCTIVE Hazard Medication in Pharmacy	36
Delivery of POTENTIAL & REPRODUCTIVE Hazard Medication within AHS / COV Facilities from Pharmacy	36
Handling, Packaging and Preparation of Non-Sterile Preparations: POTENTIAL & REPRODUCTIVE Hazard Medication.....	37
Preparation of Compounded Sterile Preparations (CSPs): POTENTIAL & REPRODUCTIVE Hazard Medication	38
Spill Management of POTENTIAL & REPRODUCTIVE Hazard Medication in Pharmacy.....	39
Cleaning of Areas Involving POTENTIAL & REPRODUCTIVE Hazard Medication in Pharmacy.....	40

Handling POTENTIAL & REPRODUCTIVE Hazard Medication Waste Containers	40
Frontline Clinical Staff	41
Receiving, Storage and Delivery of POTENTIAL & REPRODUCTIVE Hazard Medication in Patient Care Areas	41
Preparation and Administration of POTENTIAL & REPRODUCTIVE Hazard Medication in Patient Care Areas	42
Spill Management of POTENTIAL & REPRODUCTIVE Hazard Medication in Patient Care Areas.....	43
Handling Human Waste	44
Handling Patient Specimens	44
Handling POTENTIAL & REPRODUCTIVE Hazard Medication Waste Containers	44
Frontline Non-Clinical Staff.....	45
Receiving, Storage and Delivery of POTENTIAL & REPRODUCTIVE Hazard Medication	46
Spill Management of POTENTIAL & REPRODUCTIVE Hazard Medication.....	46
Handling Human Waste	46
Handling POTENTIAL & REPRODUCTIVE Hazard Medication Waste Containers	46
Nutrition & Food Services Staff and Linen & Environmental Services Staff	47
Spill Management of POTENTIAL & REPRODUCTIVE Hazard Medication.....	48
Cleaning of Areas Involved in POTENTIAL & REPRODUCTIVE Hazard Medication	48
Handling Soiled Linen.....	48
Cleaning of Patient Care Areas and Handling Human Waste	48
Handling POTENTIAL & REPRODUCTIVE Hazard Medication Waste Containers	48
Acronyms and Definitions	49
Hazardous Medication List – Key Points	52
Appendix A: Hazardous Medication List.....	53
Appendix B: Special Handling Considerations for Specified Hazardous Medication	56
Appendix C: Precautionary Period for KNOWN Hazard Medication	57
Appendix D: Hierarchy of Control.....	58
Appendix E: Reproductive Population Subset	59
Appendix F:.....	60
Resources and References.....	61

Hazardous Medication and Occupational Exposure

What is a Hazardous Medication?

Hazardous medication are those medication that can pose a health risk from exposure in the workplace due to the medication's inherent toxicity. According to the National Institute for Occupational Safety and Health (NIOSH) they exhibit one or more of the following characteristics in humans or animals:

- Carcinogenicity – capable of causing or promoting the development of cancer or a lesion which could be the starting point of a cancer
- Teratogenicity or other developmental toxicity – capable of causing congenital malformations due to an action on the embryo
- Genotoxicity – capable of damaging genetic material (DNA) to cause mutations
- Reproductive toxicity – capable of affecting fertility (i.e. miscarriages, late fetal death, infertility)
- Organ toxicity at low doses – capable of causing serious organ or other toxic effects at a low dose (i.e. liver damage, local necrosis of exposed tissue)
- Structure and toxicity profiles of medication that mimic existing medication determined hazardous by the above criteria

See [Appendix A: Hazardous Medication List](#)

See [Appendix B: Special Handling Considerations for Specified Hazardous Medication](#)

See [Appendix C: Precautionary Period for KNOWN Hazard Medication Requiring PPE for Longer than 48 hours](#)

What is Occupational Exposure?

Occupational exposure occurs during the performance of job duties and may place staff at risk of adverse health effects. Occupational exposure to hazardous medication may occur through inhalation, skin contact, ingestion or injection and may be associated with either frequent exposure to low levels of hazardous medication, or a single exposure to a larger amount. Exposure to hazardous medication may occur at all points of the medication circuit including receiving, preparing and administering the medication, handling contaminated supplies and materials, disposing of hazardous medication and associated hazardous waste and handling contaminated materials such as patient waste.

Reducing Occupational Exposure in the Workplace

The following key concepts help reduce occupational exposure to hazardous medication:

- Use of engineering controls (e.g., biological safety cabinet (BSC), closed-system transfer devices (CSTD))
- Wearing of Personal Protective Equipment (PPE)
- Safe work practices (e.g., following spill procedures, standard cleaning practices)
- Determination of the risk of inhalation, or risk of spill or splash

Staff can mitigate possible exposure to hazardous medication by using one or more of the following minimum precaution recommendations when handling medication:

- Wearing appropriate PPE indicated in this guide
- Practicing “touchless technique”
- Practicing good hand hygiene

Spill Management

Spill kits must be available in locations where hazardous medication are handled. All contents should be verified regularly, including checking of expiration dates.

Hierarchy of Hazard Control

The Hierarchy of Hazard Control offers a complete framework used by companies to minimize or eliminate exposure to hazards. Elimination and substitution of the hazard are the most effective options; however, this is not always possible when referring to hazardous medication. Engineering controls, administrative controls and PPE are all important aspects of handling of hazardous medication, however, this document will only address the use of appropriate PPE.

See [Appendix D: Hierarchy of Hazard Controls](#)

Hazard vs. Risk – What’s the Difference?

Often the two words are used interchangeably, however, in terms of risk assessment they have very distinct meanings.



$$\text{Hazard} \times \text{Exposure} = \text{Risk}$$

A hazard poses no risk if there is not exposure to that hazard.

Factors that influence the degree of risk include:

- How often and for how long a person is exposed to a hazardous object or condition.
- How the person is exposed (e.g., breathing in vapors, skin contact).
- How severe the effects are under the conditions of exposure.


Who Does This Apply To?

This document has been prepared to provide guidance to the following staffing groups:

Pharmacy Services	<ul style="list-style-type: none"> • Pharmacists • Pharmacy Assistants • Pharmacy Technicians • Pharmacy Students
Frontline Clinical	<ul style="list-style-type: none"> • Allied Health Professionals • Diagnostic Imaging (DI) Staff • Healthcare Aides • Laboratory Technologists and Assistants • Nursing Practitioners • Nurse Staff • Paramedics • Physicians and Medical Residents • Respiratory Therapists • Students
Frontline Non-Clinical	<ul style="list-style-type: none"> • Contracting Procurement and Supply Management (CPSM) • Porters • Service Staff (e.g. Corrections) • Unit Clerks
Nutrition & Food Services and Linen & Environmental Services	<ul style="list-style-type: none"> • Environmental Services Staff • Linen Services • Nutrition & Food Services Staff

Classification of Hazardous Medication

NIOSH List of Antineoplastic and Other Hazardous Drugs in Healthcare Settings, 2016	
<u>Group 1:</u>	Antineoplastic medication (American Hospital Formulary Service (AHFS) classification 10:00) Note that many of these medications may also pose a reproductive risk for susceptible populations. (NIOSH Table 1)
<u>Group 2:</u>	Non-Antineoplastic medication that meet one or more of the NIOSH criteria for a hazardous medication. Note that some of these medications may also pose a reproductive risk for susceptible populations. (NIOSH Table 2)
<u>Group 3:</u>	Non-Antineoplastic medication that <u>primarily</u> pose a reproductive risk for men and women who are actively trying to conceive, and women who are pregnant or breastfeeding, because some of these medication may be present in breast milk. (NIOSH Table 3)

Alberta Health Services / Covenant Health Hazardous Medication Classification	
KNOWN Hazard Medication	<p>These are mainly antineoplastic medication as per NIOSH Group 1, predominantly used in the treatment of cancer (chemotherapy) and in some cases, used for the treatment of other conditions (e.g., psoriasis, rheumatoid arthritis).</p> <p>These medication present a serious risk to the health, or welfare of a healthcare staff member during occupational exposure. Many of these medication are cytotoxic agents. </p>
POTENTIAL Hazard Medication	<p>These are mainly non-antineoplastic medication as per NIOSH Group 2.</p> <p>These medication meet one or more criteria for a hazardous medication. Have or shows the capacity to become or develop into something in the future.</p>
REPRODUCTIVE Hazard Medication	<p>These are mainly non-antineoplastic medication as per NIOSH Group 3.</p> <p>These medication may pose a risk <u>only for certain individuals</u>, that is men and women, with a potential to conceive, and women who are pregnant or breastfeeding.</p>

Reproductive Hazard Medication in AHS / COV Health

These medications may present an occupational exposure risk to men or women with a potential to conceive, women who are pregnant, or women who are breast feeding, because the medication may be present in breast milk.

Staff can mitigate possible exposure to hazardous medication by using one or more of the following minimum precaution recommendations when handling medication:

- Wearing appropriate PPE indicated in this guide
- Practicing “touchless technique”
- Practicing good hand hygiene






Should staff members have specific questions, they should discuss with their supervisors in consultation with their personal physicians and Workplace Health and Safety (WHS) to assess the risk of occupational exposure to these medication and the option of temporarily refraining from handling hazardous medications.

Certain Reproductive Hazard Medications may only be applicable to a subset of the Reproductive population.

See [Appendix E](#) for more detailed reproductive hazard medication specific information.

Labelling of Hazardous Medication

Labelling of hazardous medication is important to provide a visual cue to staff that the medication is hazardous and presents an occupational exposure risk.







Label	Application
	<p>This label will be applied to those hazardous medications that are KNOWN hazard.</p>
	<p>This label will be applied to those hazardous medications that are POTENTIAL hazard.</p>
	<p>Additional labels for the KNOWN Hazard Medication that are cytotoxic.</p>
	<p>Label for REPRODUCTIVE HAZARD Medication</p>
	<p>For Labelling of Patient Specimens, refer to KNOWN Hazardous Medication Specimen label</p>

NOTE: Medication packaged in pharmacy packaging machines may come with a “Hazardous” warning on the outer package in black ink. The colorful Hazardous medication auxiliary label will not be present.

Personal Protective Equipment (PPE)

Equipment that protects staff from exposure to hazardous medication.

