CYTOTOXIC AND HAZARDOUS DRUGS: ADMINISTRATION & HANDLING - SCH

PROCEDURE ©

DOCUMENT SUMMARY/KEY POINTS

- Cytotoxic drug solutions are to be prepared, administered and disposed of in accordance with NSW WorkCover guide, "**Cytotoxic Drugs and Related Waste Risk Management Guide 2008**", the *minimum standard for clinical practice*.
- All cytotoxic drugs [whether administered by the oral (PO), intramuscular (IM), subcutaneous (Subcut) or intravenous (IV) route and intrathecal] should be:
  - handled with extreme care,
  - administered by an **accredited** Registered Nurse (RN) or medical officer (MO).
- Checking Cytotoxic drugs:
  - Cytotoxic drugs covered by Full Cytotoxic Accreditation must be checked by 2 accredited RNs or one accredited RN and one accredited Medical Officer (MO). The accredited RN/ MO *and* the 2nd checker must be present at the commencement of drug administration to complete the Chemotherapy Time Out Sheet.
  - Cytotoxic drugs covered by Partial Cytotoxic Accreditation must be checked by one accredited RN and another RN within their scope of practice. The accredited RN *and* the 2nd checker must present at the commencement of drug administration. The drug must be administered to the patient by the accredited RN.
  - Intrathecal drugs must be checked by an accredited RN and the MO administering the medication.
- Vinca alkaloids should always be administered via a mini bag, not a syringe, except if patient weighs 5kg or less, where an individual assessment is determined by the consultant and pharmacist.
- Strict guidelines apply for Personal Protective Equipment (PPE) which must be worn throughout the process of preparation, administration and handling of cytotoxic waste.
- **Urgent management of extravasation is essential.** Refer to Section 14 for more information.
- Staff exposure: Complete Adverse event log (Appendix 3) and IIMS.
- Parents/carers and families members also receive appropriate training.

Approved by:	SCHN Policy, Procedure and Guideline Committee	
Date Effective:	1st March 2014	**Review Period**: 3 years
Team Leader:	Clinical Nurse Educator	**Area/Dept**: C2West

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CHANGE SUMMARY

- The SCH Cytotoxic Drugs: Administration and Handling Procedure has been extensively amended. It is recommended for the entire document is re-read.

READ ACKNOWLEDGEMENT

- Prior to undertaking procedures outlined in this guideline Registered Nurses must undertake local training and competency assessment as specified below.

Training and Accreditation Required:

- **Nursing Staff**
  - To be accredited to administer cytotoxic drugs, nursing staff must complete an Accreditation Program and be deemed competent. There are two levels of accreditation:
    1. Cytotoxic Administration Accreditation-**Full**
    2. Cytotoxic/Hazardous Drug Administration Accreditation-**Partial**
- **Medical Staff**
  - To be accredited to administer intrathecal cytotoxic drugs, Medical staff must undertake the training program instigated by the Kid's Cancer Centre (KCC) medical team.
- **Other staff**
  - Pharmacy, laboratory, maintenance, Patient Service Assistants, store and transport staff receives training in the safe handling of cytotoxic waste and safe transport of cytotoxic drugs. Training is repeated as required.
- **Mandatory Read Acknowledgement**
  - All staff members who administer and handle cytotoxic drugs and related waste at SCH must read and acknowledge they understand the contents of this document to local manager.
  - All staff members who care for patients receiving cytotoxic drugs must read and acknowledge they understand the contents of this document to local manager.
  - Line managers are to maintain records of staff read acknowledgements for quality review and compliance audit processes.

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1 Introduction

1.1 Cytotoxic Drugs

Cytotoxic drugs are one group of agents falling under the classification of hazardous substances.[2,4-6] Cytotoxic drugs work by causing cell death in certain types of cells and are used to treat various malignant and auto-immune disorders.[2] Cytotoxic drugs are drugs known to be highly toxic to non target cells primarily due to their ability to interfere with cell reproduction.[2] Cytotoxic drugs include anti-neoplastic agents, some antiviral drugs, some hormones, some bio-engineered drugs, and other miscellaneous drugs[1].

Drugs are considered cytotoxic if they exhibit one or more of the following 6 characteristics:

1. Carcinogenicity.
2. Mutagenicity.
3. Teratogenicity
4. Reproductive or fertility impairment.
5. Serious organ toxicity or adverse health effects at low doses in experimental animal models; toxic substances and preparations which, if they are inhaled or ingested or if they penetrate the skin, may involve serious, acute or chronic health risks.
6. Structure and toxicity profiles of new drugs that mimic existing drugs determined hazardous by the five previous criteria[3, 5, 6, 15].

Occupational exposure to cytotoxic drugs or related waste may occur through skin contact and absorption, inhalation, ingestion or needle stick injuries if safety precautions are not adhered to or in place.[2] The risk to one's health is dependent on the level of exposure and the extent of the toxic effects of these drugs. Exposure risks can be greatly reduced through engineering controls such as using a ventilated cabinet and using appropriate procedures and protective equipment.[1]

The cytotoxic drugs listed in Appendix 4 are drugs that are identified as cytotoxic by NSW WorkCover [2], "**Cytotoxic Drugs and Related Waste Risk Management Guide 2008**", or have been classified as cytotoxic on the *Safety Data Sheets (SDS)* prepared by the manufacturer, in accordance with the *Globally Harmonised System of Classification and Labelling of Chemicals* (GHS).[27-30] There are drugs that are not yet classified under the GHS. For these drugs, information has been sourced from the SDS and ChemAlert.[33]

Drugs on ChemAlert are given a hazard rating. **RED** classification indicates that it is highly hazardous with normal use, **AMBER** classification indicates that it is moderately hazardous with normal use and **GREEN** classification indicates that the drug is a minimally hazardous with normal use. *Drugs identified on ChemAlert as **RED** are to be handled with the same precautions as cytotoxic drugs. Drugs identified on ChemAlert as **AMBER** are hazardous drugs and will be discussed under section 1.2 Hazardous Drugs and in Appendix 5).*

Cytotoxic drugs and anti-neoplastic agents will be labelled by pharmacy with a sticker identifying them as **CYTOTOXIC** and require special precautions when handling and administering.

Cytotoxic drug solutions are to be prepared, administered

and disposed of in accordance with NSW WorkCover guide[2], "**Cytotoxic Drugs and Related Waste Risk Management Guide 2008**[1, 3]":
http://www.cnsa.org.au/documents/oct2008/cytotoxic_drugs_related_waste_risk_management_guide_5633.pdf

All cytotoxic drugs [including oral suspension and tablets, intramuscular (IM) and subcutaneous (Subcut) injections, intravenous infusions (IV)] and intrathecal injections should be handled with extreme care and must be administered by an Accredited RN or Accredited Medical Officer[2, 3, 7, 8, 15, 17-19, 27-30].

1.2 Hazardous Drugs

There are certain drugs for example immunosuppressants, immunomodulators and anti-virals, currently administered within SCH that are identified as hazardous drugs. Hazardous drugs can be defined as drugs that are suspected to cause adverse health effects in workers from exposures in the workplace[1]. The level of exposure and the extent of the toxic effects of these drugs contribute to its classification as a hazardous drug.[30]

Hazardous drugs have been classified as '*hazardous*' on the SDS prepared by the manufacturer, in accordance with the GHS as previously discussed in section 1.1 Cytotoxic Drugs.[27- 30]

At SCH hazardous drugs that are given an **AMBER** classification from ChemAlert indicate that the drug is moderately hazardous with normal use.[33] *Drugs identified on ChemAlert as **AMBER** are **not defined as cytotoxic**, however are considered **hazardous** and require safety precautions in handling and administration by following the PPE recommendations in Appendix 5).* Please refer to Section 1.1 Cytotoxic Drugs, for more information about ChemAlert identification of hazardous drugs.

Some hazardous drugs must be '**handled as cytotoxic**' as they carry a higher hazard risk than other hazardous drugs. Therefore, RNs must be partially accredited to administer '**handled as cytotoxic**' hazardous drugs. These are identified in Section 2 and Appendix 5. Hazardous drugs identified as 'handle as cytotoxic' should be administered in the same manner as cytotoxic drugs (see Sections 5-8).

These drugs will be identified with **'handle as cytotoxic'** stickers to alert staff to the need to handle in the same manner as cytotoxic drugs.

Hazardous drugs will be identified with **'hazardous medication-check precautions'** stickers to alert staff that the drug must be handled with the precautions outlined in Appendix 5.

Some drugs carry a higher hazard risk when they are in liquid (IV) or suspension form and may require accreditation to administer, when the capsule or tablet formulations do not. Refer to Section 2 and Appendix 5 for more information.

Refer to Section 13 and Appendix 5 for the storage and labelling requirements of hazardous drugs.

1.3 Definitions Related to Cytotoxic Drugs[1-6, 23]

The following definitions aim to clarify what are cytotoxic drugs and distinguish them from hazardous drugs and non cytotoxic drugs.

- **Antineoplastic Drugs:** cytotoxic drugs used in the treatment of neoplasms or malignant disease.
- **Cytotoxic drugs:** hazardous substances which are detrimental or destructive to cells used in the treatment of malignant and/or other diseases. They have been shown to be mutagenic, carcinogenic and/or teratogenic, either in treatment doses in animal and bacterial assays.
- **Chemotherapy:** Antineoplastic drugs used in the treatment of neoplastic disease.
- **Hazardous Drugs:** are drugs that are suspected to cause adverse health effects in workers from ex¬posures in the workplace which are not classifiable as cytotoxic
- **Carcinogenicity:** the ability to cause cancer.
- **Mutagenicity:** genotoxicity or the ability to cause a change or mutation in genetic material.
- **Teratogenicity:** the ability to cause defects in foetal development or foetal malformations; a teratogen and other developmental toxicities that can be manifested at any point in the life span of the foetus.
- **Immunosuppressants:** drugs that induce immunosuppression, some of which are cytotoxic drugs.
- **Immunomodulators:** drugs that diminish the immune system by altering the immune ability to produce antibodies or sensitised cells, some of which are cytotoxic drugs.
- **Monoclonal Antibodies:** pure type of antibodies which target specific antigens, substances that specifically bind to target cells or proteins and stimulate the patient's immune system and produce an immunological response with consequential direct or indirect anti-tumour effect, some of which are cytotoxic drugs.
- **Anti-Virals:** these drugs act by interfering with a virus's ability to enter a host cell and/or replicate itself using the host cell machinery, some of which are cytotoxic drugs.

2 Staff Training and Accreditation

2.1 Registered Nurses

All clinical nursing staff at Sydney Children's Hospital Randwick are required to complete the eLearning module 1 from the Cancer Institute NSW titled 'Handling Antineoplastic Drugs and Related Waste Safely'. A record of completion is recorded in the Learning Management System (LMS) under the code CSK13105: Safe Handling and Administration of Cytotoxic Therapies in Paediatrics (Part A).

There are 2 levels of Cytotoxic Administration Accreditation:

1. **Cytotoxic Administration Accreditation- Full.** Kids Cancer Centre (KCC) nursing staff who have completed this accreditation program are accredited to administer any

cytotoxic drug within SCH with the exception of intrathecal drugs. Training is recorded in the LMS under the code CSK13181.

2. **Cytotoxic Administration Accreditation- Partial.** SCH nursing staff who have completed this program, have modified accreditation to administer a limited number of specific drugs.

These drugs are listed below:

Drugs included in Partial Accreditation		
Drug Name	Route	Cytotoxic or Hazardous
Azathioprine	PO, IV	Cytotoxic
Cidofovir	IV	Cytotoxic
Cyclophosphamide	IV (C2S staff only)	Cytotoxic
Cyclosporin	IV, PO liquid *	Hazardous- Handle as Cytotoxic
Cytarabine	Subcut	Cytotoxic
Gancyclovir	IV	Cytotoxic
Hydroxyurea	PO	Cytotoxic
Mercaptopurine	PO	Cytotoxic
Methotrexate	Subcut, PO	Cytotoxic
Mycophenolate mofitil	IV, PO liquid*	Hazardous- Handle as Cytotoxic
Procarbazine	PO	Cytotoxic
Tacrolimus	IV, PO liquid *	Hazardous- Handle as Cytotoxic
Thioguanine	PO	Cytotoxic
Valgangcyclovir	PO (tablets and suspension)	Cytotoxic
*suspension/liquid form only are included in partial accreditation as they carry a higher risk. Refer to appendix 5. Tablet/capsule forms of this drug are considered low risk and only require the use of purple gloves and no partial accreditation is required due to the low risk of exposure.		

Those drugs are detailed in the LMS under the following codes:

CSK13231 Intravenous

CSK13233 Mycophenolate Mofetil (MMF)

CSK13233 Cyclophosphamide Renal Pathway

CSK13234 Oral

CSK13235 Subcutaneous

2.1.1 Full Cytotoxic Administration Accreditation process is as follows:

- RNs identify the need for Full Cytotoxic Administration Accreditation in their clinical setting.
- Discuss with KCC Nurse Unit Manager (NUM), or Clinical Nurse Educator (CNE) to identify appropriate time to undertake the accreditation process and any support which may be required.
- Complete a "Cytototoxic Blood Screening Declaration" (Appendix 1). The CNE enters completion of declaration into the LMS and forwards a copy to the Nurse Manager (Workforce).
- Attend the SCH **Cytotoxic Administration Study Day** or demonstrate recent recognised prior learning from other organisations such as the College of Nursing or the American Association of Paediatric/Heamatology Oncology Nurses (APHON) or accreditation from other places of employment.
- Successfully complete the **Safe Handling and Administration of Cytotoxic Therapies in Paediatrics (Part C)**, which includes a learning package and practical clinical assessment.
- CNE or Clinical Nurse Consultant (CNC) is responsible for filing a hard copy of the completed accreditation within a designated area in the clinical unit.
- CNE records completed accreditation, including assessor's details, into the LMS and forwards notification to Nurse Manager (Workforce).

