



PROVINCIAL GUIDELINES FOR THE
SAFE HANDLING, ADMINISTRATION AND
DISPOSAL OF ANTINEOPLASTIC AGENTS

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1. INTRODUCTION

There have been increasing numbers of reports in the literature describing the possible effects of antineoplastic drugs on health care professionals (Fuchs et al., 1997; Grummt et al., 1993; Selevan et al., 1985; Valanis et al., 1997). It has therefore become imperative that staff are knowledgeable regarding the safe handling of antineoplastic drugs. The risk to health care professionals from handling a hazardous drug stems from its inherent toxicity and the extent to which workers are exposed to the drug. The primary routes of exposure are through direct skin contact and through inhalation of aerosolized drug products. Other potential exposure occurs during the disposal of the drugs, disposal of the items used in drug preparation and administration, and when caring for patients who have received these drugs.

Although the absolute risk cannot be eliminated, much can be done to reduce the relative risks associated with the handling of antineoplastic agents (Mayer, 1992). Health care professionals who handle antineoplastics are advised to be well informed of the potential health hazards, be familiar with safe handling and disposal of these agents, utilize appropriate protective equipment and adhere to available written policies, procedures and guidelines.

This evidence based document is intended to facilitate the standardization of institutional practice guidelines for the safe handling of antineoplastic agents across the Province of Ontario. Following these guidelines will assist in minimizing unnecessary exposure and maximizing safety.

2. RECEIVING OF ANTINEOPLASTIC AGENTS

Handling procedures need to begin with safely receiving these products into the hospital.

- Institutional policies for accidental exposures must be in place. Please refer to the Occupational Safety and Health Administration (OSHA) and the American Society of Hospital Pharmacists (ASHP) guidelines.
- As there is a risk of broken vials, individuals receiving packaged cytotoxic agents should be protected to the same degree recommended for those preparing and administering antineoplastics.
- Chemotherapy spill kits should be available in the Institutional Receiving Department.

- In the event of a spill or untoward exposure, notify appropriate authorities, e.g. Occupational Health & Safety, Environmental Services, as per institutional policies.

3. EDUCATION

It is recommended that all pharmacies to follow the OSHA guidelines when preparing and dispensing of antineoplastics. All Cytotoxic drugs and containers should have appropriate label (See Appendix 1) to alert handler of special precautions needed for handling.

3.1 Education of Health Care Professionals for the Administration of Chemotherapy

- All pediatric oncology nursing orientation programs should include a review of hospital policy, procedures and guidelines for administering oral chemotherapy, for monitoring chemotherapy infusions and for caring for patients receiving chemotherapy and the risk of occupational exposure.
- Parenteral antineoplastics should only be administered by health care professionals who have been specially trained in parenteral chemotherapy administration.
- Standardized courses and curricula for chemotherapy administration should be developed at each institution.

4. PREPARATION FOR THE ADMINISTRATION OF ANTINEOPLASTICS

4.1 Protective Clothing Recommendations

For all protective clothing and equipment (gowns, gloves, goggles), the manufacturer must provide documented evidence of the impermeability to antineoplastic agents. Research has shown that gowns made of high-density polyethylene provide the most protective barrier against spillage or aerosolization of cytotoxic drugs (ONS, 1997, pg.6).

Gowns must be:

- worn wherever antineoplastic agents are being manipulated and administered.
- disposable, impermeable, lint-free, with back closure and long cuffed sleeves, which should be tucked into the gloves.
- changed in the event of an obvious spill (time to permeability of a vesicant is one hour).
- single use (ONS, 2003) or according to the manufacturer's recommendations.

Gloves

- Use gloves that have been tested to protect against permeations by antineoplastic agents.
- Hand washing should occur before donning gloves and after removing gloves.
- The minimum acceptable standard is powder-free surgical latex gloves (0.007 inches). Some newer products may be thicker and provide more protection.
- In the event of latex sensitivity, equivalent surgical nitrile gloves should be used.
- Gloves should be changed after each administration, OR if contamination or puncture occurs, OR every 30 minutes.
- Use double gloving for all activities involving hazardous drugs. Make sure that the outer glove extends over the cuff of the gown.

Masks

- Must be worn throughout the process of antineoplastic drug manipulation and administration.
- Surgical masks are not acceptable.
- Masks that are designated to protect against aerosolized particles by the manufacturer should be used.
- The literature is unclear as to how long each mask offers protection. Masks should be changed with obvious contamination.

Eye and Face Protection

- Plastic Face Shields must be worn wherever antineoplastic agents are being manipulated and administered.
- It is recommended that contact lenses should not be worn because of risk of absorption.
- Safety glasses or regular eye glasses are not adequate.
- Eye protectors should be cleaned after each use according to manufacturer's recommendations.
- In the event of contamination, appropriate spill procedures must be followed (OSHA guideline).