NEW

PPE	ICON	Description
Gloves		<p>“Chemo Gloves”: Are high quality, powder free gloves made of either latex, nitrile, polyurethane, neoprene, polychloroprene that meet the American Society for Testing and Materials (ASTM) standard (ASTM D6978 – 05) for chemotherapy permeability (includes sterile and non-sterile gloves). In AHS, the non-sterile powder free nitrile gloves are ASTM rated for chemo permeability.</p>
Gowns		<p>“DMR Chemo Gowns”: Are disposable moisture resistant (DMR) gowns made of strong, breathable, non-linting polyethylene material or with vinyl coatings, long sleeves with tight-fitting cuffs, full back with waist tie closure, solid front, and tie or Velcro® neck. These gowns have been tested by the manufacturers against the top chemotherapy drugs. Based on NIOSH and other evidence, DMR Chemo gowns are for use mainly with KNOWN hazard medication.</p> <p>Protective Gowns: Are disposable, made of strong, breathable polypropylene material that is fluid resistant, long sleeves with soft knit cuffs, a full back, long neck with ties, and tie waist.</p>
Respiratory Protection		<p>N95 Respirator: A face mask respirator that filters particles from the air. They must be fit tested and worn properly to ensure that contaminated particles within the air are not inhaled.</p> <p>Chemical Cartridge Respirator: (Pharmacy Use Only) A face mask respirator that filters <u>gases and vapors</u> from the air. Only some models must be fit tested, so follow instructions carefully. When worn properly they ensure that hazardous vapors are not inhaled. Available as a half face piece respirator to be worn with goggles and face shield for staff with eyeglasses.</p> <p>Surgical Mask: A loose-fitting single-use filtration device worn over the nose and mouth of staff to prevent contaminants being released into the immediate environment and to protect the wearer from spray or splash.</p>
Eye and Face Protection		<p>Goggles: Must be face sealing with or without side vents.</p> <p>Face Shield: Must be long enough to cover the nose and mouth.</p>
Head Cover and Facial Hair Cover		<p>Hair Covers / Bouffant / Hijab Cover: Must cover all exposed hair and / or hijab completely.</p> <p>Facial Hair Cover: Must cover all facial hair completely, if applicable.</p>
Shoe Covers		<p>Shoe Cover: Disposable, single use.</p>

Disposal of Used PPE and Hazardous Medication Waste

KNOWN Hazard Medication

KNOWN hazard medication waste includes the medication and any contaminated packaging, empty vials, ampoules, syringes, and administration sets.

Disposable PPE

Contaminated, disposable PPE should be disposed as Cytotoxic Waste. In this instance, contaminated means:

- Has come into contact with KNOWN hazard medications during their storage, handling, preparation, administration and disposal.
- Is soiled with blood or body fluid (including human waste) from patients receiving a KNOWN hazard medication - **during the posted precautionary period** - to the point of dripping; or when compressed it releases liquid.



If disposable PPE has not been contaminated with either a KNOWN hazard medication or blood and body fluids from patients receiving KNOWN hazard medication, it can be disposed of as general waste.

The chart below provides more detail regarding the disposal of KNOWN hazard medication waste and any contaminated PPE.

The chart is meant to highlight as many possible scenarios of waste disposal containers that might be encountered across AHS and provide disposal information. Different sites across AHS are using different containers and have legacy practices in place for waste disposal. These options are provided so that areas can best utilize their existing suite of containers **in the interim** until standardized containers are available; to provide a solution that meets the needs to ensure appropriate disposal, and to make best effort at a streamlined approach for the sites.









The chart is designed in such a way that the **preferred** containers are checked in **red** indicating that these containers are the ones that should be used; and that sites should be transitioning to. The remaining containers (checked in **black**) are the containers (with labelling instructions) that could be used if a site does not have access to the preferred container. The chart does not provide an exhaustive list of all the containers available. It highlights the most commonly used containers within AHS.

*** Directions for affixing cytotoxic labels to waste containers ***

Place labels on the front/sides of the container when being filled and on top of the container (next to the barcode label) when it is sealed for transport and disposal.

Chart A: Disposal of KNOWN Hazard Medication and PPE

This is not an exhaustive list of the types of containers available. It highlights the most common containers used within AHS sites

<p>KNOWN Hazard Medication</p> <p>ALL waste containers used for KNOWN hazard medication MUST be marked with a CYTOTOXIC label</p> 							
	White Pharmaceutical Waste Container with Cytotoxic label added/affixed	Yellow Reusable Biomedical Waste Container with Cytotoxic label added/affixed	Biomedical Waste Cardboard Box Container with Cytotoxic label added/affixed	Yellow Biomedical Waste Container with Cytotoxic label added/affixed	Red Anatomical Waste Container with Cytotoxic label added/affixed	Designated Red Medication Waste Container with Cytotoxic label added/affixed	Red Cytotoxic Waste Container pre-labelled with Cytotoxic label
Sharps contaminated with KNOWN hazard medication should be disposed of in the sharps container with the CYTOTOXIC symbol							
Medication waste WITHIN the Pharmacy department	✓ Preferred	<i>Yellow reusable biomedical waste containers (with the cytotoxic label affixed) should only be used to collect smaller (sealed) waste containers filled with cytotoxic waste (e.g. filled cytotoxic sharps containers)</i>					✓ Preferred
Disposable PPE <u>contaminated</u> with KNOWN hazard medication waste WITHIN the Pharmacy department	✓ Preferred						✓ Preferred
Medication waste OUTSIDE the Pharmacy department			✓ Preferred	✓ Preferred			
Disposable PPE <u>contaminated</u> with KNOWN hazard medication waste OUTSIDE the Pharmacy department			✓ Acceptable	✓ Acceptable			✓ Preferred
Disposable PPE <u>contaminated</u> with blood or body fluid (including human waste) from patients receiving KNOWN hazard medication during the posted precautionary period			✓ Acceptable	✓ Acceptable	✓ Acceptable		✓ Preferred

Legend: Red ✓ means **Preferred** disposal container

Black ✓ means **Acceptable (interim)** disposable container

POTENTIAL & REPRODUCTIVE Hazard Medication

POTENTIAL & REPRODUCTIVE hazard medication waste includes the medication, any vials, ampoules, and syringes with remaining medication. These should be disposed of in designated medication waste container. Empty vials or ampoules (with no patient information) should be disposed of as non-contaminated sharps. Empty packaging should be disposed of as general waste. (See Chart B)

Disposable PPE

Disposable PPE can be disposed of through the general waste stream except under the following conditions:

- PPE is soiled with POTENTIAL & REPRODUCTIVE hazard medication to the point of dripping; or when compressed it releases liquid (e.g. used to contain a spill). This now becomes medication waste (white container in pharmacy, red container in all other areas).
- PPE is soiled with blood or body fluid (**not** including human waste) from patients receiving a POTENTIAL & REPRODUCTIVE hazard medication to the point of dripping; or when compressed it releases liquid. This now becomes biomedical waste (yellow container).

Reusable PPE

Reusable PPE is to be laundered following the soiled linen practices at your site.

The chart below provides more detail regarding the disposal of POTENTIAL & REPRODUCTIVE hazard medication waste and any contaminated PPE.

The chart is meant to highlight as many possible scenarios of waste disposal containers that might be encountered across AHS and provide disposal information. Different sites across AHS are using different containers and have legacy practices in place for waste disposal. These options are provided so that areas can best utilize their existing suite of containers in the interim until standardized containers are available; to provide a solution that meets the needs to ensure appropriate disposal, and to make best effort at a streamlined approach for the sites.







The chart is designed in such a way that the **preferred** containers are checked in **red** indicating that these containers are the ones that should be used; and that sites should be transitioning to. The remaining containers (checked in **black**) are the containers (with labelling instructions) that could be used, if a site does not have access to the preferred container. The chart does not provide an exhaustive list of all the containers available. It highlights the most commonly used containers within AHS.

*** Directions if/when affixing incinerate labels to waste containers ***

Place labels on the front/sides of the container when being filled and on top of the container (next to the barcode label) when it is sealed for transport and disposal.

Chart B: Disposal of POTENTIAL & REPRODUCTIVE Hazard Medication and PPE

This is not and exhaustive list of the types of containers available. It highlights the most common containers used within AHS sites.

<p>POTENTIAL & REPRODUCTIVE Hazard Medication</p>						
	White Pharmaceutical Waste Container	Yellow Reusable Biomedical Waste Container	Biomedical Waste Cardboard Box Container	Yellow Biomedical Waste Container	Red Anatomical Waste Container	Designated Red Medication Waste Container
<p><i>Sharps contaminated with POTENTIAL & REPRODUCTIVE hazard medication should be disposed of in the sharps container used for medication (sharps) waste</i></p>						
Medication waste WITHIN the Pharmacy department including disposable PPE contaminated with medication (See explanation on previous page)	<p>✓ Preferred</p>					
Medication waste OUTSIDE the Pharmacy department (See explanation on previous page)						<p>✓ Preferred</p>
Disposable PPE <u>contaminated with medication waste</u> OUTSIDE the Pharmacy department (See explanation on previous page)		<p>✓ Acceptable *affix incinerate label</p>	<p>✓ Acceptable *affix incinerate label</p>	<p>✓ Acceptable *affix incinerate label</p>		<p>✓ Preferred</p>
Disposable PPE <u>contaminated with blood or body fluid</u> (See explanation on previous page)		<p>✓ Preferred</p>	<p>✓ Preferred</p>	<p>✓ Preferred</p>		

Legend: Red ✓ means **preferred** disposal container Black ✓ means **Acceptable (interim)** disposable container

For more information on waste management please see the following documents:

AHS

Please contact Linen and Environmental Services Waste Management at les@ahs.ca

Covenant Health

Please contact Medication Management Team at medication.management@covenanthealth.ca

Hazardous Medications Handling Risk Assessment (HMHRA)

The Hazardous Medication Handling Risk Assessment (HMHRA) is an evaluation of the risk factors related to potential exposure to a hazardous medication, or the blood and body fluids of patients receiving hazardous medications to reduce occupational exposure.

A HMHRA must be conducted by the **health care provider** prior to performing a task related to hazardous medication handling, preparing, administering or disposing or handling blood and body fluids of a patient who has received a hazardous medication.