2.1.2 Partial Cytotoxic Administration Accreditation process

- SCH RNs identify the need for partial Cytotoxic Administration Accreditation in their clinical setting.
- Discuss with NUM, NE or CNE the appropriate timing to undertake the accreditation process and any support which may be required.
- Complete a "Cytotoxic Blood Screening Declaration". (see Appendix 1)
- Identify specific drugs in **Safe Handling and Administration of Cytotoxic Therapies in Paediatrics (Part B)** that will be included in the partial accreditation.
- Attend the Partial Cytotoxic Accreditation Workshop.
- Successfully complete the SCH **Modified Cytotoxic Administration Learning Package** and practical clinical assessment.
- CNE or Clinical Nurse Consultant (CNC) is responsible for filing a hard copy of the completed accreditation within a designated area in the clinical unit.
- CNE records completed accreditation, including assessor's details, into the LMS and forwards notification to Nurse Manager (Workforce).

2.1.3 Accredited Assessors for full accreditation

The following designated positions are able to assess clinical competence in the administration of cytotoxic drugs:

- KCC CNEs
- KCC CNCs with full accreditation
- CNS – Oncology (nominated position)

2.1.4 Accredited Assessors for partial Accreditation

The following designated positions are able to assess clinical competence in the administration of cytotoxic drugs:

- The above positions
- CNE/NE with partial accreditation who work in clinical areas other than KCC where cytotoxic drugs are administered.

2.1.5 Maintenance of Accreditation

All staff members with Cytotoxic Accreditation are required to regularly update their knowledge of new procedures, treatments and protocols by attending relevant professional development and education sessions. [1, 3, 7, 8, 17]

Staff members with either full or partial Cytotoxic Administration Accreditation are required to undergo accreditation assessment following the SCH reaccreditation process **every 2 years**. [2, 3, 7, 8, 17] The assessment is recorded in the LMS. Staff members who do not undertake the 2nd yearly assessment will have their cytotoxic accreditation reconsidered.

Staff members who take a leave of absence from SCH KCC for greater than 12 months will have their accreditation status reviewed.

Staff members who have achieved either full or partial accreditation are required to maintain a record of their cytotoxic drug administration (Appendix 2) in order to retain their accreditation. Upon termination of employment, a copy of this log must be provided to the Nurse Manager (Workforce).

The Cytotoxic Administration Accreditation Program is co-ordinated by the CNEs KCC SCH.

2.1.6 The following information is collected and maintained by SCH: [2-4]

- A list of personnel approved to administer cytotoxic drugs.
- Training records which identifies date, topics and presenters, attendees, evaluations and assessed competencies. These records are kept for a minimum of five (5) years.
- Individual employee records and health monitoring records. These records are kept for a minimum of thirty (30) years by the Nurse Manager (Workforce).
- The responsibility for keeping and maintaining these records remains with the relevant department heads, clinical educators and the CNEs KCC.

3 Checking Cytotoxic Drugs

The general principles of drug administration apply as per the Administration of non-cytotoxic drugs guideline.

Cytotoxic drugs covered by **Full Cytotoxic Accreditation** must be checked by 2 accredited RNs or 1 accredited RN and 1 accredited Medical Officer (MO). The accredited RN/ MO ***and*** the 2nd checker must be present at the bedside for the commencement of drug administration to complete the Chemotherapy Time Out Sheet.

Cytotoxic drugs covered by **Partial Cytotoxic Accreditation** must be checked by one accredited RN and another RN within their scope of practice. The accredited RN ***and*** the 2nd checker must present at the bedside for the commencement of drug administration. The drug must be administered to the patient by the accredited RN.

Intrathecal drugs must be checked by an accredited RN and the medical officer administering the drug. Refer to Section 9: Intrathecal Drugs for further information[2, 9 - 11, 24].

- For drugs that are referred to in the **full cytotoxic accreditation** the following additional checks must be performed:
  - A copy of the patient's treatment protocol or road map in the 3HO/ "Buff Folder" should be checked against the medication order on the Cytotoxic Fluid Order Sheet to ensure accuracy prior to commencing[2, 7, 8, 24].
  - A written "Go-Ahead" for cytotoxic therapy must be documented in the medical record/3HO detailing the protocol, time point, cycle/course, day/s of treatment and that the patient has met the medical pre-requisites for current stage of treatment.
  - The written "Go-Ahead" for cytotoxic drugs must be written by a Haematology/ Oncology Medical Officer. Orders made by Registrars and Residents must have accompanying documentation that the Haematology/Oncology Fellow or Consultant agrees to "Go-Ahead" with therapy and documents this in the "Go-Ahead".
  - The patient must have a double signed weight and height documented by 2 RNs or 1 RN and 1 MO/EN/AIN for each admission. This is to ensure an accurate Body Surface Area (BSA) can be calculated and the drug dosage adjusted if necessary. This must be no more than 7 days old.
  - If the prescribed dosage of cytotoxic drug differs by more than 10% from the calculated dose (based on the patient's BSA or weight), the medical consultant must be contacted regarding potential changes to dosage and this can be verified by Pharmacy.
- All cytotoxic drugs *prescribed as a part of a chemotherapy protocol* require the following checks:
  - Drugs must be read '**out loud**' with both checkers present in a designated low traffic area.
  - There should be a verbal '**Time Out**' *immediately prior* to the administration of the cytotoxic drugs where the drug is read again '**out loud**' **and checked** against the prescription order. This is documented on the " Chemotherapy Time Out Form" (Appendix 7): [7, 8, 24]

4 Personal Protective Equipment (PPE)

One of the greatest risks of occupational exposure to cytotoxic drugs is during administration of cytotoxic drugs and handling of related waste. Exposure may occur due to direct contamination with unchanged drug or active metabolites. Contamination may occur from solid or liquid aerosols, skin absorption, liquid spills or splashes and needle stick injuries. [1-24]

The following **personal protective equipment must be worn during administration of all cytotoxic drugs listed in Appendix 4 and when handling related waste**:

- A particulate respirator mask (P2/N95) (not surgical mask).
- A long sleeved gown of impermeable material with elasticated cuffs(e.g. Tyvek).
- Protective eyewear - can be goggles or protective eyewear with side shields.
- Nitrile non-sterile purple gloves (sterile nitrile gloves are available for sterile/surgical ANTT procedures such as port access and lumbar punctures).

Refer to Appendix 5 for details on minimum PPE requirements when handling hazardous drugs and related waste.

Note: In addition to the above PPE, standard precautions also apply.

5 Intravenous Cytotoxic Drugs

5.1 Intravenous Cytotoxic Drugs

- Cytotoxic drugs must be hung one at a time. If multiple drugs are due to be given at the same time, they must be set up one at a time, to avoid potential administration errors.
- Cytotoxic drugs should be infused without delay after connecting the infusion line and bag to the patient.
- Central venous access devices must be checked for patency and blood return to confirm placement of the device prior to the administration of any cytotoxic drugs.
- Only needles, syringes and other equipment with luer-lock fittings are to be used in the administration of cytotoxic drugs.
- A plastic backed absorbent sheet or pad must be placed under the administration work area, use only sheets/pads stored in clean clinical areas.
- A closed system should be maintained at all times during intravenous administration of cytotoxic drugs.
- A 3 Needle free Valve Smart site Extension set (chooks foot) must be used for the administration of all intravenous cytotoxic drugs.
- When spiking the IV cytotoxic drug bag a piece of sterile gauze must be wrapped around the entry port to minimise environmental contamination by droplet or spill.
- **Do not attach/spike the cytotoxic drug bag while hanging on the IV pole**. Insert the spike whilst the IV cytotoxic drug bag is lying flat on the preparation area at waist height and facing away from the patient.

- The IV line is flushed following completion of the cytotoxic infusion with 20mL of non-cytotoxic compatible fluid. The flush may be inserted into the burette via the access port using a luer lock syringe and **must not be disconnected** from this port. **Full PPE must be worn**.
- **Do not** disconnect the IV cytotoxic medication bag on completion of the infusion. The whole administration set is placed into a sealable plastic bag and discarded into an appropriate cytotoxic waste container.
- When vesicants are administered via a peripheral line, the cannula must be no more than 24 hours old. **Note:** staff should avoid inserting the cannula over the wrist or into the antecubital fossa due to the potential for nerve or tendon damage or contractures. Immediately prior to the administration of the vesicant the patency of the cannula must be checked observing for backflow and flushing well. The site must be observed continuously during the bolus injection/rapid infusion and hourly during a long infusion. If there is any concern regarding the patency of the cannula, contact the medical officer immediately.
- **Vinca Alkaloids are always administered via a mini bag, not via a syringe**[3]. Except if the patient weighs 5kg or less, where an individual assessment is determined by the Consultant and Pharmacist.

5.2 Procedure: Intravenous Cytotoxic Medications

For all intravenous cytotoxic medication administration, checks must occur as outlined in Section 3.

5.2.1 Via Burette and Infusion Set with cytotoxic medication in a bag

Set up

1. Clean all work surfaces on the trolley with a large 70% alcohol wipe.
2. Collect all equipment required.
3. Perform hand hygiene.
4. Place a plastic backed absorbent pad/sheet under the work administration area[2].
5. Prepare area- open syringes, needles, sterile gauze, swabs following aseptic non-touch technique.
6. Prime 'the SCH approved cytotoxic drug administration set' with prescribed compatible IV fluid.
7. Take trolley, with equipment to the bedside and perform the Chemotherapy "Time Out" if required, checking of the patient details with the second checker (see Section 3 for information regarding when to complete a time out. See Appendix 7 for Chemotherapy Time Out Sheets).
8. All IV lines must be checked for patency prior to administration of any cytotoxic drug. CVADs must be checked for patency and blood return to confirm placement of the device prior to the administration of any cytotoxic drug.

9. If the patient is accessed, attach line to one of the needle free valve ports on the extension set and label appropriately (see picture)
10. If patient is not accessed, access as per SCHN CVAD Practice Guideline.

Infusion

1. Perform hand hygiene
2. Don PPE, except gloves.
3. Perform hand hygiene and don gloves
4. Clean connection between priming bag and burette spike with 2% chlorhexidine in 70% alcohol wipe. Allow to dry.
5. Remove plastic cap from cytotoxic drug bag and discard of immediately as cytotoxic waste.
6. Wrap sterile gauze around burette spike and disconnect the compatible fluid bag used to prime line. Keep cytotoxic drug bag flat on the trolley and spike at waist level, facing away from the patient.
7. Hang the cytotoxic medication bag on the IV pole and protect from light (if required).
8. **Once the cytotoxic fluid is attached to the primary line it is not to be removed as this will break the closed system**.
9. Discard gauze as cytotoxic waste, along with all other cytotoxic waste.
10. Remove PPE and dispose of as cytotoxic waste.
11. Perform hand hygiene.
12. Undo roller clamp between the cytotoxic drug bag and the burette and empty the contents in to the burette. Do not leave roller clamp open. Do not overfill burette.
13. Make note of the amount of cytotoxic medication in the burette, if the amount exceeds what can safely fit in the burette, use the weight of the bag measured when checking. This will be used to calculate the infusion rate.
14. Set a rate of 400mL/hr with the dose limit that is determined by the volume required to prime the line (current SCH plum pump giving set dose limit is 16mL). Open the clamp on the 3 Needle Free Valve Smart Site Extension set. Trace back the line to the pump to ensure correct infusion line. (Note: if a different line must be used, the dose limit is the priming volume of the line to be used, i.e. non PVC line).
15. Start pump, two RNs must remain by the bedside while the line is being rapid primed with the cytotoxic drug.
16. Once the line has been rapid primed, reset infusion rate according the prescribed rate. This is calculated based on the duration of the infusion and the weight/volume of cytotoxic medication (as noted in step 13).
17. Double check all limits and rates with second checker, and start pump.

18. Protect cytotoxic drug in the burette from light, if required.
19. Label line and burette with drug name and label as cytotoxic or hazardous (refer to Appendix 4 and Appendix 5 for classification).
20. In cytotoxic medication administration the prescribed infusion time is of most importance. By rapid priming the line with cytotoxic medication the flush volume will be included in the infusion rate, for the prescribed time.

Example of rate calculations:

1. You are to infuse Daunorubicin that is prescribed over 1 hour.
2. Fill burette with drug.
3. There is 60mL of Daunorubicin in the burette before rapid priming the line. Record this amount.
4. Rapid prime 16mL of Daunorubicin at 400mL/hr using a Hospira plum pump & related giving set.
5. When primed, reset pump to at 60mL/hr with a dose limit of 44mL.
6. Flush with 20mL of compatible IV fluid. This flush volume may vary for different infusion pumps/ giving sets.

Flush

1. Perform hand hygiene.
2. Draw up 20mL of compatible fluid in a 20mL luer lock syringe and label appropriately.
3. Don PPE, except gloves.
4. Perform hand hygiene and then don gloves.
5. Close air valve on in-line burette.
6. Clean bung on burette with 2% chlorhexidine in 70% alcohol wipe. Allow to dry.
7. Attach syringe to bung on burette.
8. Push flush fluid into burette.
9. Do not remove flush syringe.
10. Re-open air valve.
11. Remove PPE and discard as cytotoxic waste.
12. Perform hand hygiene.
13. Set pump to the same rate as the infusion with a dose limit of 20mL.

Completion of infusion

1. Perform hand hygiene.
2. Draw up 5-10mL of 0.9% Sodium Chloride flush in luer lock syringe.
3. Don PPE, except gloves.
4. Perform hand hygiene and then don gloves.
5. Clamp the extension set used for the cytotoxic drug.

