



Chemotherapy Guidelines
&
Recommendations for Best Nursing Practice

Jordanian Nursing Council

2009

Contents:

Topic	Page #
Forward	
Scope of the Guidelines	
Training of Nurses to Undertake Administration of Cytotoxic Drugs	
Safe Handling of Cytotoxic Drugs	
Pre-administration Patient Assessment	
Route-Specific Nursing Care for Cytotoxic Drugs Administration	
Management of Side Effects of Cytotoxic Drugs	
Spill Management	
Management of Extravasations	
Anaphylaxis Management	
Waste Management	

Forward

The continuous improvement of nursing services in Jordan is at the heart of the Jordanian Nursing Council's (JNC's) mission. We are dedicated to improving the quality of nursing care through legislation, education, practice, and licensure. As such, JNC has taken many steps towards providing Jordanian nurses with updated clinical guidelines for best and whenever possible evidence-based practice. The *Chemotherapy Guidelines and Recommendations for Best Practice* was prepared by a group of Jordanian professional nurses with proper education and expertise. The guidelines were based on the published literature, Web-based literature, and on the "common practice" and expertise of the committee members. A panel of physicians and nurses specialized in oncology and chemotherapy also reviewed and approved the guidelines.

We at the JNC put forward these guidelines for the nurses to use in their daily practice and for the hospitals to utilize in the development of chemotherapy-related policies and procedures and in their in-service training of chemotherapy nurses.

JNC is grateful for the following professionals who served as members of the national committee that prepared the guidelines:

Dr. Hasan Al-Omran, Chair, Hashemite University

Mr. Mohammed Abu-Humaid, Convener, Al-Hussein Cancer Center

Ms. Lina Khader, Member, Private Hospitals Society -Jordan Hospital

Mr. Mouayed El-Hour, Member, Jordan University Hospital

Mrs. Wafa Abu Islaih, Member, Ministry of Health

1st Lt. Mrs. Hala Al-Adwan, Member, Royal Medical Services

Ms. Dima Jaradat, Member, King Abdullah University Hospital

Mrs. Sana' Rayyan, Member, Ministry of Health -Prince Hamzah Hospital

Secretary General, JNC

Da'ad Shokeh RN, MSN

Scope of the Guidelines

Chemotherapy is administered in a variety of health care settings in Jordan. The majority of cancer patients receive systemic chemotherapy on outpatient basis. Few patients actually require hospitalization for chemotherapy despite the fact that treatment regimens are currently more aggressive and dose-intensive in nature. Hospital admissions are generally reserved for patients who require intensive monitoring or are acutely ill. The shift to outpatient ambulatory care services has grown out of the need for more efficient and economical health care delivery systems. Such a shift, however, placed tremendous demands on nursing to teach patients and their families about self-management of chemotherapy related side effects at home.

Exposure to chemotherapeutic agents is known to be potentially hazardous to the care giver's health. The potential risk stems from fact that some cytotoxic drugs are known carcinogenic, mutagenic, and teratogenic. Cytotoxic agents may enter the body of the caregiver by three possible routes: inhalation (when an aerosol or airborne dust is produced), ingestion, or skin contact. These are most likely to occur with injectable agents during either their preparation or administration. Although the link between previous professional contact with cytotoxic agents and subsequent development of cancer was not definite in the literature, the possibility of a long-term hazard has to be taken seriously. The exposure to cytotoxic drugs has also elicited

many short-term awkward reactions to the caregiver's health such as skin rash, skin discoloration, scarring, blurred vision, and dizziness. Awareness of these toxicities has led to concern over the possible hazards to health care workers who prepare, administer, or care for patients receiving chemotherapy. Such awareness, in addition to the felt need to base our nursing practices on best evidence and to improve patient care, has created a sincere interest among the Jordanian Nursing Council leadership to assemble a national committee to put together these guidelines to protect the nurses and their co-health workers from the possible occupational hazards of chemotherapy, to improve the quality of care for those patients receiving chemotherapy, and to help the hospitals develop chemotherapy care policies based on these guidelines.

The guidelines detail the training requirements for nurses to undertake administration of cytotoxic drugs, the procedures for safe handling of cytotoxic drugs, patient assessment nurses need to perform prior to administration of cytotoxic drugs, preparation and administration of cytotoxic drugs, routes for cytotoxic drugs administration, management of side effects of cytotoxic drugs, management of extravasations, spill management, anaphylaxis management, and waste management.

Professional Preparation of Nurses to Administer Chemotherapy

The Jordanian Nursing Council has defined the criteria for chemotherapy nurse's professional preparation as follows:

1. Must be a licensed registered nurse with a minimal clinical experience of six months post graduation
2. Must complete a theoretical post-graduate course in chemotherapy administration from an accredited institution which includes principles of chemotherapy administration, safe handling of cytotoxic drugs, classes of chemotherapeutic agents and cell kinetics, anaphylaxis, spill, and extravasation management, management of chemotherapy side effects, and patient teaching.
3. Must complete a minimum of three months clinical (hands-on) training experience under the supervision of a senior chemotherapy nurse.
4. Must understand the hazards of cytotoxic drugs and what precautions are to be taken.