The HMHRA includes:

- 1) Identifying the hazardous medication (KNOWN, POTENTIAL, or REPRODUCTIVE).
- 2) Identifying the task (see Hazardous Medication Personal Protective Equipment (PPE) Guide).
- 3) Evaluating the likelihood of exposure when handling the hazardous medication;
 - By contact with hands or clothing
 - From inhalation, spray or splash from a specific task. Some examples include:
 - Crushing or cutting pills; pouring the cut/crushed pill on to applesauce,
 - Administration via enteral tube,
 - Removing medications from a vial/ampoule,
 - Administering a medication via inhalation,
 - Performing / assisting with procedures that may generate medication aerosols e.g.
 - Hyperthermia Intraperitoneal Chemotherapy (HIPEC)
 - Cleaning up spills of powdered medications
 - Disconnecting medication lines
- 4) Evaluating the likelihood of exposure (by contact, inhalation, spray or splash) to the blood and body fluids of patients receiving hazardous medications;
 - Including urine, feces, vomitus, vaginal secretions, seminal excretions, cerebral spinal fluid, synovial fluid, pleural fluid, peritoneal fluid, pericardial fluid, amniotic fluid, non-bloody saliva and tears, nasal secretions, sputum, and sweat.
 - From a specific task (some examples include: emptying urinals/bedpans, changing diapers/incontinent products, collecting blood/urine/tissue specimens, changing soiled linens, dressing changes, performing tracheostomy care, performing/assisting with procedures likely to generate medication aerosols, spray or splash).

- 5) Choosing the appropriate Personal Protective Equipment (PPE) per the Hazardous Medication PPE Guide to minimize the risk of exposure to the health care provider.
- 6) Disposing of used PPE/waste appropriately.
- 7) Cleaning up spills appropriately.

Hazardous Medication Handling Practices includes:

- Risk assessment to determine risk of contact, inhalation or aerosol exposure, spray or splash.
- Hand Hygiene.
- Wearing PPE per the Hazardous Medication PPE Guide for specific tasks.
- Following the Hazardous Medications Donning and Doffing Posters.
- Appropriate disposal of used PPE and hazardous medication waste.
- Appropriate spill clean-up procedures and cleaning practices.

See [Appendix F: Hazardous Medication Handling Risk Assessment Algorithm](#)







Chapter 1







KNOWN

Hazard

Medication

Pharmacy Services Staff







KNOWN HAZARD						
Receiving, Unpacking and Stocking of KNOWN Hazard Medication in Pharmacy						
Receiving and unpacking UNDAMAGED medication parcels	✓ 2 Pairs					
Receiving and unpacking DAMAGED medication parcels <i>Treat as a Hazardous Spill</i>	✓ 2 Pairs	✓ DMR Chemo	✓ Chemical Cartridge Respirator	✓ Goggles and Face Shield	✓	✓ 1 Pair
Delivery of KNOWN Hazard Medication within AHS / COV Facilities from Pharmacy						
Delivery to patient care areas	✓ 1 Pair					

KNOWN HAZARD						
Handling, Packaging and Preparation of Non-Sterile Preparations: KNOWN Hazard Medication						
Intact dosage forms (e.g., tablets, capsules, prefilled syringes, etc.)	✓ 1 Pair					
Unit dose packaged (e.g., received from manufacturer)	✓ 1 Pair					
Picking for <ul style="list-style-type: none"> • Wardstock • Patient Daily Run 	✓ 1 Pair					
Packaging using a manual packaging system (e.g., cold seal blisterpack)	✓ 2 Pairs		✓ N95		✓	
The following preparations MUST be prepared in a Class II, externally vented Biological Safety Cabinet (BSC) or Compounding Aseptic Containment Isolator (CACI) designated for non-sterile hazardous preparations. Cleanroom BSCs may be used for occasional non-sterile preparation only. Follow site processes for BSCs.						
Cutting, crushing or otherwise manipulating tablets or capsules	✓ 2 Pairs Sterile	✓ DMR Chemo	✓ *Surgical Mask		✓	✓ 2 Pairs
Compounding oral liquids, suppositories, topical preparations (e.g., creams, ointments, lotions)	✓ 2 Pairs Sterile	✓ DMR Chemo	✓ *Surgical Mask		✓	✓ 2 Pairs
Repackaging of oral liquids	✓ 2 Pairs Sterile	✓ DMR Chemo	✓ *Surgical Mask		✓	✓ 2 Pairs

*Surgical Mask: Worn in the cleanroom to protect the sterile compounding environment and the preparation from personnel contamination.

Follow NAPRA Guidelines for Sterile Compounding and PPE Requirements in the Clean Room.

Follow AHS Donning and Doffing Reference document for Sterile Compounding. A cloth or disposable gown is required to be worn beneath the DMR chemo gown as per AHS sterile compounding requirements.

KNOWN HAZARD						
Preparation of Compounded Sterile Preparations (CSPs): KNOWN Hazard Medication						
Non-compounding staff in the clean room	✓ 2 Pairs Sterile	✓ DMR Chemo	✓ *Surgical Mask		✓	✓ 2 Pairs
The following preparations <u>MUST</u> be prepared in a Class II, externally vented Biological Safety Cabinet (BSC) or Compounding Aseptic Containment Isolator (CACI). Use Closed System Transfer Devices (CSTD) as per pharmacy policy and procedure, as required.						
IV, SC, IM, IT, IP, injectable preparations, etc.	✓ 2 Pairs Sterile	✓ DMR Chemo	✓ *Surgical Mask		✓	✓ 2 Pairs
Solutions for irrigation, powders or solutions for inhalation	✓ 2 Pairs Sterile	✓ DMR Chemo	✓ *Surgical Mask		✓	✓ 2 Pairs
Ophthalmic preparations	✓ 2 Pairs Sterile	✓ DMR Chemo	✓ *Surgical Mask		✓	✓ 2 Pairs







IV – Intravenous, SC – Subcutaneous, IM – Intramuscular, IT – Intrathecal, IP – Intraperitoneal

*Surgical Mask: Worn in the cleanroom to protect the sterile compounding environment and the preparation from personnel contamination.

Follow NAPRA Guidelines for Sterile Compounding and PPE Requirements in the Clean Room.

Follow AHS Donning and Doffing Reference document for Sterile Compounding. A cloth or disposable gown is required to be worn beneath the DMR chemo gown as per AHS sterile compounding requirements.

For further information related to hazardous sterile compounding, please refer to Pharmacy Services Practice Resources on Insite.







KNOWN HAZARD						
Spill Management of KNOWN Hazard Medication in Pharmacy						
When required, obtain Cytotoxic Medication Spill Kit. Perform spill clean-up based on nature, size and location of spill.						
Intact dosage form spill (e.g., tablets) <i>Spill Kit Not Required</i>	✓ 1 Pair					
Spill inside the BSC or CACI (Glass is down)	✓ 2 Pairs Sterile	✓ DMR Chemo	✓ *Surgical Mask	Don Goggles if Risk of Spray or Splash	✓	✓ 2 Pairs
Spill inside the BSC or CACI (Glass is up)	✓ 2 Pairs Sterile	✓ DMR Chemo	✓ Chemical Cartridge Respirator	✓ Goggles and Face Shield	✓	✓ 2 Pairs
Spill outside the BSC or CACI in the clean room <i>Don PPE from Spill Kit, and obtain fit- tested chemical cartridge respirator</i>	✓ 2 Pairs	✓ DMR Chemo	✓ Chemical Cartridge Respirator	✓ Goggles and Face Shield	✓	✓ 2 Pairs
Spill outside the clean room <i>Don PPE from Spill Kit, and obtain fit- tested chemical cartridge respirator</i>	✓ 2 Pairs	✓ DMR Chemo	✓ Chemical Cartridge Respirator	✓ Goggles and Face Shield	✓	✓ 1 Pair

BSC – Biological Safety Cabinet, CACI – Compounding Aseptic Containment Isolator

*Surgical Mask: Worn in the cleanroom to protect the sterile compounding environment and the preparation from personnel contamination.

Follow NAPRA Guidelines for Sterile Compounding and PPE Requirements in the Clean Room.

Follow AHS Donning and Doffing Reference document for Sterile Compounding. A cloth or disposable gown is required to be worn beneath the DMR chemo gown as per AHS sterile compounding requirements.







KNOWN HAZARD						
Cleaning of Areas Involving KNOWN Hazard Medication in Pharmacy						
Cleaning of preparation areas (e.g., countertops in dispensary)	✓ 1 Pair		Don N95 if Risk of Inhalation or Aerosol Exposure	Don Goggles if Risk of Spray or Splash		
Clean Room environment	✓ 2 Pairs	✓ DMR Chemo	✓ *Surgical Mask	Don Goggles if Risk of Spray or Splash	✓	✓ 2 Pairs
Daily clean of BSC or CACI (Glass is down)	✓ 2 Pairs	✓ DMR Chemo	✓ *Surgical Mask	Don Goggles if Risk of Spray or Splash	✓	✓ 2 Pairs
Daily clean of BSC or CACI (Glass is up)	✓ 2 Pairs	✓ DMR Chemo	✓ Chemical Cartridge Respirator	✓ Goggles and Face Shield	✓	✓ 2 Pairs
Decontamination of BSC or CACI (Glass is up)	✓ 2 Pairs	✓ DMR Chemo	✓ Chemical Cartridge Respirator	✓ Goggles and Face Shield	✓	✓ 2 Pairs
Handling KNOWN Hazard Medication Waste Containers						
Handling (cytotoxic) hazardous medication waste containers (Outside of the clean room / general pharmacy areas)	✓ 1 Pair					







BSC – Biological Safety Cabinet, CACI – Compounding Aseptic Containment Isolator

*Surgical Mask: Worn in the cleanroom to protect the sterile compounding environment and the preparation from personnel contamination.

Follow NAPRA Guidelines for Sterile Compounding and PPE Requirements in the Clean Room.
 Follow AHS Donning and Doffing Reference document for Sterile Compounding. A cloth or disposable gown is required to be worn beneath the DMR chemo gown as per AHS sterile compounding requirements.