6. Wrap sterile gauze around the connection between the end of the line and the extension set. Disconnect the line.
7. Place the intact IV line into a zip lock bag, seal, and dispose of as cytotoxic waste.
8. Remove gloves, perform hand hygiene, replace with clean gloves
9. Clean bung on extension set with a 2% chlorhexidine in 70% alcohol wipe. Allow to dry
10. Manually flush the extension set with appropriate amount of 0.9% Sodium Chloride and clamp the extension set. Label as cytotoxic.

11. Discard any other cytotoxic waste.
12. Remove PPE and discard of as cytotoxic waste.
13. Perform hand hygiene.
14. If heparin lock post infusion is required, it is to be done wearing full PPE and any related waste discarded as cytotoxic waste. Refer to the SCHN CVAD Practice Guideline for heparin locking procedure.

5.2.2 Via Burette and Infusion Set with Cytotoxic Drug Supplied in a syringe

Set up

1. Clean all work surfaces on the trolley with a large 70% alcohol wipe.
2. Collect all equipment required.
3. Perform hand hygiene.
4. Place a plastic backed absorbent pad/sheet under the work administration area[2].
5. Prepare area- open syringes, needles, sterile gauze, swabs following aseptic non-touch technique.
6. Prime 'the SCH approved cytotoxic drug administration set' with prescribed compatible IV fluid.
7. Take trolley, with equipment to the bedside and perform the Chemotherapy "Time Out" if required, checking of the patient details with the second checker (see section 3 for information regarding when to complete a time out. See Appendix 7 for Chemotherapy Time Out Sheets).
8. All IV lines must be checked for patency prior to administration of any cytotoxic drug. CVADs must be checked for patency and blood return to confirm placement of the device prior to the administration of any cytotoxic drug.
9. If the patient is accessed, attach line to one of the needle free valve ports on the extension set and label appropriately (see picture).
10. If patient is not accessed, access as per SCHN CVAD Practice Guideline.

Infusion

1. Perform hand hygiene.
2. Don PPE, except gloves.
3. Perform hand hygiene, and then don gloves.
4. Close air valve on in-line burette.
5. Clean bung on burette with a 2% chlorhexidine in 70% alcohol wipe. Allow to dry.
6. Wrap sterile gauze around the end of the cytotoxic syringe then remove the combi-stopper from the cytotoxic syringe. Discard the combi-stopper immediately as cytotoxic waste.
7. Leaving the gauze in place around the end of the cytotoxic syringe, attach it to the bung on the burette. *This must be done at waist height*.
8. Push contents of the cytotoxic syringe into the burette.
9. Re-open air valve.
10. **Once the cytotoxic syringe has been emptied into the burette it is not to be removed**.
11. Discard gauze as cytotoxic waste, along with all other cytotoxic waste.
12. Remove PPE and dispose of as cytotoxic waste.
13. Perform hand hygiene.
14. Make a note of the amount of cytotoxic drug in the burette.
15. Set a rate of 400mL/hr with the dose limit that is determined by the volume required to prime the line (current SCH plum pump giving set dose limit is 16mL). Open the clamp on the 3 Needle Free Valve Smart Site Extension set. Trace back the line to the pump to ensure correct infusion line. (Note: if a different line must be used, the dose limit is the priming volume of the line to be used, i.e. non PVC line).
16. Start pump, two RNs must remain by the bedside while the line is being rapid primed with the cytotoxic drug.
17. Once the line has been rapid primed, reset the infusion rate according to the prescribed rate. This is calculated based on the duration of the infusion and total volume of cytotoxic drug (as noted above in step 14).
18. Double check all limits and rates with the second checker, and start pump.
19. Protect cytotoxic drug in the burette from light, if required.
20. Label line and burette with drug name and **label as cytotoxic or hazardous** (refer to Appendix 4 and Appendix 5 for classification).
21. In cytotoxic drug administration the prescribed infusion time is of the most importance. By rapid priming the line with the cytotoxic drug, the flush volume will be included in the infusion rate, for the prescribed time.

Flush

1. Perform hand hygiene.
2. Fill the burette with 20mL of fluid from the fluid bag that is already attached.
3. Perform hand hygiene.
4. Set pump to the same rate with a volume limit of 20mL.

Completion of infusion

1. Perform hand hygiene.
2. Draw up 5-10mL of 0.9% Sodium Chloride flush in a luer lock syringe
3. Don PPE, except gloves.
4. Perform hand hygiene, and then don gloves.
5. Clamp the extension set used for the cytotoxic drug.
6. Wrap sterile gauze around the connection between the end of the line and the extension set. Disconnect the line.
7. Place the intact IV line into a zip lock bag, seal, and dispose of as cytotoxic waste.
8. Remove gloves, perform hand hygiene, replace with clean gloves.

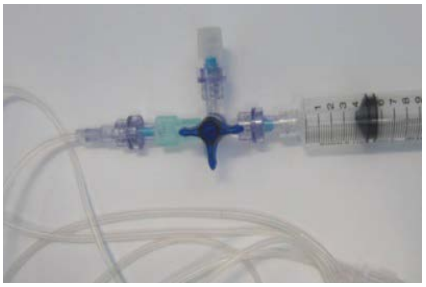
9. Clean bung on extension set with a 2% chlorhexidine in 70% alcohol wipe. Allow to dry.
10. Manually flush the extension set with the appropriate amount of 0.9% Sodium Chloride and clamp the extension set. Label as cytotoxic.
11. Discard any other cytotoxic waste.
12. Remove PPE and dispose of as cytotoxic waste.
13. Perform hand hygiene.
14. If heparin lock post infusion is required, it is to be done wearing full PPE and any related waste discarded as cytotoxic waste. Refer to the SCHN CVAD Practice Guideline for heparin locking procedure.

6 Syringe Driver Infusions

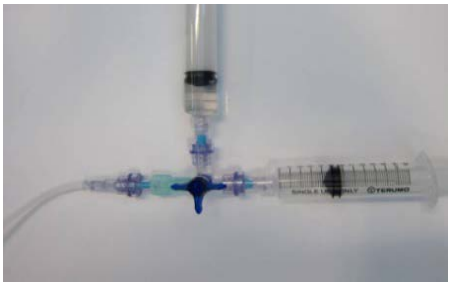
Set up

1. Clean all work surfaces on the trolley with a large 70% alcohol wipe.
2. Collect all equipment required.
3. Perform hand hygiene.
4. Place a plastic backed absorbent pad/sheet under the work administration area[2].
5. Prepare area- open syringes, needles, sterile gauze, swabs following aseptic non touch technique.
6. Draw up prescribed compatible fluid for priming line in 10mL luer lock syringe.
7. Attach a non-reflux valve to the priming syringe and then attach to a 3 way tap and minimal volume line. Prime the line, ensuring all components of the 3 way tap are primed (Picture 1).
8. Draw up 5mL of compatible flush fluid in a second 10mL Luer Lock syringe and attach to a non-reflux valve, then to the 3 way tap on the middle access point (Picture 2).
9. Perform hand hygiene.
10. Take trolley, with equipment to the bedside and perform the Chemotherapy "Time Out" if required, checking of the patient details with the second checker (see section 3 for information regarding when to complete a time out. See Appendix 7 for Chemotherapy Time Out Sheets).
11. All IV lines must be checked for patency prior to administration of any cytotoxic drug. CVADs must be checked for patency and blood return to confirm placement of the device prior to the administration of any cytotoxic drug.
12. Attach line to one of the needle free valve ports on the extension set and label as cytotoxic appropriately (Picture 3)

Picture 1

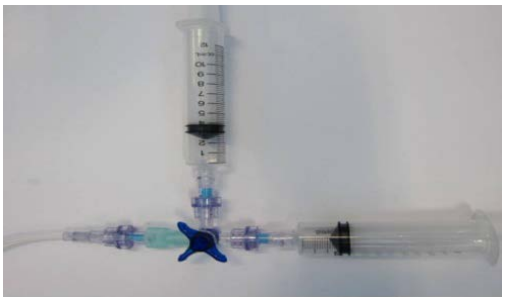


Picture 2

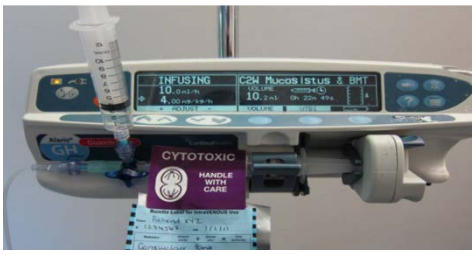


Picture 3

Infusion



1. Perform hand hygiene.
2. Don PPE, except gloves.
3. Perform hand hygiene, and then don gloves.
4. Ensure 3 way tap is in a diagonal position (off to all access points (Pictured).
5. Clean the junction of the 3 way tap and syringe used to prime the line with a 2% chlorhexidine in 70% alcohol wipe. Allow to dry.
6. At waist height disconnect the syringe used to prime the line, leaving the non-reflux valve attached to the 3 way tap.
7. Wrap sterile gauze around the end of the cytotoxic syringe then remove the combi-stopper from the cytotoxic syringe. Discard the combi-stopper immediately as cytotoxic waste.
8. Leaving the gauze in place around the end of the cytotoxic syringe, attach the cytotoxic syringe to the non reflux valve and line.
9. Discard gauze as cytotoxic waste, along with all other cytotoxic waste.
10. Place syringe in syringe driver and lock into place and turn the 3 way tap back so that it is open to the patient and the cytotoxic syringe (Pictured).



11. Remove PPE and dispose of as cytotoxic waste.
12. Perform hand hygiene.
13. Set a rate of 200mL/hr with the dose limit that is determined by the volume required to prime the line (current SCH syringe driver minimum line dose limit is 1.5mL). Open the clamp on the 3 Needle Free Valve Smart Site Extension set. Trace back the line to the pump to ensure correct infusion line. (Note: if a different line must be used, the dose limit is the priming volume of the line to be used, i.e. non PVC line).
14. Start syringe driver, two RNs must remain by the bedside while the line is being rapid primed with the cytotoxic drug.
15. Once the line has been rapid primed, reset infusion rate according to the prescribed rate which is calculated based on the duration of the infusion and volume of cytotoxic drug in the syringe.
16. Double check all limits and rates with the second checker, and start syringe driver.
17. Protect cytotoxic drug in the syringe from light, if required.
18. Label line and burette with drug name and **label as cytotoxic or hazardous** (refer to Appendix 4 and Appendix 5 for classification).
19. In cytotoxic drug administration the prescribed infusion time is of the most importance. By rapid priming the line with the cytotoxic drug, the flush volume will be included in the infusion rate, for the prescribed time.

Flush

1. Perform hand hygiene.
2. Don PPE, except gloves.
3. Perform hand hygiene, and then don gloves.
4. Remove syringe from syringe driver.
5. Place sterile gauze around the end of the cytotoxic syringe.
6. Turn 3 way tap off to patient and draw 2mL of the flush fluid (from the syringe attached at mid access point) into the syringe that contained the cytotoxic drug. Be careful not to draw any air into the syringe (pictured).
7. Turn 3 way tap off to mid access point and open to patient to infuse the flush.
8. Discard gauze as cytotoxic waste.
9. Place syringe back into the syringe driver and lock in place.
10. Remove PPE and dispose of as cytotoxic waste.
11. Perform hand hygiene.
12. Set syringe driver to the same rate with a volume limit of 2mL (minimal volume lines only need a 2mL flush, however please check the volume of the line you are using).

Completion of infusion

1. Perform hand hygiene.
2. Draw up 5-10mL of 0.9% Sodium Chloride flush in a luer lock syringe.
3. Don PPE, except gloves.
4. Perform hand hygiene, and then don gloves.
5. Clamp the extension set used for the cytotoxic drug.
6. Wrap sterile gauze around the connection between the end of the line and the extension set. Disconnect the line.

7. Place the intact IV line into a zip lock bag, seal, and dispose of as cytotoxic waste.
8. Remove gloves, perform hand hygiene, replace with clean gloves.
9. Clean bung on extension set with a 2% chlorhexidine in 70% alcohol wipe. Allow to dry.
10. Manually flush the extension set with the appropriate amount of 0.9% Sodium Chloride and clamp the extension set. Label as cytotoxic.
11. Discard any other cytotoxic waste.
12. Remove PPE and dispose of as cytotoxic waste.
13. Perform hand hygiene.
14. If heparin lock post infusion is required, it is to be done wearing full PPE and any related waste discarded as cytotoxic waste. Refer to the SCHN CVAD guidelines for hep-locking procedure.

7 Oral Cytotoxic Drugs

When handling and/or administrating oral cytotoxic medications **Full PPE MUST be Worn**.

Where possible, oral cytotoxic tablets and capsules should be given whole:

Oral cytotoxic drugs MUST NEVER BE CRUSHED

The practice of breaking, cutting or dissolving oral cytotoxic drugs SHOULD BE AVOIDED WHEN EVER POSSIBLE.

Liquid forms of cytotoxic drugs should not be decanted from original container outside of pharmacy.

Calculated doses should be rounded to the nearest tablet strength where possible (whole or half)

7.1 Procedure for Oral Cytotoxic Drugs:

This section of the policy is to be used in conjunction with 'Safe Administration of Liquid Medicines by Routes other than Injection', NSW Health Policy Directive PD2012_006
http://www0.health.nsw.gov.au/policies/pd/2012/PD2012_006.html [34]

For administration of oral cytotoxic drugs via nasogastric and gastrostomy tubes an adaptor is required to safely connect the oral syringes to the tubes. They are to be attached to the tube and remain in place for the life of the tube or replaced if connection becomes unsecure. *Ordering information: PEG adaptor (Enteral Connector) 16fr Catalogue number 8884-751622 on NSW state contract.*

7.1.1 Administration of a Whole Cytotoxic Tablet

1. Identify an appropriate low flow designated safe area to prepare cytotoxic drug.
2. Clean all work surfaces with a large 70% alcohol wipe, allow to dry.
3. Place a plastic backed absorbent pad/sheet under the work administration area[2]. Use only sheets/pads stored in clean clinical areas.
4. Prepare equipment at waist height.
5. Perform hand hygiene.
6. Don full PPE, except gloves.
7. Perform hand hygiene and then don gloves.
8. Transfer tablets/capsules from their original container(s) using tweezers directly into a disposable specimen jar and secure with lid.
9. If not preparing the cytotoxic drug at the bedside, gloves must be removed and discarded as cytotoxic waste. Perform hand hygiene and don new gloves.
10. At the bedside perform the chemotherapy "Time Out" if required, checking the patient details with second RN (see Section 3).
11. Instruct the patient to take the tablet/capsule directly from the specimen jar, without handling.