Safe Handling of Cytotoxic Drugs

Purpose:

To provide nurses and pharmacists (who are involved in chemotherapy preparation) with guidelines for the safe handling of cytotoxic drugs during the preparation, transportation, and administration of chemotherapy.

Responsibilities:

All staff that have contact with cytotoxic drugs should be following the guidelines regarding the safe handling of cytotoxic drugs as set below.

Safe Handling during the admixture of Cytotoxic drugs

- Admix all chemotherapeutic agents in a biological safety cabinet (laminar air flow with HEPA filtration) that meets standards and has been inspected properly.
- All admixing of chemotherapeutic agents must be done in the pharmacy by a well-trained pharmacist.
- Wear latex powder free long cuff gloves while preparing chemotherapy drugs. Wear a gown that is non-permeable, long sleeve, cuffed and solid fronted and use aerosols free mask.
- Work over a suitable container to prevent the spread of any spillage.
- Prevent high pressure being generated inside sealed vials. When fluids are introduced an equivalent volume of air should be withdrawn or a

venting needle with a hydrophobic filter (to prevent aerosol formation) may be used if available.

- Ampoules should be directed away from the face and covered with a suitable pad or cotton when broken open.
- Diluent fluids should be introduced slowly into open-ended ampoules or vials. Running it down the vessel wall and ensuring the drug powder is moist before shaking.
- When excess air is expelled from a filled syringe it should be exhausted into a pad and not straight into the atmosphere.
- If excess drug is to be expelled from a filled syringe it should be removed first and a sterile cotton wool placed over the end of the syringe to prevent possible scatter of aerosol droplets.
- Luer lock fittings should be used in preference to push connections on syringes, tubing, and IV sets.
- All labeled bottles should be labeled properly (it's mandatory).
- Check the reconstitute or diluents for the particular drug and the concentration in which it is to be reconstituted.

Checklist before preparing the cytotoxic drugs

- Name of the drug, company name, active salt, strength and expiry date
- Patient name, age, and patient ID number
- Number of chemotherapy cycle
- Approximate cost of the drug
- Drug delivery route and availability of access devices

- Solvent and its concentration in which it is to be mixed
- Infusion or diluent fluids (D5%W, NS, RL, DNS) with which to be mixed
- Availability of drug delivery access
- Cross marking of the pack and label of the vial/ampoule
- Pre-medication as prescribed is given
- Drug dose according to body surface area/body weight

Safe Handling during administration

- Spill kits must be available in all areas that administer cytotoxic drugs.

The spill kit should include the following:

Spill Kit Content:

1. Double latex gloves.
2. water-proof gown.
3. Mask & eye goggles.
4. Shoes cover.
5. Spill kit sign.
6. Scupper & brush.
7. Absorbent sheet.
8. Double labeled plastic bag.

- The person who transports cytotoxic drugs should be oriented to the hazards of cytotoxic agents.
- Transporting cytotoxic drugs from pharmacy to delivery area should be in a leak-proof container.

- Wash hands thoroughly before and after administration of cytotoxic drugs.
- Wear personal protective equipment (double disposable surgical latex gloves, long sleeved non absorbent gown with elastic at the wrist, mask, and eye goggles if required) when administering cytotoxic drugs because splash may occur.
- Explain to the patient and family that chemotherapy is harmful to normal cells as well, so they should use protective measures to minimize exposure to these agents.
- Gloves should be changed and hands washed immediately after obvious contamination of the gloves with chemotherapy or after any patient contact.
- Staff nurse should not eat, drink, chew gum, or store food in immediate chemotherapy administration area during activities.
- Place a plastic- backed absorbent pad under the tubing during administration to catch any leakage.
- Flush IV lines and clear air from tubing with IV fluid (not chemotherapy) to minimize aerosolizing or splashing.
- When expelling bubbling from a syringe, cover the tip of the needle with dry sterile gauze.
- Don't dispose any supplies or unused cytotoxic drugs in patient care area.

- Use protective precautions (double gloves, water-proof gown, and mask if required) when handling bodily fluids and excreta of patients who have received cytotoxic drugs.

Note:

. Bodily fluids and excreta of patients who received cytotoxic drugs within 48hrs are consider potentially hazardous.

- Wear disposable gloves and water-proof gowns When handling linen from patients receiving (or have received within the last 48 hours) cytotoxic drugs.
- It is recommended that you use a close administration system (e.g., *PhaSeal*) to administer intravenous cytotoxic drugs.
- Instruct the patient who is receiving chemotherapy to double flush the commode (toilet seat) after each use and to continue for 48 hours after receiving chemotherapy.