Frontline Clinical Staff







KNOWN HAZARD						
Receiving, Storing and Delivery of KNOWN Hazard Medication in Patient Care Areas						
Receiving and storage in patient care areas	✓ 1 Pair					
Delivery to patient care areas	✓ 1 Pair					

KNOWN HAZARD						
Preparation and Administration of KNOWN Hazard Medication in Patient Care Areas						
<p>Whenever possible, consult Pharmacy Services regarding manipulation of final dosage forms.</p> <p>If it is absolutely necessary to prepare the medication in the patient care area, prepare medication in an isolated area and use a disposable, plastic-backed absorbent pad (one example is ChemoPlus prep mat) to avoid contamination of the work surface. Don PPE as indicated.</p>						
Intact dosage forms (e.g., tablets, capsules)	✓ 1 Pair & Touchless Technique					
Cutting, crushing or otherwise manipulating tablets or capsules	✓ 2 Pairs & Touchless Technique	✓ DMR Chemo	Don N95 if Risk of Inhalation or Aerosol Exposure	Don if Risk of Spray or Splash		
Oral liquids, suppositories, topical preparations (e.g., creams, ointments, lotions),	✓ 2 Pairs	✓ DMR Chemo	Don N95 if Risk of Inhalation or Aerosol Exposure	Don if Risk of Spray or Splash		
IV, SC, IM, IT, IP, injectable preparations, bladder instillations, etc.	✓ 2 Pairs	✓ DMR Chemo	Don N95** if Risk of Inhalation or Aerosol Exposure	Don if Risk of Spray or Splash		
Solutions for irrigation, powders or solutions for inhalation	✓ 2 pairs	✓ DMR Chemo	Don N95** if Risk of Inhalation or Aerosol Exposure	Don if Risk of Spray or Splash		







IV – Intravenous, SC – Subcutaneous, IM – Intramuscular, IT – Intrathecal, IP – Intraperitoneal

**Note: N95 Respirator is not required if using a closed system transfer device (CSTD).







KNOWN HAZARD						
Spill Management of KNOWN Hazard Medication						
<p>When required, obtain Cytotoxic Medication Spill Kit. Perform spill clean-up based on nature, size and location of spill.</p>						
Spillage or breakage in patient care areas <i>Don PPE from Spill Kit</i>	✓ 2 Pairs	✓ DMR Chemo	✓ N95	✓	✓	✓ 1 Pair

KNOWN HAZARD							
<p><u>Precautionary Period</u>: Starts at the time of administration of a KNOWN hazard medication and continues for a minimum of 48 hours after completion of dose. Certain medications require precautions up to 14 days. (See Appendix C) NOTE: Follow Hazardous Medication Handling Risk assessment after precautionary period.</p>							
Handling Human Waste							
Handling bodily fluids	✓ 2 Pairs	✓ DMR Chemo	Don N95 if Risk of Inhalation or Aerosol Exposure	Don if Risk of Spray or Splash			
Handling contaminated linens	✓ 2 Pairs	✓ DMR Chemo	Don N95 if Risk of Inhalation or Aerosol Exposure	Don if Risk of Spray or Splash			
Handling Patient Specimens							
<p>For labelling of patient specimens from patients on KNOWN hazard medications, refer to: <u>KNOWN Hazardous Medication Specimen label</u> document. This can be accessed by emailing: AHSLaboratoryWorkplaceSafety@ahs.ca</p>							
Specimen collection and testing (Lab)	<p>Refer to Laboratory Services Hazardous Medication PPE Guideline - Laboratory Services. This can be accessed by emailing: AHSLaboratoryWorkplaceSafety@ahs.ca</p>						
Blood specimen collection (Nursing)	✓ 1 Pair	Don DMR Chemo if Risk of Spray or Splash	Don N95 if Risk of Inhalation or Aerosol Exposure	Don if Risk of Spray or Splash			
Other specimen collection (Nursing)	✓ 2 Pairs	✓ DMR Chemo	Don N95 if Risk of Inhalation or Aerosol Exposure	Don if Risk of Spray or Splash			
Handling KNOWN Hazard Medication Waste Containers							
Handling (cytotoxic) hazardous medication waste containers	✓ 1 Pair						

Frontline Non-Clinical Staff

KNOWN HAZARD							
Receiving, Storage and Delivery of KNOWN Hazard Medication							
Receiving and storage in patient care areas	✓ 1 Pair						
Delivery to patient care areas	✓ 1 Pair						
Spill Management of KNOWN Hazard Medication							
Spillage or breakage in patient care area	Follow Site specific CODE BROWN procedures to clean up the spill						
Handling Human Waste							
In the event of an exposure to potentially hazardous bodily fluids (e.g., patient vomits during portering)	Contact Clinical Staff						
Handling KNOWN Hazard Medication Waste Containers							
Handling (cytotoxic) hazardous medication waste containers	✓ 1 Pair						

Nutrition & Food Services and Linen & Environmental Services Staff

KNOWN HAZARD						
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Spill Management of KNOWN Hazard Medication

Spillage or breakage in patient care area <i>(Final environmental clean only)</i>	Follow site specific CODE BROWN procedures
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Cleaning of Areas Involved in KNOWN Hazard Medication

Cleaning of the clean room in pharmacy <small>(A cloth or disposable gown is required to be worn beneath the DMR chemo gown as per AHS sterile compounding requirements)</small>	✓ 2 Pairs Sterile	✓ DMR Chemo	✓ *Surgical Mask	Don if Risk of Spray or Splash	✓	✓ 2 Pairs
Cleaning of preparation & administration areas in patient care areas <small>(e.g., medication rooms)</small>	✓ 1 Pair					







Handling Soiled Linen within Linen Processing Area

Handling of soiled linens <u>within the linen processing areas</u> of patients receiving hazardous medication	Refer to Linen Services Soiled Linen Protocol. This can be accessed by emailing NFLES.PolicyResource@ahs.ca
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Handling KNOWN Hazard Medication Waste Containers

Handling (cytotoxic) hazardous medication waste containers	✓ 1 Pair
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*Surgical Mask: Worn in the cleanroom to protect the sterile compounding environment and the preparation from personnel contamination.

KNOWN HAZARD							
Cleaning of Patient Care Areas and / or Handling Human Waste DURING the Precautionary Period When Signage is Posted							
<u>Precautionary Period:</u> 48 hours following the administration of the last dose of a KNOWN hazard medication and up to 7 days for specific medication.							
Cleaning of a patient room and / or handling human waste DURING the precautionary period, where there is a risk of contact with: <ul style="list-style-type: none"> Hazardous medication Blood & body fluid from the patient 	✓ 2 Pairs	✓ DMR Chemo	Don N95 If Risk of Inhalation or Aerosol Exposure	Don if Risk of Spray or Splash			
Cleaning of a patient room washroom DURING the precautionary period, where there is a risk of contact with: <ul style="list-style-type: none"> Hazardous medication Blood & body fluid from the patient 	✓ 2 Pairs	✓ DMR Chemo	Don N95 If Risk of Inhalation or Aerosol Exposure	Don if Risk of Spray or Splash			
Retrieving meal trays from patient rooms DURING the precautionary period, where there is a risk of contact with: <ul style="list-style-type: none"> Hazardous medication Blood & body fluid from the patient 	✓ 2 Pairs						
Handling Soiled Linen in Patient Care Areas DURING the Precautionary Period When Signage is Posted							
Handling contaminated linens DURING the precautionary period, where there is a risk of contact with: <ul style="list-style-type: none"> Hazardous medication Blood & body fluid from the patient 	✓ 2 Pairs	✓ DMR Chemo	Don N95 If Risk of Inhalation or Aerosol Exposure	Don if Risk of Spray or Splash			

KNOWN HAZARD



Cleaning of Patient Care Areas and / or Handling Human Waste AFTER the Precautionary Period When Signage is No Longer Posted

NEW

Cleaning of a patient room and / or handling human waste AFTER the precautionary period

✓
1 Pair

Don Protective Gown if Risk of Spray or Splash

Don Surgical Mask if Risk of Spray or Splash

Don if Risk of Spray or Splash

NEW

Cleaning of a patient room washroom AFTER the precautionary period

✓
1 Pair

Don Protective Gown if Risk of Spray or Splash

Don Surgical Mask if Risk of Spray or Splash

Don if Risk of Spray or Splash

NEW

Retrieving meal trays from patient rooms AFTER the precautionary period

✓
1 Pair

Don Protective Gown if Risk of Spray or Splash

Don Surgical Mask if Risk of Spray or Splash

Don if Risk of Spray or Splash

Handling Soiled Linen in Patient Care Areas AFTER the Precautionary Period When Signage is No Longer Posted

NEW

Handling contaminated linens AFTER the precautionary period

✓
1 Pair







Don Protective Gown if Risk of Spray or Splash







Don Surgical Mask if Risk of Spray or Splash

Don if Risk of Spray or Splash

Chapter 2
POTENTIAL &
REPRODUCTIVE
Hazard
Medication

Pharmacy Services Staff

POTENTIAL HAZARD REPRODUCTIVE Hazard, If Applicable						
Receiving, Unpacking and Stocking of POTENTIAL & REPRODUCTIVE Hazard Medication in Pharmacy						
Receiving and unpacking UNDAMAGED medication parcels	✓ 2 Pairs					
Receiving and unpacking DAMAGED medication parcels <i>Treat as a Hazardous spill</i>	✓ 2 Pairs	✓ DMR Chemo	✓ Chemical Cartridge Respirator	✓ Goggles and Face Shield	✓	✓ 1 Pair
Delivery of POTENTIAL & REPRODUCTIVE Hazard Medication within AHS / COV Facilities from Pharmacy						
Delivery to patient care areas	✓ 1 Pair					

POTENTIAL HAZARD REPRODUCTIVE Hazard, If Applicable						
Handling, Packaging and Preparation of Non-Sterile Preparations: POTENTIAL & REPRODUCTIVE Hazard Medication						
Intact dosage forms (e.g., tablets, capsules, prefilled syringes, etc.)	✓ 1 Pair					
Unit dose packaged (e.g., received from manufacturer)	✓ 1 Pair					
Picking for <ul style="list-style-type: none"> • Wardstock • Patient Daily Run 	✓ 1 Pair					
Packaging using a manual packaging system (e.g., cold seal blisterpack)	✓ 2 Pairs		✓ N95		✓	
The following preparations SHOULD be prepared in a Class II, externally vented Biological Safety Cabinet (BSC) or Compounding Aseptic Containment Isolator (CACI) designated for non-sterile hazardous preparations. Cleanroom BSCs may be used for occasional non-sterile preparation only. Follow site processes for BSCs.						
Cutting, crushing or otherwise manipulating tablets or capsules	✓ 2 Pairs Sterile	✓ DMR Chemo	✓ *Surgical Mask		✓	✓ 2 Pairs
Compounding oral liquids, suppositories, topical preparations (e.g., creams, ointments, lotions),	✓ 2 Pairs Sterile	✓ DMR Chemo	✓ *Surgical Mask		✓	✓ 2 Pairs
Repackaging of oral liquids	✓ 2 Pairs Sterile	✓ DMR Chemo	✓ *Surgical Mask		✓	✓ 2 Pairs







*Surgical Mask: Worn in the cleanroom to protect the sterile compounding environment and the preparation from personnel contamination.