12. If the patient has had any handling of the drug ensure they wash their hands.
13. Place contaminated specimen jar in zip lock bag and dispose of as cytotoxic waste, along with any other waste.
14. While wearing PPE wash tweezers with soap and water.
15. After washing tweezers, remove contaminated gloves and replace with clean gloves.
16. Return tweezers to the cytotoxic container.
17. Rinse the sink and dry with a paper towel. Dispose of towel as cytotoxic waste
18. Remove PPE dispose of as cytotoxic waste.
19. Perform hand hygiene.
20. If a child vomits within 15 minutes of administration of the oral cytotoxic the medical officer should be notified to determine if another dose should be administered.

7.2 Cutting of a Whole Cytotoxic Tablet

1. Identify an appropriate low flow designated safe area to prepare cytotoxic drug.
2. Clean all work surfaces with a large 70% alcohol wipe, allow to dry.
3. Place a plastic backed absorbent pad/sheet under the work administration area[2]. Use only sheets/pads stored in clean clinical areas.
4. Prepare equipment at waist height.
5. Perform hand hygiene.
6. Don full PPE, except gloves.
7. Perform hand hygiene and then don gloves.
8. Using tweezers, place the tablet into the pill cutter in a zip-lock bag.
9. Seal the bag.
10. Break the tablet cleanly in half using the tablet cutter.
11. Open bag and retrieve the required tablet portion using tweezers and place directly into a disposable specimen jar and replace lid.
12. Using tweezers place the portion of the tablet not required back in the tablet container.
13. Dispose of the used zip-lock bag as cytotoxic waste, along with all other cytotoxic waste.
14. If not preparing the cytotoxic drug at the bedside, gloves must be removed and discarded as cytotoxic waste. Perform hand hygiene and don new gloves.
15. At the bedside perform the chemotherapy “Time Out” if required, checking the patient details with second RN (see Section 3).
16. Instruct the patient to take the tablet/capsule directly from the specimen jar, without handling.

17. If the patient has had any handling of the drug ensure they wash their hands.
18. Place contaminated specimen jar in zip lock bag and dispose of as cytotoxic waste, along with any other waste.
19. While wearing PPE wash pill cutter and tweezers with soap and water.
20. After washing equipment, remove contaminated gloves and replace with clean gloves.
21. Return pill cutter and tweezers to the cytotoxic container.
22. Rinse the sink and dry with a paper towel. Dispose of towel as cytotoxic waste
23. Remove PPE dispose of as cytotoxic waste.
24. Perform hand hygiene.
25. If a child vomits within 15 minutes of administration of the oral cytotoxic the medical officer should be notified to determine if another dose should be administered.

Note: The tablet cutter and tweezers must be designated specifically for cytotoxic use and be labelled with a cytotoxic sticker.

7.3 Dissolving Oral Cytotoxic Tablet in a Hospital Environment

1. Identify an appropriate low flow designated safe area to prepare cytotoxic drug.
2. Clean all work surfaces with a large 70% alcohol wipe, allow to dry.
3. Place a plastic backed absorbent pad/sheet under the work administration area[2]. Use only sheets/pads stored in clean clinical areas.
4. Prepare equipment at waist height.
5. Perform hand hygiene.
6. Don full PPE, except gloves.
7. Perform hand hygiene and then don gloves.
8. Using a 5mL syringe, remove the plunger.
9. **IF WHOLE TABLET IS REQUIRED:**
    - Using tweezers transfer tablets/capsules from their original container(s) directly into the syringe chamber and replace the plunger.
    - Expel air into damp sterile gauze (note: gauze should moistened with sterile water and not be soaking wet).
10. **IF PART OF A TABLET IS REQUIRED:**
    - Using tweezers place the tablet into the pill cutter in a zip-lock bag.
    - Seal the bag.
    - Break the tablet to obtain required dose using tablet cutter.

- Open bag and using tweezers retrieve the required tablet portion and place directly into the syringe chamber and replace the plunger.
- Using tweezers place the portion of the tablet not required back in the tablet container.
- Expel air into damp sterile gauze (note: gauze should moistened with sterile water and not be soaking wet).

11. Dispose of the sterile gauze immediately as cytotoxic waste.

12. Draw up a minimum of 2mL Water for Injection and 0.5mL air into the oral syringe.

13. Immediately place a cap onto the end of the syringe (note: caps are available for orange oral syringes). Ensure the cap is discarded as cytotoxic waste as it presents a choking hazard.

14. Check the connections are secure.

15. Gently agitate the dispenser until the tablet is fully dissolved and place into a disposable kidney dish.

16. If not preparing the cytotoxic drug at the bedside, gloves must removed and discarded as cytotoxic waste. Perform hand hygiene and don new gloves.

17. At the bedside perform the chemotherapy “Time Out” if required, checking the patient details with second RN (see Section 3 for information regarding when to complete a time out. See Appendix 7 for Chemotherapy Time Out Sheets).

18. Once suspension is prepared, administer directly into the patients mouth, if given orally.

19. If administering suspension via a naso-gastric tube.

- Place a plastic backed absorbent sheet under the connection site.
- Place sterile gauze around the connection between the syringe and the gastric tube with adaptor connected.
- Confirm naso-gastric tube position as per SCH Enteral Feeding Practice Guideline.
- Administer the suspension through the adaptor into the tube followed by a minimum of 5mL water flush.
- Label naso-gastric tube (if used) with a cytotoxic sticker.
- N.B. Naso-gastric tube should be disposed of as cytotoxic waste when removed

20. If administering suspension via a gastrostomy tube:

- A separate extension tube must be designated for administering cytotoxic drugs. This extension tube should always be stored separate to other gastrostomy tubes and labelled as cytotoxic. Use an oral syringe adaptor on the tube if required.
- Place a plastic backed absorbent sheet under the connection site.
- Place sterile gauze around the connection between the oral syringe and the gastric tube. Use syringe adaptor if required.
- Administer the suspension followed by a minimum of 5mL water flush.

- The dedicated cytotoxic extension tube **must be stored separately** in a sealed and labelled container.
- N.B. When tube is no longer required it should be disposed of as cytotoxic waste

21. Dispose of all equipment immediately as cytotoxic waste. Ensure the syringe cap is discarded as cytotoxic waste as it presents a choking hazard.

22. While wearing PPE wash pill cutter and tweezers with soap and water.

23. After washing equipment, remove contaminated gloves and replace with clean gloves.

24. Return pill cutter and tweezers to the cytotoxic container.

25. Rinse the sink and dry with a paper towel. Dispose of towel as cytotoxic waste

26. Remove PPE dispose of as cytotoxic waste.

27. Perform hand hygiene.

28. If a child vomits within 15 minutes of administration of the oral cytotoxic the medical officer should be notified to determine if another dose should be administered.

7.4 Administering Liquid Cytotoxic Drugs in a Hospital Environment

1. Identify an appropriate low flow designated safe area to prepare cytotoxic drug.

2. Clean all work surfaces with a large 70% alcohol wipe, allow to dry.

3. 3. Place a plastic backed absorbent pad/sheet under the work administration area[2]. Use only sheets/pads stored in clean clinical areas.

4. Prepare equipment at waist height.

5. Perform hand hygiene.

6. Don full PPE, except gloves.

7. Perform hand hygiene and then don gloves.

8. Open the oral cytotoxic drug bottle.

9. Attach the syringe to a mixing cannula and draw up required volume of cytotoxic drug from the bottle. Mixing cannulas are available for the orange oral syringes. (Note: Liquid cytotoxic drugs should not be poured or decanted from their original containers as it increases the risk of inhalation).

10. Disconnect the syringe from the mixing cannula and discard the mixing cannula immediately as cytotoxic waste.

11. If there is air in the syringe that **must** be removed, expel air into damp sterile gauze (note: gauze should moistened with sterile water and not be soaking wet).

12. Dispose of the sterile gauze immediately as cytotoxic waste.

13. Immediately place a cap onto the end of the syringe and place in to a disposable kidney dish (note: caps are available for orange oral syringes). Ensure the cap is discarded as cytotoxic waste as it presents a choking hazard.

14. If not preparing the cytotoxic drug at the bedside, gloves must be removed and discarded as cytotoxic waste. Perform hand hygiene and don new gloves.

15. 1At the bedside perform the chemotherapy "Time Out" if required, checking the patient details with second RN (see Section 3 for information regarding when to complete a time out. See Appendix 7 for Chemotherapy Time Out Sheets).

16. Once suspension is prepared, administer directly into the patients mouth, if given orally.

17. If administering suspension via a naso-gastric tube:

- **i.** Place a plastic backed absorbent sheet under the connection site.
- **ii.** Place sterile gauze around the connection between the syringe and the gastric tube with adaptor connected.
- **iii.** Confirm naso-gastric tube position as per SCH Enteral Feeding Practice Guideline.
- **iv.** Administer the suspension through the adaptor into the tube followed by a minimum of 5mL water flush.
- **v.** Label naso-gastric tube (if used) with a cytotoxic sticker.
- **vi.** N.B. Naso-gastric tube should be disposed of as cytotoxic waste when removed.

18. If administering suspension via a gastrostomy tube:

- **i.** A separate extension tube must be designated for administering cytotoxic drugs. This extension tube should always be stored separate to other gastrostomy tubes and labelled as cytotoxic. Use an oral syringe adaptor on the tube if required.
- **ii.** Place a plastic backed absorbent sheet under the connection site.
- **iii.** Place sterile gauze around the connection between the oral syringe and the gastric tube.
- **iv.** Administer the suspension followed by a minimum of 5mL water flush.
- **v.** The dedicated cytotoxic extension tube **must be stored separately** in a sealed and labelled container.
- **vi.** N.B. When tube is no longer required it should be disposed of as cytotoxic waste.

19. Dispose of all equipment immediately as cytotoxic waste. Ensure the syringe cap is discarded as cytotoxic waste as it presents a choking hazard.

20. Remove PPE dispose of as cytotoxic waste.

21. Perform hand hygiene.

22. If a child vomits within 15 minutes of administration of the oral cytotoxic the medical officer should be notified to determine if another dose should be administered.

8 Subcutaneous or Intramuscular Cytotoxic Drugs

Intramuscular and subcutaneous injections must be administered in conjunction with SCH Administration of Intramuscular Injection SCH.C.5.05 and SCH Administration of Subcutaneous Medication SCH.C.5.06

Subcutaneous drugs should never be prescribed using the abbreviation 'S/C or SC' as it is an error prone abbreviation due to potential confusion with 'S/L or SL' (sublingual) [31]. The acceptable abbreviation is 'subcut' and must be used in all prescriptions[31].

8.1 Procedure

1. Perform hand hygiene.
2. Remove the anaesthetic patch/cream and wipe off the skin.
3. Perform hand hygiene.
4. Don PPE, except gloves.
5. Perform hand hygiene and then don gloves.
6. At the bedside perform the chemotherapy "Time Out" if required, checking the patient details with second RN (see Section 3 for information regarding when to complete a time out. See Appendix 7 for Chemotherapy Time Out Sheets).
7. Remove the combi-stopper from the cytotoxic syringe and discard immediately as cytotoxic waste.
8. Attach the needle to syringe containing cytotoxic medication ensuring it is twisted on tightly.
9. **Do not prime needle. Do not expel air from needle**.
10. Place a plastic backed absorbent pad/sheet under the injection area[2]. Use only sheets/pads stored in clean clinical areas.
11. Position patient into a comfortable position. You made need another person to help hold them.
12. Swab the area with the alcohol wipe.
13. Remove cap from needle and inject into the leg as prescribed (IM or Subcut).
14. Inject the contents of the syringe into the patient. An insuflon must never be used for subcut cytotoxic drugs.
15. Leave the needle insitu for 5 seconds (if possible) and slowly remove needle. This minimises the amount of cytotoxic that may spill out of the injection site.
16. Place the needle immediately into the cytotoxic sharps waste bin and never re-sheath.
17. Apply sterile gauze to injection site to absorb any potential ooze and then apply the bandaid.
18. Discard all other equipment used including the disposable injection tray or kidney dish into the cytotoxic waste bin.
19. Discard gauze as cytotoxic waste.
20. Remove PPE and dispose of as cytotoxic waste.
21. Perform hand hygiene

9 Intrathecal Drugs [3, 7-11, 15, 18, 24]

9.1 Prescription of Intrathecal Drugs

- Intrathecal drugs should never be prescribed using the abbreviation 'IT' as it is an error prone abbreviation due to potential confusion with 'IV' (31). The full word 'intrathecal' must be used in all prescriptions (31).
- Only members of the Oncology Services medical team are authorised to prescribe intrathecal drugs:
  - "Go-Ahead" with intrathecal therapy must be written by the Consultant of Fellow the progress notes/3HO 'buff folder'.
  - The written "Go-Ahead" for cytotoxic drugs must be written by an Haematology/Oncology Medical Officer. Orders made by Registrars and Residents must have accompanying documentation that the Haematology/Oncology Fellow or Consultant agrees to "Go-Ahead" with therapy and documents this in the "Go-Ahead".
- Methotrexate, cytarabine and hydrocortisone are the only drugs prescribed for intrathecal administration. In very rare circumstances other drugs may be prescribed.
- Intrathecal drugs and Vinca Alkaloids are **NEVER** prescribed for administration on the same day.
- Prescriptions for intrathecal cytotoxic drugs are mostly pre-printed by Pharmacy or written on a standard medication chart, and never abbreviated as "IT". [31]

9.2 Labelling and Packaging

- All intrathecal drugs are clearly labelled with patient and medication details.
- All drugs for intrathecal administration are drawn up in luer lock syringes.
- All intrathecal drugs are clearly labelled with a prominent warning label on the syringe and outer bag to identify '**FOR INTRATHECAL USE ONLY**'.
- All intrathecal drugs are packaged and dispensed separately from other cytotoxic drugs.