4.2 Drug Preparation Area for Nursing Personnel

A dedicated area with restricted access and that is free of food and drink is required. Chewing of gum in this area should not be allowed.

- This designated area should not be heavily trafficked.
- Signs that restrict access to authorized personnel only should be displayed.
- Appropriate warning labels must be placed on all antineoplastic drug storage areas (OSHA guideline) (See Appendix 1 - Sample Warning Label).

- A sink, an eyewash station and a spill kit should be available in this space. A less desirable alternative is the availability of large volumes of saline solution for eye washing purposes.
- A plastic-backed absorbent pad should be used under tubing, syringe or sites of potential leak.
- Leak-proof and puncture-proof biohazard containers should be present. All needles, syringes and other disposable items should be disposed of in these.

4.3 Preparation for the Administration of Oral Antineoplastics¹

Examples: Mercaptopurine, Thioguanine.

It is recommended that all health care professionals administering oral antineoplastics adhere to the protective clothing guidelines as outlined above (Section 4.1).

Handling Precautions

- a) Transfer chemotherapy tablets/powder into empty syringe barrel without touching them (wear gloves).
- b) Open capsules in a biohazard hood.
- c) It is preferable to dissolve tablets in water instead of crushing them (see below).
- d) Prepare each dose on an absorbent pad on an uncluttered surface. Discard materials that have been in contact with the tablets/capsules (medicine cups, oral syringes, absorbent pad, etc) as hazardous waste.
- e) Wash your hands after preparing medication.

Tablets

For children who cannot swallow tablets, methotrexate, mercaptopurine and thioguanine can be dissolved in water according to the following procedure:

Manipulate the required number of tablets into a liquid formulation immediately prior to dose time as follows:

- a) Remove the plunger of a 10 mL oral syringe.
- b) Place the required number of tablets into the barrel of the oral syringe.
- c) Replace the plunger and draw up 5-7.5 mL of tap water (not hot water) into syringe.
- d) Cap oral syringe with blue syringe tip
- e) Wait 5 minutes to allow the tablets to disintegrate (shake syringe occasionally)

¹ Updated based on current best practice standards by Andrea Mattiussi RPh, BSP, The Hospital for Sick Children. Based on HSC Guidelines.

- f) Give the dose in usual manner.
- g) Draw up another 5 mL of tap water into oral syringe. Cap syringe and shake well to dislodge any remaining particles. Give dose in usual manner.
- h) Rinse the dissolve and dose device after each use.

Capsules

For children who cannot swallow capsules or where the dose is less than one capsule, the contents of the capsule can be emptied into a Dissolve and Dose (TM) container and made into a solution using the following procedure. This should be performed in a biohazard hood if possible.

Examples include procarbazine, temozolomide, hydroxyurea.

- a) Knock the powder down into one end of the capsule.
- b) Take the top off the capsule and empty the contents into the Dissolve and Dose device.
- c) Add 10 mL of tap water (not hot).
- d) Cap the device, shake well and allow to sit for 2 minutes.
- e) Measure the appropriate dose using an oral syringe.

For children who cannot swallow capsules where the dose is one or more capsules the contents of the capsule may be removed and mixed with food or liquid immediately prior to dose time as follows. This should be performed in a biohazard hood if possible. Examples include lomustine, temozolomide, hydroxyurea, procarbazine.

- a) Put the food or liquid you will mix the drug with in a small medication cup.
- b) Knock the powder down into one end of the capsule.
- c) Take the top off the capsule and empty the contents into the medication cup.
- d) Mix the powder and the food/liquid that is in the cup.
- e) Draw liquid mixed with drug into a syringe.

5. ADMINISTRATION AND DISPOSAL OF ANTINEOPLASTIC AGENTS

There should be no open food in patient room when the IV system is opened for the purpose of administering antineoplastic agents, as there is a potential for the food to be contaminated.

- Personal protective equipment, as outlined above, should be used.
- Plastic-backed absorbent pads should be placed under tubing and syringes.
- Only syringes and tubing with Luer-Lok connections should be used.
- Infusion bags should be changed at waist level (Brown et. al, 2001).

5.1 Disposal of Equipment /Personal Protective Equipment used to Administer Antineoplastic Agents

- All syringes and needles should be discarded in containers that are puncture-resistant, leak-proof, have a lid that seals securely, and appropriately labeled.
- Bags and solution administration sets should be discarded intact in appropriately labeled resealable containers that are both leak-proof and puncture-proof.
- Personal protective equipment used during handling and administration should be disposed of in appropriately labeled container.

6. THE NURSING CARE AND MANAGEMENT OF PATIENTS WHO HAVE RECEIVED ANTINEOPLASTIC AGENTS

Potential duration of excretion of antineoplastic agents and their metabolites are not well defined. While there is some data derived from the adult population, the extent to which this is applicable to children is unclear. Therefore, there is a real potential risk to health care professionals and parents who are caring for children following the administration of antineoplastic agents. Careful attention should be paid to the Guidelines for the Safe Handling of Patient Excreta (see Appendix 1 – Safe Handling of Patient Excreta).