EXCEPTION – If a BSC/CACI is unavailable and the site is required to prepare the medication on a countertop – ensure an area of low traffic and airflow.

Don the Following PPE: 2 Pairs Gloves, DMR Chemo Gown, N95 Respirator, Head Cover, and Goggles if Risk of Splash or Spray.

Follow NAPRA Guidelines for Sterile Compounding and PPE Requirements in the Clean Room.

Follow AHS Donning and Doffing Reference document for Sterile Compounding. A cloth or disposable gown is required to be worn beneath the DMR chemo gown as per AHS sterile compounding requirements.







POTENTIAL HAZARD REPRODUCTIVE Hazard, If Applicable						
Preparation of Compounded Sterile Preparations (CSPs): POTENTIAL & REPRODUCTIVE Hazard Medication						
Non-compounding staff in the clean room	✓ 2 Pairs Sterile	✓ DMR Chemo	✓ *Surgical Mask		✓	✓ 2 Pairs
The following preparations <u>MUST</u> be prepared in a Class II, externally vented Biological Safety Cabinet (BSC) or Compounding Aseptic Containment Isolator (CACI). Use Closed System Transfer Devices (CSTD) as per pharmacy policy and procedure, as required.						
IV, SC, IM, IT, IP, injectable preparations, etc.	✓ 2 Pairs Sterile	✓ DMR Chemo	✓ *Surgical Mask		✓	✓ 2 Pairs
Solutions for irrigation, powders or solutions for inhalation	✓ 2 Pairs Sterile	✓ DMR Chemo	✓ *Surgical Mask		✓	✓ 2 Pairs
Ophthalmic preparations	✓ 2 Pairs Sterile	✓ DMR Chemo	✓ *Surgical Mask		✓	✓ 2 Pairs

IV – Intravenous, SC – Subcutaneous, IM – Intramuscular, IT – Intrathecal, IP – Intraperitoneal

*Surgical Mask: Worn in the cleanroom to protect the sterile compounding environment and the preparation from personnel contamination.

Follow NAPRA Guidelines for Sterile Compounding and PPE Requirements in the Clean Room.







Follow AHS Donning and Doffing Reference document for Sterile Compounding. A cloth or disposable gown is required to be worn beneath the DMR chemo gown as per AHS sterile compounding requirements.

POTENTIAL HAZARD REPRODUCTIVE Hazard, If Applicable							
Spill Management of POTENTIAL & REPRODUCTIVE Hazard Medication in Pharmacy							
When required, obtain Cytotoxic Medication Spill Kit. Perform spill clean-up based on nature, size and location of spill.							
Intact dosage form spill (e.g., tablets) <i>Spill Kit Not Required</i>	✓ 1 Pair						
Spill inside the BSC or CACI (Glass is down)	✓ 2 Pairs Sterile	✓ DMR Chemo	✓ *Surgical Mask	Don Goggles if Risk of Spray or Splash	✓		✓ 2 Pairs
Spill inside the BSC or CACI (Glass is up)	✓ 2 Pairs Sterile	✓ DMR Chemo	✓ Chemical Cartridge Respirator	✓ Goggles and Face Shield	✓		✓ 2 Pairs
Spill outside the BSC or CACI inside the clean room <i>Don PPE from Spill Kit, and obtain fit- tested chemical cartridge respirator</i>	✓ 2 Pairs	✓ DMR Chemo	✓ Chemical Cartridge Respirator	✓ Goggles and Face Shield	✓		✓ 2 Pairs
Spill outside the clean room <i>Don PPE from Spill Kit, and obtain fit- tested chemical cartridge respirator</i>	✓ 2 Pairs	✓ DMR Chemo	✓ Chemical Cartridge Respirator	✓ Goggles and Face Shield	✓		✓ 1 Pair

BSC – Biological Safety Cabinet, CACI – Compounding Aseptic Containment Isolator

*Surgical Mask: Worn in the cleanroom to protect the sterile compounding environment and the preparation from personnel contamination.

Follow NAPRA Guidelines for Sterile Compounding and PPE Requirements in the Clean Room.
 Follow AHS Donning and Doffing Reference document for Sterile Compounding. A cloth or disposable gown is required to be worn beneath the DMR chemo gown as per AHS sterile compounding requirements.







POTENTIAL HAZARD REPRODUCTIVE Hazard, If Applicable						
	Cleaning of Areas Involving POTENTIAL & REPRODUCTIVE Hazard Medication in Pharmacy					
Cleaning of preparation areas (e.g., countertops in dispensary)	✓ 1 Pair		Don N95 if Risk of Inhalation or Aerosol Exposure	Don Goggles if Risk of Spray or Splash		
Clean Room environment	✓ 2 Pairs Sterile	✓ DMR Chemo	✓ *Surgical Mask	Don Goggles if Risk of Splash or Spray	✓	✓ 2 Pairs
Daily clean of BSC or CACI (Glass is down)	✓ 2 Pairs Sterile	✓ DMR Chemo	✓ *Surgical Mask		✓	✓ 2 Pairs
Daily clean of BSC or CACI (Glass is up)	✓ 2 Pairs Sterile	✓ DMR Chemo	✓ Chemical Cartridge Respirator	✓ Goggles and Face Shield	✓	✓ 2 Pairs
Decontamination of BSC or CACI (Glass is up)	✓ 2 Pairs Sterile	✓ DMR Chemo	✓ Chemical Cartridge Respirator	✓ Goggles and Face Shield	✓	✓ 2 Pairs

Handling POTENTIAL & REPRODUCTIVE Hazard Medication Waste Containers						
Handling hazardous medication waste containers (outside of the clean room / general pharmacy areas)	✓ 1 Pair					







BSC – Biological Safety Cabinet, CACI – Compounding Aseptic Containment Isolator
 *Surgical Mask: Worn in the cleanroom to protect the sterile compounding environment and the preparation from personnel contamination.

Follow NAPRA Guidelines for Sterile Compounding and PPE Requirements in the Clean Room.

Follow AHS Donning and Doffing Reference document for Sterile Compounding. A cloth or disposable gown is required to be worn beneath the DMR chemo gown as per AHS sterile compounding requirements.







POTENTIAL HAZARD REPRODUCTIVE Hazard, If Applicable						
Receiving, Storage and Delivery of POTENTIAL & REPRODUCTIVE Hazard Medication in Patient Care Areas						
Receiving and storage in patient care areas	✓ 1 Pair					
Delivery to patient care areas	✓ 1 Pair					







Frontline Clinical Staff

POTENTIAL HAZARD REPRODUCTIVE Hazard, If Applicable							
Preparation and Administration of POTENTIAL & REPRODUCTIVE Hazard Medication in Patient Care Areas							
When preparing the medication in the patient care area, prepare in an isolated area and use a disposable, plastic-backed absorbent pad to avoid contamination of the work surface. Don PPE as indicated.							
	Intact dosage forms (e.g., tablets, capsules)	✓ 1 Pair & Touchless Technique					
NEW	Cutting, crushing or otherwise manipulating tablets or capsules	✓ 2 Pairs & Touchless Technique	✓ Protective Gown	Don N95 if Risk of Inhalation or Aerosol Exposure	Don if Risk of Spray or Splash		
NEW	Oral liquids, suppositories, topical preparations (e.g., creams, ointments, lotions)	✓ 2 Pairs	✓ Protective Gown	Don N95 if Risk of Inhalation or Aerosol Exposure	Don if Risk of Spray or Splash		
NEW	IV, SC, IM, IT, IP, injectable preparations, bladder instillations, etc.	✓ 2 Pairs	✓ Protective Gown	Don N95** if Risk of Inhalation or Aerosol Exposure	Don if Risk of Spray or Splash		
NEW	Solutions for irrigation, powders or solutions for inhalation	✓ 2 Pairs	✓ Protective Gown	Don N95** if Risk of Inhalation or Aerosol Exposure	Don if Risk of Spray or Splash		







IV – Intravenous, SC – Subcutaneous, IM – Intramuscular, IT – Intrathecal, IP – Intraperitoneal

** N95 respirator not required if using closed system transfer during administration.

POTENTIAL HAZARD REPRODUCTIVE Hazard, If Applicable							
Spill Management of POTENTIAL & REPRODUCTIVE Hazard Medication in Patient Care Areas							
When required, obtain Cytotoxic Medication Spill Kit. Perform spill clean-up based on nature, size and location of spill.							
NEW Spillage or breakage in patient care areas <i>Don PPE from Spill Kit</i>	✓ 2 Pairs	✓ Protective Gown	✓ N95	✓	✓	✓	✓ 1 Pair







POTENTIAL HAZARD REPRODUCTIVE Hazard, if Applicable							
Handling Human Waste							
NEW	Handling bodily fluids	✓ 1 Pair	Don Protective Gown if Risk of Spray or Splash	Don Surgical Mask if Risk of Spray or Splash	Don if Risk of Spray or Splash		
NEW	Handling contaminated linens	✓ 1 Pair	Don Protective Gown if Risk of Spray or Splash	Don Surgical Mask if Risk of Spray or Splash	Don if Risk of Spray or Splash		
Handling Patient Specimens							
	Specimen collection and testing (Lab)	Refer to Laboratory Services <u>Hazardous Medication PPE Guideline - Laboratory Services</u> This can be accessed by emailing: AHSLaboratoryWorkplaceSafety@ahs.ca					
NEW	Blood specimen collection (Nursing)	✓ 1 Pair	Don Protective Gown if Risk of Spray or Splash	Don Surgical Mask if Risk of Spray or Splash	Don if Risk of Spray or Splash		
NEW	Other specimen collection (Nursing)	✓ 1 Pair	Don Protective Gown if Risk of Spray or Splash	Don Surgical Mask if Risk of Spray or Splash	Don if Risk of Spray or Splash		
Handling POTENTIAL & REPRODUCTIVE Hazard Medication Waste Containers							
	Handling hazardous medication waste containers	✓ 1 Pair					