9.3 Transport and Storage

- All intrathecal drugs are stored in the Pharmacy Department in designated areas for intrathecal drugs only.
- Outside the Pharmacy Department, intrathecal drugs are stored in the designated intrathecal cytotoxic hard storage box in the Medication Room refrigerators on C2North and C2West.

9.4 Checking and Administration

- Intrathecal drugs should only be administered within '**normal working hours**' when a full range of specialist expertise, knowledge and support is readily accessible.
- Intrathecal drugs may **ONLY** be administered by KCC MOs who have completed the SCH MO accreditation program.
- Intrathecal drugs should be checked '**out loud**' with a fully accredited RN and the Oncology MO.
- At the bedside, the intrathecal drug should be checked '**out loud**' using the Chemotherapy 'time out' form (Appendix 7) immediately prior to the injection.
- No other cytotoxic drug should be available in the treatment area during lumbar punctures and the administration of intrathecal drugs.

VINCA ALKALOIDS are never prescribed on the same day as the administration of **INTRATHECAL** medications. Vinca alkaloids are clearly labelled with a prominent sticker which states '**FOR INTRAVENOUS USE ONLY – FATAL IF GIVEN BY OTHER ROUTES**'.

10 Monoclonal Antibodies and Small Molecule Inhibitors

Drugs that have a suffix of – mab are classified as *Monoclonal Antibodies* e.g. Rituximab.

Drugs that have a suffix of –nib are classified as *Small Molecule Inhibitors* e.g. Sorafenib.

Within Australia safe handling requirements for this group of drugs are still under development and long term exposure to handling these drugs and their related waste is currently unknown. Until this information is available, safe handling of these specific groups of drugs should be on an individual basis and should follow pharmacy warning identification labels.

For any questions regarding administration and safe handling please contact the Paediatric Oncology Pharmacist, KCC or CNS2 Clinical Trials KCC.

11 Patient and Family Education

- Patient and family education must be completed prior to administration of cytotoxic drugs.[3, 7, 8, 15, 24] Appropriate verbal and written educational resources are provided to the patient and family which include:
  - Cytotoxic drug information
  - Concomitant medications and fluids
  - Treatment protocol and cycle of treatment
  - Potential side effects and symptom management
  - Waste Management
  - Adverse and long term side effects
- A copy of the *The KCC Family Handbook* is given to all families which contains printed information regarding each cytotoxic drug.
- On discharge, patients, parents and/or family members are provided with the Homecare Guidelines "*Oral Chemotherapy at Home*" (see Appendix 9).
- CNC Outreach will provide pre-packaged spill kits and educate families on its use.

12 Transporting Patients

While IV cytotoxic drug infusions are in progress patients should remain at their bed space on the ward. Transportation of patients, who have an IV cytotoxic drug infusion in progress, should be avoided. If this is not possible and a patient is transported whilst a cytotoxic drug infusion is in progress, a staff member trained in spill management and a spill kit must accompany the patient. The IV pole should be clamped to the bed and raised off the ground during transportation. [2, 15, 24]

13 Packaging, Transporting and Storage of Cytotoxic Drugs

13.1 Cytotoxic Drugs

Cytotoxic drugs packaging, transport and storage requirements are determined by NSW WorkCover.

Parenteral/ injectable cytotoxic drugs prepared in the pharmacy sterile unit should be packaged with outer bags heat sealed and transported in a leak proof, sealed, puncture proof container that is clearly labelled as **cytotoxic**. Oral cytotoxic drugs must be dispensed into a container with a 'child-proof' lid. Any members of staff transporting cytotoxic drugs should also carry a Cytotoxic spill kit.

A sealed puncture proof container that is clearly labelled "**Cytotoxic**" must be used to store individual cytotoxic drugs in the medication rooms within the wards. This includes all cytotoxic drugs which require refrigeration, oral cytotoxic drugs, intrathecal drugs as well as all other cytotoxic drugs.

Quantities of cytotoxic drug stored in the wards should be restricted to those required for short term use and be stored in a designated area to facilitate quick and efficient containment of any spill.[2, 24]

13.2 Hazardous Drugs

Hazardous drugs packaging, transport and storage requirements are not stipulated by NSW WorkCover.

Hazardous Drugs:

Hazardous drugs will be identified as hazardous by pharmacy with a hazardous label. They will be supplied to the ward from pharmacy into a puncture proof sealable container that is labelled as '**hazardous'** drugs. The drugs will be transported in the hazardous drug container to the wards. There are no other requirements for transporting hazardous drugs however a spill kit should be available on the ward in case of a spill.

A sealed puncture proof container that is clearly labelled "**Hazardous Drugs**" must be used to store individual hazardous drugs in the medication rooms within the wards. This includes all hazardous drugs which require refrigeration. Hazardous drugs should be stored separately to cytotoxic drugs and handle as cytotoxic drugs.

Handle as Cytotoxic Drugs

Hazardous drugs packaging, transport and storage requirements are not stipulated by NSW WorkCover however at SCHR Handle as Cytotoxic Drugs will be transported and stored in the same manner as cytotoxic drugs as described above.

14 Extravasation

Cytotoxic drugs can be vesicants, irritants or neutral. Vesicant drugs cause tissue necrosis when extravasated. Irritant drugs do not cause necrosis, but cause stinging, aching, tightness, and phlebitis when extravasated. Neutral drugs do not cause local irritation when extravasated.

Extravasation is defined as the inadvertent administration or leakage of a medication into the surrounding tissue instead of into the intended vascular pathway. If extravasated or infiltrated, some cytotoxic drugs cause irritation, ulceration and potential burns. Extravasation can occur peripherally (through an intravenous cannula) or centrally (through a Central Venous Access Device).

The following should be implemented to avoid a cytotoxic extravasation:

- Assess intravenous access site throughout administration of chemotherapy.
- Do not attempt to give an intravenous drug unless you are confident of accessing the vein.
- The antecubital veins should be avoided as extravasation in this area can cause serious tissue injury and potential long term damage.
- The administration of a vesicant via a peripheral cannula or Peripherally Inserted Central Catheter (PICC) line must be undertaken by an Accredited RN or MO.
- Cannulas should be no more than 24 hours old and patent.
- Blood backflow must be confirmed for all CVADs prior to the administration of cytotoxic drugs. If blood flow is difficult or does not flow easily, consult MO for treatment of potential blockage or tip migration/malposition prior to administering cytotoxic drugs.
- Extravasation should be suspected if the patient complains of burning, stinging, pain or discomfort or there is swelling, oedema, erythema, leakage at the site. Inflammation and blistering are the late symptoms of an extravasation. In the event of a mixed drug extravasation it is recommended to act in accordance with the drug that has the most harmful properties.

In the event of an extravasation or infiltration injury:

1. Stop the injection or intravenous infusion immediately.
2. Leave the central venous access device (CVAD) in place.
3. Aspirate any residual drug from the CVAD using a sterile syringe.
4. Notify medical officer, pharmacist and or a senior nurse
5. Assess:
    - drug extravasated, dose, volume
    - position and size of wound
    - amount and type of exudate
    - presence of swelling, oedema
    - extent and spread of erythema, trace the affected area with pen
    - pain
6. Photograph the area if possible
7. Provide pain relief if indicated
8. Initiate appropriate drug specific management measures as per Pharmacy.
9. For Vinca Alkaloids, apply warm compress to the affect area for 15 minutes. Do not apply pressure or wrap the compress to the skin. For all other vesicants or irritants, apply a cold compress to the affected area for 15 minutes. For further management consult medical team.
10. Complete an IIMS

Refer to www.eviq.org.au for more information on extravasation management

15 Patient Monitoring Requirement

All patients undergoing cytotoxic or hazardous drug therapy should have a minimum of 4 hourly observations (pulse, respiratory rate, temperature and blood pressure), 4 hourly fluid balances and daily urinalysis. Regular monitoring of full blood count, liver and renal function is recommended. In the event of patient deterioration notify the medical team and increased the frequency of observations.

Certain cytotoxic and hazardous drugs require extra patient monitoring which are detailed in Appendix 10. Refer to the pharmacy chemotherapy fluid order sheets and the medical notes for more information.

16 Waste Management [2-4, 15, 17, 18]

16.1 Cytotoxic Waste

Cytotoxic waste is any residual cytotoxic drug or material associated with the administration of these agents. Such items include sharps, syringes, IV bags and administration sets. All intravenous waste is placed in a sealed plastic bag and disposed of into an appropriate cytotoxic sharps or waste container.

16.2 Cytotoxic Patient Waste

Most cytotoxic drugs are primarily eliminated from the patient by renal or faecal excretion, however may also be eliminated in a patient's blood and sweat. Urine, faeces, sweat and the patient's blood may be potentially contaminated with either the unchanged drug or active metabolites. Vomitus of patients who have recently received oral cytotoxic drugs may also be contaminated. The following precautions should be standard for all patients receiving cytotoxic drugs:

- eviQ states that irrespective of the cytotoxic drug administered, staff are to apply a **7-day excretion protection period**. That is, **full PPE is worn for a seven day period from the completion of cytotoxic treatment when handling patient body fluids.** If specific drug excretion times are required, please refer to Appendix 6. This is a guide for homecare only.
- In SCH a purple **Excretion Alert Page** is placed at the front of the medical record to identify patients who are excreting cytotoxic waste.
- Prior to caring for patients receiving cytotoxic drugs, nursing staff should know the name of the drug administered, the route of administration and the usual route of excretion.
- On discharge, patients, parents and/or family members are provided with the Homecare Guidelines "Oral Chemotherapy at Home" (Appendix 9).
- Urine is not decanted into a jug for measurement due to the risk of aerosol contamination. Urine required to be measured should be weighed.
- Patients using the toilet should be instructed to close the toilet lid to avoid splash and to use a full flush.

16.3 Contaminated Linen

Linen contaminated with cytotoxic drugs or cytotoxic patient waste should be placed in a purple cytotoxic waste bag, sealed with a bag tie and then placed in appropriate cytotoxic waste bin.

If a mattress is contaminated with cytotoxic waste or spill, this should be first cleaned as per a cytotoxic spill (may require the use of a cytotoxic spill kit) wearing full PPE[2]. The mattress must then be cleaned with appropriate disinfectant as per hospital policy.

16.4 Hazardous Drug Waste

Most hazardous drugs are primarily eliminated from the patient by renal or faecal excretion. Urine, faeces, sweat and the patient's blood may be potentially contaminated with either the unchanged drug or active metabolites. Vomitus of patients who have recently received hazardous drugs may also be contaminated. Refer to Appendix 5 for PPE requirement when handling hazardous drug body fluid waste.

Linen contaminated with hazardous drugs or hazardous patient waste should be handled as per section 16.3 (above).

17 Spill Management [2-4, 17, 15]

A cytotoxic spill requires immediate management and must be effectively controlled so as not to promote unnecessary contamination of the environment. Cytotoxic spills include any spill of medication whether it is powder or liquid and spills of patient waste such as urine/vomit, blood and faeces.

The following applies:

- All areas where cytotoxic drugs are prepared, stored or administered must have a Cytotoxic Drug Spill Kit available.
- All staff working in these areas should be trained in spill management.
- In every hospital (fleet) vehicle used to transport cytotoxic drugs or related waste products, a spill kit should be readily available in the boot.
- Cytotoxic Spill kits are available on stores through barcoding.
- A Spill Kit will effectively contain a spill up to 1000mL.
- When managing any drug spilt on personnel, the first priority is the removal of the drug from the person. Flushing the contaminated areas with copious amounts of water for 15-20 minutes is first line management. In these instances someone other than the affected operator should clean up the spill.
- The immediate area should be cleared of as many people as possible.
- Notify the Pharmacy Department informing them of the incident and naming the cytotoxic drug involved and the extent of the spill.
- Notify the Consultant/Fellow of the spill for assessment of the child's drug dose requirements.
- Complete an IIMS notification and adverse event log entry.
- NM/NUMs are responsible to keep a record of spills (from IIMS) for each exposed staff member. Upon cessation of employment, the record/s are then forwarded to NM Workforce who will store them in the respective Staff Health Personnel file for 30 years.
- It's a legal requirement that all spills involving Cyclophosphamide must be reported to WorkCover NSW. SCH Work Health Safety (WHS) are responsible to provide the report.

For more information refer to NSW WorkCover guide, "Cytotoxic Drugs and Related Waste Risk Management Guide 2008":
http://www.cnsa.org.au/documents/oct2008/cytotoxic_drugs_related_waste_risk_management_guide_5633.pdf

18 Personnel Management [2-4, 12]

Little is known about the long term effects of occupational exposure to low level doses of cytotoxic drugs. Currently, there is no process of biological monitoring or health assessment which is sufficiently specific to adequately predict the effects of exposure to cytotoxic drugs.

Therefore the primary focus of safety during the preparation and handling of cytotoxic drugs must be on the control of the working environment and safe working practices. Current literature suggests that staff involved in the handling and administration of cytotoxic drugs should have medical assessments performed for epidemiological studies.