6.1 Personal Protective Equipment

Personal protective equipment, as defined above, must be worn when handling any patient blood or body fluids.

- Plastic Face Shields should be worn when there is a risk of splash, e.g., flushing toilet, changing diapers, frequent or unpredictable vomiting.
- Parents must be gloved when handling excreta and diapers up to 7 days post treatment.
- Gloves should be discarded after each patient use, and when soiled or contaminated with body fluids, in appropriately labeled containers.
- Gloves and gowns should not be worn outside of the drug administration area.

6.2 Flushing of Toilets

- All toilets should be flushed twice, as recommended in the literature but not evidence based (Brown et. al, 2001, p.70).
- The toilet bowl (seat up) should be covered with a plastic-lined, absorbent pad (absorbent side facing down) prior to flushing. These pads should be disposed of in biohazard containers after each use.

6.3 Disposal of Diapers

- Diapers should be disposed of in a biohazard container for 7 days after antineoplastic administration.

6.4 Disposal of Contaminated Linen

- Contaminated, non-disposable, linen should be handled with gloves and gowns and should be dealt with in a manner consistent with institutional policies regarding handling and disposal of infectious linens.
- Parents should not clean up contaminated linens or clothing. This should be done by gowned and gloved health care personnel.

6.5 Patients Who go to Other Areas of the Hospital

- Personnel in other areas of the Hospital (e.g., Diagnostic Imaging, Echocardiography) should observe these safe handling guidelines when handling patients who have received antineoplastic agents.
- These guidelines should be disseminated to all hospital personnel who may care for oncology patients in other areas.

7. DISPOSAL OF BIOHAZARDOUS CONTAMINATED MATERIALS

As per OSHA guidelines - Section IX, all areas where antineoplastic drugs are handled should have specific disposable containers close at hand for easy and safe disposal.

- Needles and syringes should be disposed intact.
- Sharps and breakable items e.g. vials, ampules should be disposed of in leak proof, puncture resistant containers with labels indicating antineoplastic (cytotoxic) waste.
- Non-sharp antineoplastic drug waste, e.g. plastic IV bags and tubing, personal protection equipment, should be sealed in leak proof, puncture resistant containers with appropriate labels.
- These containers should be of a different colour from regular disposal or hazardous waste containers.

8. ACCIDENTAL CONTAMINATION AND CHEMOTHERAPY SPILLS

Every institution should have policy and procedures in place for the management of accidental contamination and chemotherapy spills. All health care professionals who handle antineoplastic agents should be oriented and familiar with these policy and procedures.

Appendix 1:**SAMPLE WARNING LABEL**

Appendix 2: GUIDELINES FOR THE SAFE HANDLING OF PATIENT EXCRETA

| Antineoplastic Agents and Times for Protective Handling of Patient Excreta | | |
|--|---|------------------------|
| Antineoplastic Agent | Recommended Duration for Protective Precautions | |
| | Urine | Feces |
| Asparaginase * | | |
| Bleomycin sulfate | 72 hours | |
| Busulfan | 12 - 24 hours | |
| Carboplatin | 24 - 48 hours | |
| Carmustine * (BCNU) | | |
| Chlorambucil | 48 hours | |
| Cisplatin | 7 days | |
| Cyclophosphamide | 72 hours | 5 days after oral dose |
| Cytarabine | 24 hours | |
| Dacarbazine * (DTIC) | | |
| Dactinomycin | 5 days | 7 days |
| Daunorubicin | 48 hours | 7 days |
| Doxorubicin | 6 days | 7 days |
| Epirubicin | 7 days | 5 days |
| Etoposide | 4 days | 7 days |
| Fluorouracil | 48 hours | |
| Ifosphamide | 48 hours | |
| Mechlorethamine | 48 hours | |
| Melphalan | 48 hours | 7 days |
| Mercaptopurine (6MP) | 48 - 72 hours | |
| Methotrexate | 72 hours | 7 days |
| Mitomycin | 24 hours | |
| Mitoxantrone | 6 days | 7 days |
| Procarbazine * | | |
| Thioguanine (6TG) | 24 hours | |
| Thiotepa | 72 hours | |
| Vinblastine | 4 days | 7 days |
| Vincristine | 4 days | 7 days |
| References: | | |
| <ul style="list-style-type: none"> • Cass, Y & Musgrave, C.F. Guidelines for the safe handling of excreta contaminated by cytotoxic agents. American Journal of Hospital Pharmacists, Vol 49, August 1992, p.1957 - 1958. • Gullo, S.M. Safe Handling of cytotoxic agents, Oncology Nursing Forum, Vol 22, No 3, 1995, p. 523. | | |

* Contact the oncology pharmacist (or the pharmacy department) in the event that there is no published data regarding the protective handling of patient excreta post antineoplastic administration.

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