Frontline Non-Clinical Staff

POTENTIAL HAZARD REPRODUCTIVE Hazard, If Applicable							
Receiving, Storage and Delivery of POTENTIAL & REPRODUCTIVE Hazard Medication							
Receiving and storage in patient care areas	✓ 1 Pair						
Delivery to patient care areas	✓ 1 Pair						
Spill Management of POTENTIAL & REPRODUCTIVE Hazard Medication							
Spillage or breakage in patient care area	Follow Site Specific CODE BROWN Procedures to Clean Up the Spill						
Handling Human Waste							
In the event of an exposure to potentially hazardous bodily fluids (e.g., patient vomits during portering)	Contact Clinical Staff						
Handling POTENTIAL & REPRODUCTIVE Hazard Medication Waste Containers							
Handling hazardous medication waste containers	✓ 1 Pair						

Nutrition & Food Services Staff and Linen & Environmental Services Staff

Nutrition & Food Services Staff and Linen & Environmental Services Staff

POTENTIAL HAZARD REPRODUCTIVE Hazard, If Applicable							
Spill Management of POTENTIAL & REPRODUCTIVE Hazard Medication							
Spillage or breakage in patient care area	Follow Site Specific CODE BROWN Procedures to Clean Up the Spill						
Cleaning of Areas Involved in POTENTIAL & REPRODUCTIVE Hazard Medication							
Cleaning of the clean room in pharmacy <small>(A cloth or disposable gown is required to be worn beneath the DMR chemo gown as per AHS sterile compounding requirements)</small>	✓ 2 Pairs Sterile	✓ DMR Chemo	✓ *Surgical Mask	Don if Risk of Spray or Splash	✓	✓ 2 Pairs	
Cleaning of preparation & administration areas in patient care areas (e.g., medication rooms)	✓ 1 Pair						
Handling Soiled Linen							
Handling of linens <u>within the linen processing areas</u> of patients receiving hazardous medication	Refer to Linen Services Soiled Linen Handling Protocol. This can be accessed by emailing: NFLES.PolicyResource@ahs.ca						
NEW Handling contaminated linens	✓ 1 Pair	Don Protective Gown if Risk of Spray or Splash	Don Surgical Mask if Risk of Spray or Splash	Don if Risk of Spray or Splash			
Cleaning of Patient Care Areas and Handling Human Waste							
NEW Cleaning of patient care areas and / or handling human waste	✓ 1 Pair	Don Protective Gown if Risk of Spray or Splash	Don Surgical Mask if Risk of Spray or Splash	Don if Risk of Spray or Splash			
Handling POTENTIAL & REPRODUCTIVE Hazard Medication Waste Containers							
Handling hazardous medication waste containers	✓ 1 Pair						

*Surgical Mask: Worn in the cleanroom to protect the sterile compounding environment and the preparation from personnel contamination.

Acronyms and Definitions

AHFS	American Hospital Formulary Service
AHS	Alberta Health Services
ASHP	American Society of Health-System Pharmacists
ASTM	American Society for Testing and Materials
BSC	Biological Safety Cabinet
CACI	Compounding Aseptic Containment Isolator
CSP	Compounded Sterile Preparation
COV	Covenant Health
NIOSH	National Institute for Occupational Safety and Health
ONS	Oncology Nursing Society
PPE	Personal Protective Equipment
WHS	Workplace Health and Safety

Antineoplastic Medication: Refers to medication used in the treatment of cancer (cancer chemotherapy).

Biological Safety Cabinet (BSC): Laminar airflow workbench that is ventilated to protect personnel, hazardous compounded sterile preparations and the immediate environment. The open front of a BSC has the following features:

- Air intake, to protect compounding personnel from hazardous sterile preparations;
- Descending air curtain filtered with a high-efficiency particulate air filter, to protect the hazardous sterile product;
- Air evacuation system equipped with high-efficiency particulate air filters for environmental protection.

Chemotherapy: Medication used in the treatment of disease (cancer) by chemical agents.

Cleaning: Removal of dirt, dust and other substances that may host microorganisms.

Clean Room: A room in which atmospheric properties (temperature, humidity, particle and microorganism content, pressure, airflow, etc.) are controlled. The room's functional parameters are kept at specified levels. The room is designed to minimize the introduction, generation and retention of particles. In the context of compounding hazardous sterile preparations, a clean

room is an ISO Class 7 environment. For non-hazardous compounding, the clean room has positive pressure relative to adjacent areas. For hazardous compounding, the clean room has negative pressure relative to adjacent areas.

Closed-System Drug Transfer Device (CSTD): A leak proof, airtight device that mechanically prevents both the transfer of environmental contaminants into the system and the escape of hazardous drug or vapor outside the system.

Compounding: The act of preparing a pharmaceutical preparation, through preliminary work, to put it into a usable state. The term “compound” also refers to the material that has been prepared (e.g., a chemical or pharmaceutical preparation).

Compounding Aseptic Containment Isolator (CACI): A specific type of compounding aseptic isolator designed for compounding of sterile hazardous drugs to provide staff protection from exposure to undesirable levels of airborne drugs throughout the compounding and material transfer processes and to provide an aseptic environment with unidirectional airflow for compounding sterile preparations.

Compounded Sterile Preparations (CSPs): The mixing of one or more sterile products using aseptic technique.

Cytotoxic: Refers to the property of a substance or drug which has a toxic effect on a living cell and/or which interferes with or prevents cell function. This term is used to describe pharmaceuticals used for the treatment of cancer and, in some cases, for the treatment of other conditions (e.g., psoriasis, arthritis).

Exposure: Refers to the exposure to hazardous medication which can occur through various routes, including dermal absorption, absorption through mucous membranes, inadvertent ingestion, inhalation, or injection.

Hazard / Hazardous: Is any source of potential damage, harm or adverse health effects on something or someone under certain conditions at work.

Hazardous Medication: A medication for which research on humans or animals has shown that any exposure to the substance has the potential to cause cancer, lead to a developmental or reproductive toxic effect or damage organs. Such medication are considered hazardous because their effects present risks for personnel.

Hazardous Waste: Waste from the handling of hazardous medication that pose an occupational risk to staff or the environment and for which special disposal or neutralization procedures must be followed. (e.g., medication waste, used PPE, packaging material, needles, syringes, vials, administration sets).

Hazardous Waste Container: Refers to a rigid, closeable, puncture-resistant disposable container or cardboard box lined with a yellow plastic bag displaying the “biohazard waste symbol” and is labeled “bio-hazardous” waste and “cytotoxic” waste.

Health Care Provider – means any person who provides goods or services to a patient, inclusive of health care professionals, staff, students, volunteers, and other persons acting on behalf of or in conjunction with Alberta Health Services.

Intact Dosage Form: Unaltered medication in the form of tablet, capsules, commercially available syringes, and premade suspensions.

Known Hazard: Presents a serious risk to the health, or welfare of a healthcare staff member during occupational exposure.

Manipulation: For the purpose of this resource, the act of using the hands to render the medication in a final form that differs from how originally provided, but requires safe handling procedures. (e.g., withdrawing medication from an ampoule, reconstitution, crushing a tablet, opening a capsule, etc.)

National Institute of Occupational Safety and Health (NIOSH): The National Institute for Occupational Safety and Health (NIOSH) is the U.S. federal agency responsible for conducting research and making recommendations for the prevention of work-related injury and illness. NIOSH is part of the Centers for Disease Control and Prevention (CDC) in the U.S. Department of Health and Human Services.

Non-Antineoplastic Medication: Refers to medication not used in the active treatment of cancer, but require safe handling procedures.

Personal Protective Equipment (PPE): All garb and accessories, such as masks, respirators, gloves, gown and safety goggles that protect both the sterile preparation and the personnel. It enables compliance with the expected specifications of a controlled environment and protects personnel from exposure to physical or chemical hazards

Potential Hazard: Having or showing the capacity to become or develop into something in the future.

Risk: The chance, high or low, that a hazard will actually cause someone harm; the probability of suffering harm.

Reproductive Hazard: These are medication that may pose a risk only for certain groups, that is men and women, who are actively trying to conceive, and women who are pregnant or breastfeeding.

Touchless Technique: Medication should be transferred from unit dose packaging or bottle directly into a medication cup and given to the patient. Do not touch the tablets/capsules with bare or gloved hands. Do not place tablets/capsules directly into patients' hands.

Unidirectional Airflow: Airflow moving in a single direction in a robust and uniform manner and at sufficient speed to reproducibly sweep particles away from the critical site.

Hazardous Medication List – Key Points



Indicates the medication is a **CYTOTOXIC** agent.

***** Indicates **Reproductive Hazard Medications** applicable to a subset of the reproductive population.

- Some REPRODUCTIVE Hazard medications have been identified to have specific parameters and may only be applicable to a subset of the reproductive population (these medication may pose a risk only for certain individuals, that is men and women, with a potential to conceive, and women who are pregnant or breastfeeding).
- Refer to Appendix E for more detailed medication-specific information.





















The following products are NOT listed on the Hazardous Medication List, but may require special handling precautions:











- Salts, PEGylated and liposomal medication - only the *parent compound* is listed (e.g. doxorubicin)
- Combination products containing a hazardous medication (e.g. spironolactone-hydrochlorothiazide)
- Investigational / Clinical Trial medication as toxicological data is often incomplete or unavailable
- Chemicals and / or raw powders; follow the Safety Data Sheet (SDS) for safe handling precautions
- Radiopharmaceuticals; Nuclear Medicine has policies and procedures for the handling of these products

The Hazardous Medication List will be reviewed and updated on a periodic basis as new medication or information becomes available.
























Refer to Insite for the most current version.