18.1 Health Surveillance

Health Surveillance involves baseline blood tests for FBC, UECs and LFTs on commencement of employment and yearly thereafter. The NM Workforce maintains records for all nursing staff who require health surveillance. The Chief RMO maintains records for MOs.

Pregnant staff, or those anticipating pregnancy or those breastfeeding, should follow current WorkCover guidelines and discuss with Nurse Manager (Workforce) and relevant Nurse Unit Manager about the possibility of alternate duties. The form in Appendix 8 must be completed in this instance.

18.2 Reporting and Recording Staff Exposure

"Chemotherapy Administration Logs and Adverse Events Log (see Appendix 3) are to be completed by all employees involved in the preparation and administration of cytotoxic drugs(3). These are stored in the chemotherapy preparation room on C2West and on the bookshelf at the Nurses' Station on C2North. On resignation, staff members are given a copy of the sheets and the originals are stored by the NM Workforce (30 years) in the respective Staff Health Personnel File. MO logs are stored by the CRMO at the end of the medical term.

Employees should **report any side effects** or contamination related to the handling of cytotoxic drugs or contaminated waste to the NUM/CRMO and WHS & IM Department.

In the event of a **cytotoxic exposure** (which could be in the form of a spill or needlestick) where an employee is contaminated, staff must contact one of the following to arrange to a blood and urine sample.

- Work Health Safety Co-ordinator 9382 8471,
- Employee Preventative Health Unit 9382 2859

The exposure incidents must be documented in IIMS

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Appendix 1: Cytotoxic Blood Screening Declaration

SYDNEY CHILDREN'S HOSPITAL
CYTOTOXIC BLOOD SCREENING DECLARATION

This form is to be completed at commencement of employment and thereafter every year by **all staff** involved in the administration of cytotoxic medications.
All staff who have administered chemotherapy whilst employed at SCH must complete this form when they resign from SCH.

Section 1: To be completed by:
Employee Preventative Health Unit,
CHESS, Level 2 Clinical Sciences Building
Prince of Wales Hospital.

Recommended health assessment includes:
Full blood count and differential
Electrolytes, urea and creatinine
Liver function test
Folate, b12, Ferritin
Thyroid function test.

1. Employee Preventative Health Unit, CHESS, Prince of Wales Hospital

Staff NAME _____ _____ Date ___/___/___

Clinic Nurse Name _____

Signature _____ _____ Date ___/___/___

Or stamp

Section 2: Completed form to be forwarded to NM Workforce for Nursing Staff and Chief RMO for Medical Staff.

Notification received: Date__/__/__ Next health screen due: Date __/__/__

June 2011.

Appendix 2: Cytotoxic Administration Log

SYDNEY CHILDREN'S HOSPITAL CYTOTOXIC ADMINISTRATION LOG

Name: _____ **Employee No.:** _____ **Department:** _____

Date	Name of Drug	Dosage	Time in contact	Route of admin.	Activity	PPE used	Sign.
	Checked By NUM CNE (circle)			**Signature**			

Legend:
F-PPE = Full Personal Protective Equipment (Gown, Gloves, Goggles and Mask)
P-PPE = Anything less than full PPE. If less than full PPE is worn, staff members are required to specify which items of PPE were worn.

This form is to be reviewed by the Manager on the first Monday of February, May, August & November. At resignation, this form/s is to be held by NM Workforce or CRMO with a copy given to the employee.

Appendix 3: Cytotoxic Adverse Events Log

NAME: _____ **EMPLOYEE NUMBER:** _____

DEPARTMENT: _____

Protective garments are to be worn as per Hospital Policy:
Chemo gloves, TYVEK gown, mask and goggles.

IT = Intrathecal
PO = Oral Drug
IV = Intravenous Infusion
SUBCUT = Subcutaneous

Date	Name of Drug	Description of Event	What PPE used?	IIMS notification number	Signature

Appendix 4: List of Cytotoxic Drugs

Cytotoxic Drugs List: This list of drugs has been generated by the Kids Cancer Centre at Sydney Children's Hospital drugs are included on this list if stipulated as CYTOTOXIC by either the drug manufacturer or WorkCover NSW.

Drug name	Drug Class	Cited in WorkCover as Cytotoxic	Minimum PPE requirements
All-trans retinoic acid PO (tretinoin)	Miscellaneous	Yes	Gloves, Gown (if cutting/dissolving use full PPE)
Arsenic Trioxide IV	Antineoplastic	No*	Full PPE
Azathioprine PO tablets	Imunnosupressant	Yes	Gloves, Gown (if cutting/dissolving use full PPE)
Azathioprine IV, suspension	Imunnosupressant	Yes	Full PPE
Amasacrine IV	Antineoplastic	Yes	Full PPE
Asparaginase Erwinia IV/ IM	Antineoplastic	Yes	Full PPE
Asparaginase Leunase IV/ IM	Antineoplastic	Yes	Full PPE
Bleomycin IV	Antineoplastic	Yes	Full PPE
Bortezemib IV	Antineoplastic	No *	Full PPE
Brentuximab IV	Monoclonal Antibody	No *	Full PPE
Busulphan IV	Antineoplastic	Yes	Full PPE
Carboplatin IV	Antineoplastic	Yes	Full PPE
Carmustine IV	Antineoplastic	Yes	Full PPE
Cidovofir IV	Antiviral	No *	Full PPE
Cisplatin IV	Antineoplastic	Yes	Full PPE
Cladribine IV	Antineoplastic	Yes	Full PPE
Crizotinib PO	Small Molecule Inhibitor	No **	Gloves, Gown (if cutting/dissolving use full PPE)
Cyclophosphamide IV	Antineoplastic	Yes	Full PPE
Cytarabine IV, Intrathecal	Antineoplastic	Yes	Full PPE
Dacarbazine IV	Antineoplastic	Yes	Full PPE
Dactinomycin IV	Antineoplastic	Yes	Full PPE
Daunorubicin IV	Antineoplastic	Yes	Full PPE
Daunorubicin Liposomal IV	Antineoplastic	Yes	Full PPE
Dexrazoxane IV	Cardio-protectant	No **	Full PPE
Doxcetaxel IV	Antineoplastic	Yes	Full PPE
Doxorubicin IV	Antineoplastic	Yes	Full PPE
Doxorubicin Liposomal IV	Antineoplastic	Yes	Full PPE
Epirubicin IV	Antineoplastic	Yes	Full PPE
Etoposide IV	Antineoplastic	Yes	Full PPE
Etoposide Phosphate IV	Antineoplastic	Yes	Full PPE
Fluorouracil IV	Antineoplastic	Yes	Full PPE
Fludarabine IV	Antineoplastic	Yes	Full PPE
Ganciclovir IV	Antiviral	Yes	Full PPE
Gemcitabine IV	Antineoplastic	Yes	Full PPE

Drug name	Drug Class	Cited in WorkCover as Cytotoxic	Minimum PPE requirements
Hydroxyurea PO	Antineoplastic	Yes	Gloves, Gown (if cutting/dissolving use full PPE)
Idarubicin IV	Antineoplastic	Yes	Full PPE
Ifosfamide IV	Antineoplastic	Yes	Full PPE
Irinotecan IV	Antineoplastic	Yes	Full PPE
Lomustine PO (film coated capsule)	Antineoplastic	Yes	Full PPE
Melphalan IV	Antineoplastic	Yes	Full PPE
Mecaptopurine PO (uncoated tablet)	Antineoplastic	Yes	Gloves, Gown (if cutting/dissolving use full PPE)
Methotrexate PO (uncoated tablet)	Antineoplastic	Yes	Gloves, Gown (if cutting/dissolving use full PPE)
Methotrexate IV, IT	Antineoplastic	Yes	Full PPE
Mitotane PO	Anabolic Steroid	No **	Gloves, Gown (if cutting/dissolving use full PPE)
Mitozantrone IV	Antineoplastic	Yes	Full PPE
Mitomycin-C IV	Antineoplastic	Yes	Full PPE
Nelarabine IV	Antineoplastic	No **	Full PPE
Pegaspargase (Peg- Asparaginase) IV	Antineoplastic	Yes	Full PPE
Paclitaxel IV	Antineoplastic	Yes	Full PPE
Procarbazine PO (film coated capsules)	Antineoplastic	Yes	Gloves, Gown (if cutting/dissolving use full PPE)
Ribavirin IV	Antiviral	Yes	Full PPE
Sorafenib PO (film coated tablet)	Small Molecule Inhibitor	No *	Gloves, Gown (if cutting/dissolving use full PPE)
Temozolamide PO (coated tablet)	Antineoplastic	Yes	Gloves, Gown (if cutting/dissolving use full PPE)
Tenioposide IV	Antineoplastic	Yes	Full PPE
Thioguanine PO	Antineoplastic	Yes	Gloves, Gown (if cutting/dissolving use full PPE)
Thiotepa IV	Antineoplastic	Yes	Full PPE
Topetecan IV	Antineoplastic	Yes	Full PPE
Valganciclovir PO (film coated tablets)	Antiviral	Yes	Gloves, Gown (if cutting/dissolving use full PPE)
Valganciclovir suspension	Antiviral	Yes	Full PPE
Vinblastine IV	Antineoplastic	Yes	Full PPE
Vincristine IV	Antineoplastic	Yes	Full PPE
Vindesine IV	Antineoplastic	Yes	Full PPE
Vinorelabine IV	Antineoplastic	Yes	Full PPE
Vandetanib IV	Small Molecule Inhibitor	No **	Full PPE

* Manufacturer recommendation to handle as cytotoxic

** Manufacturer recommendation to handle as cytotoxic, and currently not registered in Australia, investigator's brochure used to identify if a genotoxic, carcinogenic or teratogenic risk.

Reference: Workcover 2008 [2]

Consultation of various resources has informed the inclusion of medications on this list however this list is not exhaustive. Agents not present on this list, particularly new drugs not registered for use in Australia should have a hazard assessment prior to use.

Appendix 5: 2013-2014 List of Hazardous Drugs Requiring PPE

Hazardous Drugs List: This list has been generated by the Kids Cancer Centre at Sydney Children's Hospital and the Medicines Advisory Group (MAG) high risk medications working party. Drugs are included on this list if hazardous with normal use but not explicitly stipulated as cytotoxic by either the drug manufacturer or WorkCover NSW. The Hazardous Drug list will be reviewed annually.

Drug Name	Drug classification	Hazard Risk	Exposure Risk	Handling	Minimal PPE required	Accredi-tation required to administer	Spill clean PPE	Waste Handling PPE= Gloves, Gown Goggles, Mask	Comments
Cis-trans retinoic acid (Isotretinoin) Film coated capsules	Differentiating Agent	Teratogen	Inhalation Irritant, low risk Skin irritation, low risk	Handle as Hazardous	Gloves only	No	Gloves for individual capsule spill. A spill kit with PPE is required if the area is greater than the size of your hand.	Active metabolites excreted in urine and/or faeces: Yes **Handle waste using PPE for 7 days**	If piercing or dissolving capsule use FULL PPE Follow pharmacy guidelines for preparation of dose
Cyclosporin Intravenous	Immuno-suppressant	Carcinogen Teratogen	Inhalation Irritant, high risk Skin Irritation, moderate risk	Handle as Cytotoxic	Gloves, Gown Goggles, Mask	Yes	Full PPE should be used to clean the spill. A spill kit with PPE is required if the area is greater than the size of your hand.	Active metabolites/ unchanged drug excreted in urine and/or faeces: Yes **Handle waste using PPE for 7 days**	Classified as a class 1 carcinogen by IARC WHO and due to exposure risk of IV/liquid PPE is required
Cyclosporin Suspension	Immuno-suppressant	Carcinogen Teratogen	Inhalation Irritant, moderate risk	Handle as Cytotoxic	Gloves, Gown Goggles, Mask	Yes	Full PPE should be used to clean the spill. A spill kit with PPE is required if the area is greater than the size of your hand.	Active metabolites/ unchanged drug excreted in urine and/or faeces: Yes **Handle waste using PPE for 7 days**	Classified as a class 1 carcinogen by IARC WHO and due to exposure risk of IV/liquid PPE is required
Cyclosporin Film coated capsules	Immuno-suppressant	Carcinogen Teratogen	Inhalation Irritant, low risk	Handle as Hazardous	Gloves only	No	Gloves for individual capsule spill. A spill kit with PPE is required if the area is greater than the size of your hand.	Active metabolites/ unchanged drug excreted in urine and/or faeces: Yes **Handle waste using PPE for 7 days**	Liquid is encapsulated therefore risk of exposure is low.
Leflunomide Film coated tablets	Immuno-modulator	Teratogen	Inhalation Irritant, low risk Eye Irritation, high risk when dissolved	Handle as Hazardous	Gloves only	No	Gloves for individual tablet spill. A spill kit with PPE is required if the area is greater than the size of your hand.	Excreted unchanged/ active metabolites in urine/faeces: No **Use standard precautions**	Tablets are film coated therefore risk of exposure is low. If dispersing tablets use FULL PPE as eye irritation is high risk
Mycophenolate Mofetil (MMF) Intravenous	Immuno-modulator	Mutagenic Teratogen	Inhalation Irritant, high risk Eye irritation, high risk	Handle as Cytotoxic	Gloves, Gown Goggles, Mask	Yes	Full PPE should be used to clean the spill. A spill kit with PPE is required if the area is greater than the size of your hand.	Active metabolites in urine: Yes **Handle waste using PPE for 7 days**	Reconstitute vial as per mycophenolate mofetil guideline
Mycophenolate Mofetil (MMF) Suspension	Immuno-modulator	Mutagenic Teratogen	Inhalation Irritant, moderate risk Eye irritation, high risk	Handle as Cytotoxic	Gloves, Gown Goggles, Mask	Yes	Full PPE should be used to clean the spill. A spill kit with PPE is required if the area is greater than the size of your hand.	Active metabolites in urine: Yes **Handle waste using PPE for 7 days**	Where possible mycophenolate mofetil suspension should be reconstituted in paediatric pharmacy
Mycophenolate Mofetil (MMF) Film coated Capsules/tablets	Immuno-modulator	Mutagenic Teratogen	Inhalation Irritant, low risk	Handle as Hazardous	Gloves only	No	Gloves for individual capsule or tablet spill. A spill kit with PPE is required if the area is greater than the size of your hand.	Active metabolites in urine: Yes **Handle waste using PPE for 7 days**	Capsules and tablets are film coated therefore risk of exposure is low. Use suspension for doses not multiples of 250mg/500mg Do not crush tablets or open capsules.
Tacrolimus Intravenous	Immuno-suppressant	Suspected Carcinogen Suspected Teratogen	Inhalation irritant, moderate risk Eye irritant Low risk	Handle as Cytotoxic	Gloves, Gown Goggles, Mask	Yes	Full PPE should be used to clean the spill. A spill kit with PPE is required if the area is greater than the size of your hand.	Active metabolites: Yes (92% metabolites excreted in faeces) **Handle waste using PPE for 7 days**	Classified as a class 2 carcinogen by IARC WHO and due to exposure risk of IV/liquid PPE is required
Tacrolimus Suspension	Immuno-suppressant	Suspected Carcinogen Suspected Teratogen	Inhalation irritant, moderate risk Eye irritant Low risk	Handle as Cytotoxic	Gloves, Gown Goggles, Mask	Yes	Full PPE should be used to clean the spill. A spill kit with PPE is required if the area is greater than the size of your hand.	Active metabolites/ unchanged drug excreted in urine and/or faeces: Yes **Handle waste using PPE for 7 days**	Classified as a class 2 carcinogen by IARC WHO and due to exposure risk of IV/liquid PPE is required. Store at room temperature. SCH Pharmacy prepares liquid suspension.
Tacrolimus Film coated capsules	Immuno-suppressant	Suspected Carcinogen Suspected Teratogen	Inhalation irritant, Low risk Eye irritant Low risk	Handle as Hazardous	Gloves only	No	Gloves for individual capsule spill. A spill kit with PPE is required if the area is greater than the size of your hand.	Active metabolites/ unchanged drug excreted in urine and/or faeces: Yes **Handle waste using PPE for 7 days**	Capsules are film coated therefore risk of exposure is low.