Appendix A: Hazardous Medication List

A						
abacavir	Potential		alitretinoin	Reproductive	apomorphine	Potential
abatacept	Potential		altretamine	Known 	arsenic trioxide	Known 
abiraterone	Known		ambrisentan	Reproductive	axitinib	Known
acitretin	Reproductive		amsacrine	Known 	azaCITIDine	Known 
afatinib	Known		anagrelide	Known	azaTHIOprine	Known 
alefacept	Potential		anastrozole	Known		
B						
BCG	Known		bicalutamide	Known	bosutinib	Known
belinostat	Known		bleomycin	Known 	brentuximab vedotin	Known 
bendamustine	Known		bortezomib	Known 	buserelin	Known
bexarotene	Known		bosentan	Reproductive	busulfan	Known 
C						
cabazitaxel	Known		chlorambucil	Known 	cloNAZEPam	Reproductive
cabergoline	Reproductive		chloramphenicol	Potential	colchicine	Reproductive
cabozantinib	Known		choriogonadotropin alpha	Reproductive	crizotinib	Known
capecitabine	Known		cidofovir	Potential	cyclophosphamide	Known 
carBAMazepine	Potential		CISPlatin	Known 	cycloSPORINE	Potential
CARBOplatin	Known		cladribine	Known 	cyproterone	Potential
carfilzomib	Known		clofarabine	Known 	cytarabine	Known 
carmustine	Known		clomiPHENE	Reproductive		
cetorelix acetate	Reproductive					
D						
dabrafenib	Known		deferiprone	Potential	DOXOrubicin	Known 
dacarbazine	Known		degarelix	Known	dronedarone	Reproductive
dactinomycin	Known		dexrazoxane	Known 	dutasteride	Reproductive
danazol	Reproductive		diethylstilbesterol	Potential		
dasatinib	Known		dinoprostone	Reproductive		
DAUNOrubicin	Known		divalproex sodium	Potential		
decitabine	Known		DOCEtaxel	Known 		
E						
entecavir	Potential		erlotinib	Known	estrogen / progesterone combinations	Potential
enzalutamide	Known		eslicarbazepine	Reproductive		
epirubicin	Known		estradiol	Potential		
ergonovine (ergometrine) / methylergonovine	Reproductive		estramustine	Known 	estropipate	Potential
			estrogen - esterfied	Potential	etoposide	Known 
eribulin	Known		estrogen - conjugated	Potential	everolimus	Known 
					exemestane	Known

F						
finasteride	Reproductive	fludarabine	Known		fosphenytoin	Potential
fingolimod	Potential	fluorouracil (5FU)	Known		fulvestrant	Known
floxuridine	Known	fluoxymesterone	Potential			
fluCONazole	Reproductive	flutamide	Known			
G						
ganciclovir	Potential	gemcitabine	Known		gonadotropin, chorionic	Reproductive
ganirelix acetate	Reproductive	gemtuzumab	Known		goserelin	Known
gefitinib	Known	ozogamicin				
H						
histrelin	Known	hydroxyurea	Known			
I						
ibrutinib	Known	ifosfamide	Known		ISOtretinoin	Reproductive
icatibant	Reproductive	imatinib	Known		ixabepilone	Known
IDArubicin	Known	irinotecan	Known		ixazomib	Known
J / K						
L						
lapatinib	Known	leuprolide	Known		lomitapide	Reproductive
leflunomide	Potential	liraglutide recombinant	Potential		lomustine	Known
lenalidomide	Potential					
letrozole	Known					
M						
macitentan	Reproductive	methimazole	Potential		mitomycin	Known
medroxyPROGES-TERone	Potential	methotrexate	Known		mitotane	Known
		methylTESTOS-TERone	Reproductive		mitoXANTRONE	Known
megestrol	Known	mifepristone	Reproductive		mycophenolate mofetil	Potential
melphalan	Known	mipomersen	Potential		mycophenolic acid	Potential
menotropins	Reproductive	misoprostol	Reproductive			
mercaptopurine	Known					
N						
nafarelin	Reproductive	nevirapine	Potential		nilutamide	Known
nelarabine	Known	nilotinib	Known			
O						
omacetaxin	Known	oxaliplatin	Known		OXcarbazepine	Potential
ospemifene	Potential	oxandrolone	Reproductive		oxytocin	Reproductive *

* **Reproductive Hazard Medication** applicable to a subset of the reproductive population. Refer to Appendix E for more information.

P					
PACLitaxel	Known		pemetrexed	Known	
PACLitaxel-(nab)	Known		pentamidine	Reproductive	
palifermin	Potential		pentetate calcium	Reproductive	
paliperidone	Potential		pentostatin	Known	
pamidronate	Reproductive		pertuzumab	Known	
panobinostat	Known		phenoxybenzamine	Potential	
PARoxetine	Reproductive		phenytoIN	Potential	
pasireotide	Reproductive		piritrexim isethionate	Known	
pazopanib	Known				
peginesatide	Reproductive		pipobroman	Known	
Q					
R					
raloxifene	Potential		regorafenib	Known	
raltitrexed	Known		ribavirin	Reproductive	
rasagiline	Potential		riociguat	Reproductive	
risperidone	Potential		ruxolitinib	Known	
S					
sirolimus	Potential		spironolactone	Potential	
SORafenib	Known		streptozocin	Known	
SUNtinib	Known		testosterone	Reproductive	
T					
tacrolimus	Potential		thioguanine	Known	
tamoxifen	Known		thiotepa	Known	
telavancin	Reproductive		tofacitinib	Potential	
temazepam	Reproductive		topiramate	Reproductive	
temozolomide	Known		topotecan	Known	
temsirolimus	Known		trifluridine / tipiracil (combination only)	Known	
teniposide	Known		triptorelin	Known	
U					
ulipristal	Reproductive		uracil mustard	Known	
V					
valGANciclovir	Potential		vemurafenib	Known	
valproate / valproic acid	Reproductive		vigabatrin	Reproductive	
			vinBLASine	Known	
valrubicin	Known		vinCRISine	Known	
vandetanib	Known		vinorelbine	Known	
vismodegib	Known		voriconazole	Reproductive	
vorinostat	Known		vortioxetine	Known	
W X Y					
warfarin	Reproductive				
Z					
zidovudine	Potential		ziv-aflibercept	Known	
ziprasidone	Reproductive		zoledronic acid	Reproductive	

Appendix B: Special Handling Considerations for Specified Hazardous Medication

◆ **BCG vaccine (bacillus calmette Guerin)**

BCG, although classified as a vaccine, is used in the treatment of certain cancers. BCG should be prepared with aseptic techniques. To avoid cross-contamination, parenteral drugs should not be prepared in areas where BCG has been prepared. A separate area for the preparation of BCG suspension is recommended. All equipment, supplies, and receptacles in contact with BCG should be handled and disposed of as biohazardous. If preparation cannot be performed in a containment device, then respiratory protection, gloves, and a gown should be worn to avoid inhalation or contact with BCG organisms. Follow special handling guidelines.

◇ **Pentamidine**

For inhalation (administered by respiratory therapist). Follow special handling guidelines.

Monoclonal Antibodies (mAbs)

While many monoclonal antibodies are classified by American Hospital Formulary Service (AHFS) as 10:00 antineoplastic medication, they are not typically classified as hazardous medication by NIOSH. These medications should be handled using aseptic technique.

Monoclonal antibodies included on the Hazardous Medication List require handling precautions as per the PPE Guide.

Appendix C: Precautionary Period for KNOWN Hazard Medication

KNOWN Hazard Medications Requiring PPE for Longer than 48 Hours*

Hazardous Medication	Detected in Urine	Detected in Stool or Bile
brentuximab vedotin	24% excretion for up to 7 days	72% excretion up to 7 days
carmustine	60% excretion for at least 4 days	--
CISplatin	At least 5 days	--
cyclophosphamide	Detected in urine up to 5 days	--
DOCEtaxel	9% excretion for up to 7 days	Less than 8% excretion for up to 7 days
DOXOrubicin	5% - 12 % excretion for up to 5 days	40% biliary excretion for up to 7 days
eribulin mesylate	7% excretion (greater than 40 hours)	72% excretion (greater than 40 hours)
etoposide	25% excretion for least 5 days	44% excretion for at least 5 days
gemcitabine	10% excretion for at least 7 days	--
imatinib mesylate	5% **excretion for up to 7 days	20%* excretion for up to 7 days
ixabepilone	5.6% excretion for up to 7 days	16% excretion for up to 7 days
mitoXANTRONE	7% excretion for up to 5 days	Up to 5 days
temsirolimus	4.6% excretion for up to 14 days	76% excretion for up to 14 days
teniposide	40%** excretion for up to 5 days	--
vinCRISatine	10% - 37% excretion for up to 3 days	80% excretion for up to 3 days
vinCRISatine liposomal	8% excretion for up to 4 days	--
vinorelbine	8% excretion for at least 3 days	50% biliary excretion for at least 3 days

*All KNOWN hazard medications on the AHS Hazardous Medication List require 48 hours handling precautions except those listed above. For further questions contact AHS Drug Information.

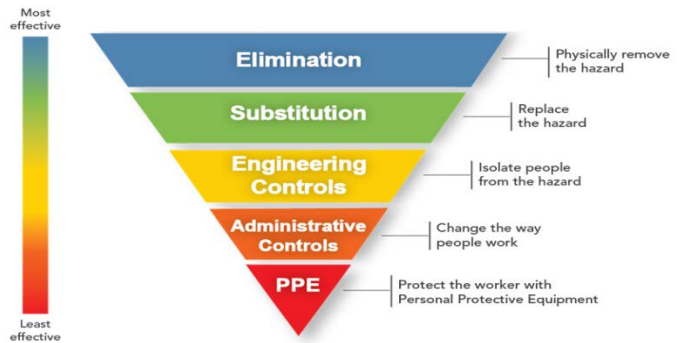
**All percentages are for active/unchanged drug unless denoted by an asterisk.

Note: Based on information from the American Society of Health-System Pharmacists, 2009; Bdikian et al, 2006; "Cyclophosphamide," 2015; Hospira Inc., 2013; Wolters Kluwer, 2015.

Source: Oncology Nursing Society – Safe Handling of Hazardous Drugs, 3rd Edition, 2017, p. 48.