Practice Points for Hazardous Drugs

All drugs are potentially hazardous and each individual staff member must use their judgement to assess the handling risk before administering to patients.

Storage:

- Clinical areas should store hazardous drugs in a separate labelled hazardous drugs box. This box should not be used to store other medications including cytotoxic drugs.
- Handle as cytotoxic drugs should be stored with cytotoxic drugs.
- Keep hazardous drugs in original packaging.

Labelling:

- There are no special labelling recommendations from the manufacturers for hazardous drugs. These drugs will be labelled as 'hazardous' or 'handle as cytotoxic' on delivery to the ward from pharmacy.
- Intravenous infusions must be labelled as 'hazardous' or 'handle as cytotoxic' by the person administering the drug, to allow clinical staff to identify the need to use appropriate precautions. Label line and burette/syringe.
- Hazardous drugs administered via naso-gastric and gastrostomy tubes must be labelled as 'hazardous'.

Administration:

- Individual patient risk assessment: Prior to each medication administration staff member should assess the hazard risk. Patient specific factors should be used to determine if increased precautions are required. Consider full PPE for hazardous drugs if patient is noncompliant with medication e.g. spitting.
- For 'Handle as cytotoxic' drugs refer to Cytotoxic and Hazardous Drugs: Administration and Handling section 5-10.
- IV or oral liquids present increased risk of exposure due to ability of active agent to aerosolise in air during dose preparation. Minimise aerosolisation of liquid or IV dosage forms during dose preparation. Film coated tablets and capsules present minimal risk of exposure if original dose form is intact. Gloves alone are sufficient handling precaution if dosage form is intact.
- Liquid should not be decanted from original packaging on the ward. Mixing cannulas should be used to draw up liquid from bottle.
- Use dose formulation suited to route prescribed. If liquid form available eg suspension, solution or syrup use this in preference to dissolving or dispersing tablets or the contents of capsules. If a solid dosage form is to be altered, check solubility of the active agent with pharmacist.

Consultation of various resources has informed the inclusion of medications on this list however this list is not exhaustive. Agents not present on this list, particularly new drugs not registered for use in Australia should have a hazard assessment prior to use.

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Appendix 6: Excretion Rates for Cytotoxic Drugs

Table adapted from the 2008 WorkCover Guidelines.

Drug	Urine	Faeces	Other
Amsacrine	3 days	2 days	
Asparaginase	Trace amounts		
Bleomycin	3 days		
Busulphan	12-24 hours	Trace amounts	
Carboplatin	1-2 days		
Carmustine	4 days		10% as CO_2
Cisplatin	7 days		
Cyclophosphamide	3 days	5 days after oral doses	In sweat and saliva for 3 days
Cytarabine	1 days		
Dacarbazine	6 hours		
Dactinomycin	5 days	7 days	
Daunorubicin	2 days	7 days	
Docetaxel	7 days	7 days	
Doxorubicin	6 days	7 days	Bile 5 days
Epirubicin	7 days	5 days	
Etopophos	5 days		
Etoposide	4 days	7 days	
Fludarabine	2 days		
Flurouracil	2 days	5 days	
Gemcitabine	7 days		
Hydroxyurea	1 days		
Idarubicin	4 days	7 days	
Ifosfamide	2 days		
Imatinib mesylate	7 days	7 days	
Irinotecan	2 days		
Liposomal Doxorubicin	Unknown		
Lomustine	1 day		
Melphalan	2 days	7 days	
Mercaptopurine	2-3 days	5 days	
Methotrexate	3 days	7 days	
Mitomycin	1 day		Small amounts in bile
Mitoxantrone	6 days	7 days	
Paclitaxel	1 day	5 days	
Procarbazine	2 days	4 days	
Temozolomide	Unknown		
Thioguanine	1 day		
Thiotepa	3 days		
Topotecan	2 days		
Vinblastine	4 days	7 days	
Vincristine	4 days	7 days	
Vindesine	4 days	7 days	
Vinorelbine	4 days	7 days	

Note: if unsure, assume excretion time of 7 days.

Reference: The NSW WorkCover Guidelines: Cytotoxic Drugs and Related Waste 2008.

Appendix 7: Chemotherapy 'Time Out' Checklist

Sydney Children's Hospitals Network	
DRAFT Cytotoxic Drug Administration Time Out Checklist	AFFIX PATIENT LABEL HERE

Two health professionals (as approved by SCH cytotoxic administration policy) are to complete TIME OUT immediately prior to drug administration for cytotoxic drugs on a treatment protocol. The medical order should be verified and any discrepancies identified should be discussed with the prescribing doctor and the pharmacist prior to drug administration. Please write or circle the appropriate answer as indicated.

Protocol: _____ Cycle:_____ Day (e.g. day 1 of 4):_____

Patient allergies/previous hypersensitivities drug reactions: _____

The following criteria must be checked "Out Loud" by the two RNs or the RN and MO checking the drug(s) in a *low traffic area*					
	Drug 1	Drug 2	Drug 3	Drug 4	Drug 5
Date					
Time of drug check					
Drug name					
Correct patient	yes/no	yes/no	yes/no	yes/no	yes/no
Correct route	yes/no	yes/no	yes/no	yes/no	yes/no
Medical authority for treatment to proceed 'go-ahead' (Day 1 only unless otherwise stated)	yes/no	yes/no	yes/no	yes/no	yes/no
Relevant laboratory values are checked, pre chemotherapy investigations completed*	yes/no/NA	yes/no/NA	yes/no/NA	yes/no/NA	yes/no/NA
Correct drug, BSA/kg dose and drug expiration**	yes/no	yes/no	yes/no	yes/no	yes/no
The following criteria must be read "Out Loud" by the 2 RNs or the RN and MO checking the drug(s) at *the patient's bedside*					
Correct patient	yes/no	yes/no	yes/no	yes/no	yes/no
Correct drug	yes/no	yes/no	yes/no	yes/no	yes/no
Correct route	IV/PO/IM/SC/ IT	IV/PO/IM/SC/ IT	IV/PO/IM/SC/ IT	IV/PO/IM/SC/ IT	IV/PO/IM/SC/ IT
Correct date and time	yes/no	yes/no	yes/no	yes/no	yes/no
Venous access patent	yes/no/ NA	yes/no/ NA	yes/no/NA	yes/no/NA	yes/no/NA
Correct rate & pump programming checked	yes/no/ NA	yes/no/ NA	yes/no/NA	yes/no/NA	yes/no/NA
Time checking completed					
Signature and Designation					
Signature and Designation					
Comments/ Issues identified during "time out"					

If any of the above is answered with a **NO**, DO NOT PROCEED with drug administration. Seek further advice from medical officer, pharmacist or senior nurse.

* For relevant blood parameters and need for pre requisites (ECHO, GFR etc) for chemotherapy refer to the patient's treatment protocol.

** verify that all doses are correct according to the treatment protocol and patient parameters e.g. weight, body surface area (BSA), creatinine clearance and that maximum and cumulative doses are not exceeded for the dose of the course according to the protocol. Check any reductions are correct according to the protocol, patient parameters and doctor's instructions.

Appendix 8: Family Planning Document

Guideline for the management of Nurses working within the SCHN who are contemplating pregnancy, are pregnant or breast feeding and are employed in areas where cytotoxic drugs are administered

Name of Employee……
Ward …….
Date of discussion……

1. As previously discussed, you have chosen to remain working in **the Kids' Cancer Centre**:
   - ☐ During your pregnancy planning
   - ☐ During your pregnancy
   - ☐ Whilst you are breastfeeding

2. We have discussed the importance of using appropriate Personal Protective Equipment (PPE):
   - ☐ When administering cytotoxic medication (IV,IM, SC and oral)
   - ☐ When disposing of cytotoxic infusions
   - ☐ When managing cytotoxic waste
   - ☐ When managing cytotoxic patient waste

     - ❖ If the appropriate PPE is not available, you must notify the team leader / manager so that the appropriate PPE is made available for your protection and use.

     - ❖ You must ensure that you take reasonable care for your own safety and that of others while you are at work. You are required to comply with safe work practices when handling and administering cytotoxic medication as well as managing related cytotoxic wastes.

3. Your family planning can be further accommodated by excluding you from the following duty:
   - ☐ The administration of cytotoxic medication

4. You understand that you are responsible for discussing with your NUM, if at any time you wish to relocate to an area that does not administer cytotoxic medication.

The above has been discussed with me in detail and I understand my obligations and responsibilities.

Name of Employee……
Signature……
Date……

Name of Manager……
Signature……..
Date……

Appendix 9: Homecare Guidelines Oral Chemotherapy at Home

Giving chemotherapy tablets and capsules at home.

What is oral chemotherapy: Oral chemotherapy is medicine that is prescribed by the doctor to treat your child's cancer. Chemotherapy is potentially toxic and therefore some of these medications will require special handling. These medications are often identified by a purple label and the nurses/pharmacists at Sydney Children's Hospital will also identify them for you. Be careful when handling these drugs, avoid contact with the skin.

How does it come: Oral chemotherapy can be in the form of tablets or capsules. Not all children can swallow capsules or tablets. If this is the case please tell your doctor, nurse or pharmacist. The following guidelines are to assist in the safe administration of chemotherapy at home. These medications can be given by mouth, nasogastric (ng) tube or gastrostomy tube (G tube, PEG tube).

Missing a dose: Always give the dose exactly as the doctor prescribes. Please try not to skip any doses. If you do forget, give the dose as soon as you remember. If it is time for the next dose, do not double up, omit the forgotten dose, make a record of any missed doses and tell your doctor.

Nausea and vomiting: If your child vomits a dose within 15 minutes of taking, give the dose again. If it is after 15 minutes please do not repeat the dose, make a note and let the doctor know. If vomiting continues you may need to give a medication to prevent nausea and vomiting prior to the oral chemotherapy.

Spitting out doses: If your child spits out the medication regularly, or you are concerned they are not swallowing the whole dose, please contact your nurse/doctor. Please ensure you wear purple gloves when cleaning up any medicine that is spat out.

Cleaning up a spill: If your child spits out a dose, vomits, or you accidentally spill the medication put on a pair of purple gloves to clean up the spill and discard any fluids in a plastic bag. If the spill gets on you or your child's clothes please wash in hot water separately from other clothing. Use a disposable cloth to clean up the spill.

Nappies: Wear purple gloves when changing nappies. Place soiled nappies in a plastic bag that can be tied closed and discard in regular waste.

Urine and stools: Use the full flush to flush the toilet after each time your child uses the bathroom.

Linen and clothing: Unsoiled clothing and linens can be washed normally. Soiled linen and clothing should be washed immediately in hot water on their own in the washing machine. Do not hand-wash soiled linens.

Pregnancy: Do not administer the drug yourself if you are pregnant or breast-feeding. Please talk to your doctor/nurse if you have concerns regarding this.

Food: Some chemotherapy medications must be separated from food and dairy or have food restrictions during their administration. These will be indicated on the label or in printed information from the pharmacist.

Safe storage: We recommended you use a plastic lunchbox or container with a lid clearly marked **"for chemo only"** to store the medication. Keep the oral chemotherapy out of reach of other children and pets. Store the medication in a cool dry place unless the label says otherwise. Some medications may need to be refrigerated. Please keep the medication in the container that it is supplied in from the pharmacy as the brown bottles and white boxes protect the medications from light.