Appendix D: Hierarchy of Control

Hierarchy of Hazard Control is a system used in industries to minimize or eliminate exposure to hazards. It is also required by the Alberta Occupational Health & Safety Code. It refers to workplace procedures adopted to minimize injury, reduce adverse health effects and control damage to the plant or equipment.



Level 1 = Elimination, Substitution, Replacement

Change the product to another product which is non-toxic or less toxic.

- Rarely possible when treating cancer patients.
- This level could become very important as more targeted therapies become available.

Level 2 = Isolation of the Hazard / Source Containment

Contain the toxic product in its container or at source.

- By containing the product at its source, the contamination of persons or material is prevented.
(If level 1 and 2 are impossible or insufficient, then the next level is applied).

Level 3 = Engineering Controls / Ventilation

Apply local and general ventilation or extraction in order to dilute the toxic product.

- Any form of dilution will reduce the concentration of the contamination.
- Any form of extraction will reduce the amount of contamination.
- Biological safety cabinets and isolators should be considered as Level 3 measures. These ventilation tools offer additional protection features; for biological safety cabinets this would include such things as controlled airflow, protection shields, and HEPA filters.

Level 3B = Administrative Controls / Organizational Measures

- Organize the work in such a way that the duration of exposure is reduced.
- Organize the work in such a way that the number of employees exposed is reduced.

Level 4 = Personal Protective Equipment (PPE)

Individual protection by using personal tools.

- Gloves, masks, respirators, gowns, goggles or face shields, and other equipment create a temporary barrier between the contamination and the operator.
- It is important to use “proven” resistant material; tested for these specific products and conditions.

International Society of Oncology Pharmacy Practitioners Standards Committee. ISOPP standards of practice. Safe handling of cytotoxics. J Oncol Pharm Pract. 2007; 13 (suppl):1-81.

Appendix E: Reproductive Population Subset

(Reproductive Hazard medications applicable to a subset of the Reproductive population are indicated with an asterisk (*) in the hazardous medication list.)

Reproductive Hazard Medication	Background	Mechanism of Action	Reference Material(s)	PPE Recommendations
oxytocin	<p>Oxytocin has been identified as a hazardous medication by NIOSH. It is considered a Group 2 Non-Antineoplastic medication that primarily has adverse reproductive effects. PPE requirements are only applicable to a subset of the reproductive population.</p>	<p>Oxytocin stimulates uterine contraction by activating G-protein-coupled receptors that trigger increases in intracellular calcium levels in uterine myofibrils. Oxytocin also increases local prostaglandin production, further stimulating uterine contraction.</p> <p>Oxytocin has specific receptors in the muscle lining of the uterus and the receptor concentration increases greatly during pregnancy, reaching a maximum in early labor at term.</p>	<p>NIOSH (2016) Hazardous only for women in 3rd trimester; FDA Pregnancy Category C</p> <p>Safety Data Sheet (Hospira) – Women working with oxytocin, and who are in the second or third trimester of pregnancy, should be informed of the potential of oxytocin to induce uterine contractions and labor.</p>	<p>Oxytocin is considered a Reproductive Risk Medication. Per the references, the reproductive risk is identified to be in pregnant women in the 2 or 3rd trimester.</p> <p>It is recommended that the Hazardous Medication PPE described in the Guide be worn by this select group. Other individuals in the Reproductive population (as described in the guide) may also choose to wear the PPE when handling oxytocin if they want to.</p>

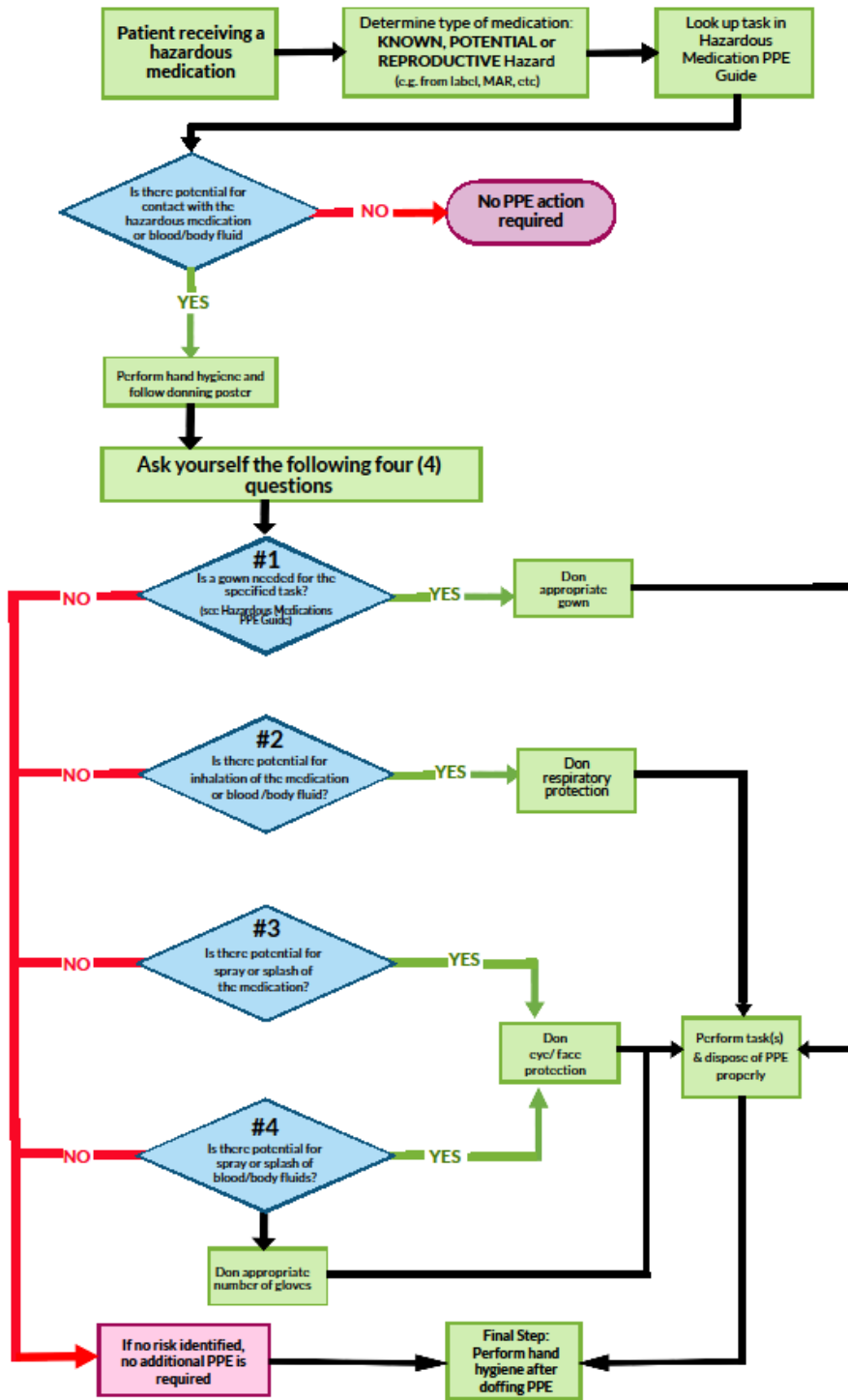
If you require more detailed information, please contact hazardousmedication@ahs.ca

This document is subject to change

Appendix F:

Hazardous Medications Handling Risk Assessment Algorithm

Note: This algorithm should be used along with the Hazardous Medication PPE Guide.



Resources and References

Information in this document has been adapted from the following:

National Institute of Occupational Safety and Health (NIOSH) List of Antineoplastic and other Hazardous Drugs in Healthcare Settings, 2016 DHHS (NIOSH) Publication No. 2016-161 (Supersedes 2014-138).

National Institute of Occupational Safety and Health (NIOSH) List of Antineoplastic and other Hazardous Drugs in Healthcare Settings, 2016 DHHS (NIOSH) Publication No. 2014-138161 (Supersedes 2012-150).

National Institute of Occupational Safety and Health, NIOSH Alert – Preventing Occupational Exposures to Antineoplastic and Other Hazardous Drugs in Health Care Settings, DHHS/CDC (NIOSH) Publication No. 2004-165, September 2004.

National Association for Pharmacy Regulatory Authorities (NAPRA) Model Standards for Pharmacy Compounding of Hazardous Sterile Preparations, 2016.

United States Pharmacopeia, USP<800> Hazardous Drugs - Handling in Healthcare Settings.

CCOHS, Canadian Centre for Occupational Health and Safety. www.ccohs.ca.

International Society of Oncology Pharmacy Practitioners Standards Committee. ISOPP standards of practice. Safe handling of Cytotoxics. J Oncol Pharm Pract. 2007; 13 (suppl):1-81.

ASSTSAS, Prevention Guide – Safe Handling of Hazardous Drugs, ASSTSAS, 2008.

University Health Consortium (UHC) Consensus Statement: Model Hazardous Drug Safety Plan for Institutions, October 2009.

OSHA, Controlling Occupational Exposure to Hazardous Drugs. OSHA Technical Manual. Section VI, Chapter 2, www.osha.gov.

AHS Cancer Services, Pharmacy Services, Cytotoxic and Hazardous Products, June 2010.

AHS / COV Health Cytotoxic Drug Manual, Administration and Handling Guidelines, 3.3 Version (Feb 2017).

Government of Alberta, Handbook of Occupational Hazards and Controls for Pharmacy Workers, 2011 <https://work.alberta.ca/documents/OHS-WSA-handbook-pharmacy-workers.pdf>

Oncology Nursing Society, Safe Handling of Hazardous Drugs, 2nd Edition, 2011

Worksafe BC <https://www.worksafefbc.com/en>

Developed by: AHS Hazardous Medication Evaluation Committee (HazMEC) and the AHS Hazardous Medication Evaluation Panel, AHS Pharmacy Services Medication Quality and Safety Team (MQST), AHS Health Professions, Strategy and Practice (HPSP), AHS Pharmacy Services Technical Practice Leads, AHS Human Factors, AHS Workplace Health and Safety (WHS), and COV Medication Management & Safety Team.

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Please direct questions related to safe handling of hazardous medications to the [WHS Services Team](#) in your Zone or send your questions to hazardousmedication@albertahealthservices.ca

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