Halving tablets: Sometimes the dose will use a half tablet. We recommend you purchase a pill cutter and keep it in a zip lock bag clearly marked for chemo only. Keep the pill cutter in the same lunchbox as the oral chemotherapy. Please do not use a knife especially one that is used for food preparation.

Crushing tablets: Do NOT crush tablets under any circumstances.

Coming in to hospital: When your child is admitted to hospital please bring their chemotherapy tablets/capsules with them as the nursing staff will use these during your stay. Remember to pick up the medications from the nursing staff to take home again on discharge.

Where to get the chemotherapy: The Sydney Children's Hospital pharmacy department will dispense the entire course for most chemotherapy medications for your child. There are some exceptions to this, such as for children on maintenance for Acute Lymphoblastic Leukaemia (ALL), or children on temozolomide for brain tumours. In these cases the doctors in clinic will write a prescription to take to your local community pharmacy. Please allow 2-3 days for the local pharmacy to order in the stock.

Directions for the safe handling within the home

1. Find a low traffic area in your house that is free from drafts, air-conditioning or wind and is not an area where food is stored or prepared. A tiled area is preferable to carpet. Often the laundry is a suitable place.

2. Ensure you have the equipment necessary to give the drug within reach: Purple gloves, paper towel, pill cutter and the medication you are going to administer. If you need to dissolve the tablet also ensure you have a syringe, water and syringe cap.

3. Wash your hands.

4. Put on a new pair of disposable purple gloves provided by the hospital.

5. Cover the work surface with an impermeable and disposable mat such as a good quality paper towel.

6. Select the correct medication and read the label carefully each time you are giving a dose.

7. When you are ready to give the dose, open the medicine bottle and remove the dose. Place the tablet or capsule in a small cup or medication cup. Do not keep the dose in your hand.

8. If the tablets need to be halved, use a dedicated pill cutter to split the dose and place in the medication cup and put the unused half back in the bottle.

9. If your child can swallow the tablets or capsule give the dose in the cup to your child with a drink of water or juice or some foods (eg jam, honey, apple puree) to make the medication easy to swallow. Your pharmacist will advise which food and drinks are suitable for each medication.

If your child cannot swallow the tablets or capsules whole, use the following directions.
10. Boil some water in the kettle, poor into a measuring cup or container, and allow to cool so that it is warm, not boiling.

11. Pick up the syringe and pull the plunger from the barrel. Place the plunger on the paper towel.

12. Place the tablet(s) or half tablet inside the syringe. If the medication is a capsule, place the whole capsule inside the syringe. **Do not open the capsule**. Only dissolve **one** type of drug in each syringe at a time. You can only put multiple tablets or capsules of the **same** medication in the syringe. Do not mix **different** types of medications together.

13. Place the plunger of the syringe back into the barrel and push down until the stopper is close to, but not touching, the tablet or capsule. Do not use the plunger to crush the tablet or capsule.

14. Now get the boiled water that has been allowed to cool. Place the tip of the syringe in the cup and draw back a small amount of water between 2-5mL. If a portion of the dose is to be given follow the instructions on the label for the amount of water required.

15. Leaving a small amount of air in the syringe to facilitate mixing, cap the syringe with the caps provided.

16. Invert the syringe a few times to allow the drug to dissolve. The outside of the capsule should dissolve but you will still be able to see granules from inside the capsule.

17. If only a portion of the dose is to be given, discard the unwanted amount down the drain and rinse with water.

18. Give the dose by mouth, NG tube or gastrostomy tube (g-tube, PEG tube). It is best to give the dose all at one time, immediately after preparation. If you prepare the dose and it is unused within 30 minutes, discard the dose and start again. If unsure contact the pharmacist.

19. If there is residual drug in the syringe draw back another small amount of water and administer this also. Flush the ng tube or g-tube if applicable.

20. Once all of the medicine is taken throw away the paper towel and syringe in the purple bin provided.

21. Discard the gloves in the purple bin provided and wash your hands. Once the course is completed or the bin is full, seal the purple bin and bring it to clinic so it can be disposed of properly.

Supplied by hospital	**Supplied by patient**
Chemotherapy tablets or capsules (except maintenance for ALL)	Lunchbox: to be labeled “for chemo only”
Syringes to dose medication	Paper towels
Syringe caps if dissolving the medication	Pillcutter
Purple bin	Ziplock bags
Purple gloves	Garbage bags with handle ties

Please contact Pharmacy Department on **93822334** if you have any questions regarding the administration of chemotherapy medications.

Disclaimer: This document is not intended to take the place of your doctor or other health professional. Questions about individual health concerns or specific treatment options should be discussed with your doctor.

Appendix 10: Cytotoxic Drug Safety and Monitoring Guideline

Cytotoxic Drug Safety Monitoring Guideline

This document is designed to provide nursing staff with the minimum expected patient monitoring requirements for specific cytotoxic drugs. This list is not inclusive of delayed toxicities and late effects. For any cytotoxic agents not listed here please refer to treatment protocol or medical notes for specific nursing management.

All patients undergoing cytotoxic therapy should have 4 hourly observations and fluid balances, regular monitoring of full blood count, liver and renal function, unless otherwise indicated below, on the pharmacy chemotherapy plan or in the medical notes. In the event of patient deterioration notify the medical team and increased the frequency of observations.

Class	Drug	Side effect/Adverse effect	Monitoring
Vinca-Alkaloids	Vincristine Vineblastine Vindesine Vinorelbine	Extravasations	Line must be checked for patency pre and post administration and observed for the entire infusion. If continuous infusion, hourly site inspections. Consult extravasations policy.
		Fatal if given via any other route than intravenously	Drug must be labelled as ***"FOR INTRAVENOUS USE ONLY. FATAL IF GIVEN BY ANY OTHER ROUTES"*** Vincristine is considered a high risk drug under the 'NSW Health High Risk Medicine Management Policy'.
		Neuro-toxicity Assessment	Ensure neurological assessment has been reported by RMO
		Constipation	Prior to administration enquire of date of last bowel motion and if >48hrs notify RMO
Epipodo-phyllotoxin	Etoposide Etopophos	Hypotension	Rapid infusion is associated with severe hypotension. Monitor blood pressure& heart rate pre- infusion, 15 minutes into the infusion, then hourly during infusion.
		Anaphylaxis	Monitor for broncho-spasm/ hypotension and follow local policy for anaphylaxis management.
Alkylating Agent	Cyclophos-phamide	Haemorrhagic cystitis	Monitor urine output & each urine for micro/macroscopic blood, consult protocol for hydration and Mesna management.
		Veno-occlusive Disease or Sinusoidal obstructive syndrome	Monitor patient for signs of hepatosplenomegaly, right upper quadrant pain, jaundice, increased transaminases/ liver function tests and fluid retention. Usually occurs 7-21 days post high dose chemotherapy.
	Ifosfamide	Haemorrhagic cystitis	Monitor urine output and each urine for micro/macroscopic blood.
		Neurotoxicity	Monitor for signs of neurotoxicity: confusion, lethargy, seizures and ataxia, stupor. May need antidote: Methylene Blue
		Fanconi Syndrome	Monitor patient for glycosuria, protienuria, hypokalemia, metabolic acidosis and hypophosphatemia as it may be a sign of the development of dose limiting Fanconi Syndrome (phosphate wasting). Refer to treatment protocol for management.
	Busulfan	Seizures	Must receive anticonvulsant prior administration and continue until after the last dose.
		Drug level Monitoring	Drug levels are taken as per protocol.
		Veno-occlusive Disease or Sinusoidal obstructive syndrome	Monitor patient for signs of hepatosplenomegaly, right upper quadrant pain, jaundice, increased transaminases/ liver function tests, weight gain and fluid retention. Usually occurs 7-21 days post high dose chemotherapy.
	Cisplatin	Otoxicity	Avoid the use of other drugs that may contribute to hearing damage (eg. Gentamicin).
		High Emetogenic Potential	Perform a risk assessment & nursing history prior to commencing infusion to ensure adequate prescription of antiemetic.
	Carboplatin	Otoxicity	Avoid the use of other drugs that may contribute to hearing damage, (eg. Gentamicin).

Class	Drug	Side effect/Adverse effect	Monitoring
		Anaphylaxis	Monitor for broncho-spasm/ hypotension and follow local policy for anaphylaxis management.
	Carmustine	Veno-occlusive Disease or Sinusoidal obstructive syndrome	Monitor patient for signs of hepatosplenomegaly, right upper quadrant pain, jaundice, increased transaminases/liver function tests and fluid retention. Usually occurs 7-21 days post high dose chemotherapy.
		Hypotension	Monitor blood pressure& heart rate pre- infusion, 15 minutes into the infusion, then hourly during infusion.
Anti-tumour antibiotic	Bleomycin	Lung Fibrosis	Signs can occur as early as 4 weeks after commencing treatment with Bleomycin. Monitor patient for crackles, dyspnoea, with cough. Ensure chest X-ray has been performed when stipulated in the treatment protocol prior to commencing infusion. **Do not administer high flow oxygen to any patient who has received Bleomycin.**
		Fever	Monitor temperature during and post infusion. Premedication of paracetamol may be required for some patients. If patient is febrile pre administration consult the medical team.
	Dactinomycin	Veno-occlusive Disease or Sinusoidal obstructive syndrome	Monitor patient for signs of hepatosplenomegaly, right upper quadrant pain, jaundice, increased liver function tests and fluid retention. Usually occurs 7-21 days post high dose chemotherapy.
		Anaphylaxis	Monitor for bronco-spasm/ hypotension and follow local policy for anaphylaxis management.
		High Emetogenic Potential	Perform a risk assessment & nursing history prior to commencing infusion to ensure adequate prescription of antiemetic.
		Extravasations	Line must be checked for patency pre and post administration and observed for the entire infusion. If continuous infusion, hourly site inspections. Consult extravasations policy.
		Radiation	When given concurrently or within 6 weeks of radiotherapy consult protocol as may require omission or dose reduction.
Anthra-cyclines	Doxorubicin	Cardiotoxicity	Ensure echocardiogram has been performed when stipulated in treatment protocol prior to starting infusion
		Flare Reaction	Potential for there to be a red flaring or tracking of the vein that is being used to administer the chemotherapy
		Radiation	When given concurrently or within 6 weeks of radiotherapy consult protocol as may require omission or dose reduction.
		Extravasations	Line must be checked for patency pre and post administration and observed for the entire infusion. If continuous infusion, hourly site inspections. Consult extravasations policy.
		Urine Colour Changes	Urine may become rose or pink in colour post infusion and last 24-48 hours.
	Daunorubicin Idarubicin Mitoxantrone	Urine Colour Changes	Urine may be rose or pink in colour post Daunorubicin/Idarubicin or green in colour post Mitoxantrone and last 24-48 hours.
		Cardiotoxicity	Ensure echocardiogram has been performed when stipulated in treatment protocol prior to starting infusion.
Anti-meta-bolite	Methotrexate	Drug level Monitoring	Dose dependent: Hydration and levels are required for high dose therapy. For impaired renal function/ delayed clearance consult protocol for management.
		Poor Renal Excretion	Folinic Acid is required as a rescue for all high dose intravenous Methotrexate infusions, consult treatment protocol for times. In the event of high levels or delayed excretion, additional doses of folinic acid may be required, consult protocol for more information.
		Neurotoxicity	Monitor for signs of neurotoxicity.
		Chemical Hepatitis	Monitor patient for an increase in liver function tests.

Class	Drug	Side effect/Adverse effect	Monitoring
	Cytarabine	Fevers	Monitor temperature during and post infusion.
		Chemical Conjunctivitis	Patients receiving high dose Cytarabine must receive Dexamethasone 1% eye drops and Cellufresh eye drops to minimise the risk of conjunctivitis. Observe conjunctiva of the eyes during treatment with Cytarabine.
		Neuro-toxicity	The predisposing factors are high dose, older age and renal impairment.
Aspara-ginase	Asparaginase	Anaphylaxis	Monitor for anaphylaxis according to the intravenous Pegylated Asparaginase policy and anaphylaxis policy. Monitor for bronco-spasm/ hypotension and follow local policy for anaphylaxis management.
		Hyperglycaemia	Monitor for glucose in the urine after the completion of infusion. If present, a peripheral blood glucose test is advisable
		Pancreatitis	Increase in Liver Function Tests (amylase, lipase), abdominal pain, occasional jaundice
		Coagulopathies	Monitor for signs of hypercoagulation such as bleeding, and for signs of clotting such as pain, swelling, and inflammation.
Immune suppres-sants	Cyclosporin Tacrolimus Sirolimus	Hypertension	Monitor blood pressure 4 hourly.
		Kidney Failure	Monitor urine output, creatinine and electrolytes.
		Drug level Monitoring	Trough levels twice weekly at minimum. Only give down WHITE LUMEN if patient has CVL, use red lumen for taking levels.
Topoi-somerase I Inhibitor	Irinotecan	Diarrhoea	Monitor patient for diarrhoea, give atropine premedication and Loperamide for treatment of diarrhoea.
		Hypertension	Monitor blood pressure 4 hourly.
Miscellan-eous	Prednisone Dexa-methasone	Hyperglycaemia	Monitor for signs of hyperglycaemia during prednisone therapy.
		Cushing's Syndrome	Monitor patients for weight gain, fluid retention, mood changes, excessive sweating and insomnia.
		Bradycardia	Monitor heart rate 4 hourly.
Investigat ional drugs	Eg CH14.18 IL-2	Multiple and Varied	For any trial drugs or investigational agents please contact the CNS2 Clinical Trials or Pharmacy for drug specific information and observation requirements.
Mono-clonal Anitbodies	Drugs with suffix …mab	Multiple and Varied	For any patient receiving a monoclonal antibody consult the treatment protocol for advice about dosage, administration & side effects. For safe handling precautions consult the treatment protocol as recommendations are drug specific.

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6. Select the correct medication and read the label carefully each time you are giving a dose.