Contact with Cytotoxic Drugs:

- If the cytotoxic drugs come in contact with your skin, flush immediately and wash thoroughly with running tap water for at least 15 minutes and avoid rubbing your skin. Seek medical attention for possible further eye care.
- If the cytotoxic drug comes in contact with your eye or mucous membranes flush with running tap water for 15 minutes without

rubbing. Do not use medicated eye drops. Seek medical attention for possible further eye care.

- If the cytotoxic drug comes in contact with your clothing, remove cloth immediately and wash the contaminated area(s) with running cold water for 15 minutes. Contaminated clothes should be placed in a blue plastic bag and should be washed separately and meticulously
- If the cytotoxic drug comes in contact with linen, remove linen and dry area then rinse with water and clean by detergent. Linen should be placed in a blue plastic bag and should be washed separately and meticulously
- Make sure to report the incident of any serious personal exposure (i.e., skin, eye, or mucus membranes contamination) and to document it properly using proper institutional procedures.

Pre-administration Patient Assessment

- ✓ For all patients commencing a course of chemotherapy a pre-treatment physical, psychological, and spiritual assessment should be undertaken by an appropriately trained nurse, and include:
 - Detailed physical assessment- including assessment of the hydration status should be performed to provide baseline data before commencing the chemotherapy administration

- Patient's concerns about treatment including misconceptions, present understanding, learning needs, family and social support, and coping strategies
- Assess level of patient understanding of his/her proposed chemotherapy schedule and treatment delivery plan, and appropriate knowledge of chemotherapy side effects-also make sure that patient has written information specific to his/her treatment
- ✓ Review all necessary blood values ensuring they are within recognized limits. Where blood values are outside recognized limits, the nurse should ensure consultation with medical staff takes place before chemotherapy administration
- ✓ If previous dosages of chemotherapy were given, assess for side-effects encountered using toxicity grading, and assess effectiveness of interventions to counteract side-effects
- ✓ Check patient's allergy status, and ensure patient wears an allergy band as necessary

Route-Specific Nursing Considerations and Interventions for Cytotoxic Drug Administration

Purpose:

To provide nurses with guidelines for the safe administration of cytotoxic drugs based on route and type of vascular access device.

Responsibilities:

All nursing staff who administer cytotoxic drugs should follow the guidelines regarding the route- and access device-specific care.

I. oral route:

Most oral cytotoxic agents are self-administered by patients, so the practice implications for the nurse are:

- Nurse should check that the patient's name, prescribed drugs, doses and route of administration on the prescription chart corresponds to information on patient's chemotherapy labels
- Chemotherapy must be handled using the 'no touch technique'.
Tablets should be used in preference to solutions and should be foil or blister wrapped
- Tablets must not be crushed where this can be avoided. If tablets must be crushed, appropriate pharmacy advice must be sought and personal protective equipment worn
- When oral medication is to be taken at home, ensure patient has appropriate number of tablets

- When oral medication is to be taken at home, patient should be given written details of the 24-hour contact information and the process to follow in the event of adverse reactions to treatment
- Patient &/or family should receive proper education regarding medication dosing, scheduling, possible side effects and their management, and safe storage
- Patient should be monitored for side effects ,toxicities & follow-up lab tests should be carried out
- Any toxicity should be documented properly and the treating physician should be informed in a timely manner
- Patient should be encouraged to increase fluid intake to maintain hydration.

II. Subcutaneous (SC) & Intramuscular (IM) Routes:

- Vesicant and irritant Chemotherapy should not administered by these routes
- In SC. route the smallest possible needle gauge should be used depending on the viscosity of medication
- Site of administration should be rotated if medication is given frequently to prevent tissue irritation
- Intramuscular injection administration should be avoided if platelet count is less than < 50000

III. Intravenous (IV) administration:

Intravenous chemotherapy can be given either IV push or IV infusion, either by peripheral cannula or by a central venous access device.

General Guidelines:

- Only medical staff and senior nurses deemed competent are permitted to insert intravenous cannulae.
- Aseptic technique must be used for insertion of all cannulae and must be secured using transparent dressing for easy visualization
- Three-way taps and extension tubing are placed on all IV cannulae and are changed when cannulae are replaced as are existing IV lines.
- IV Cannulae should be resited every 48 hours, particularly during fluorouracil infusion to prevent/reduce thrombophlebitis
- Only senior nursing staff having completed an accepted postgraduate chemotherapy course or those deemed competent are permitted to administer bolus chemotherapy
- Various central access devices are available as an option for planned long-term chemotherapy and/or poor venous access.
- Some central access devices require insertion under general anesthesia by a surgical team (e.g., Portacath & Hickman Catheter), obtaining patient's consent form is essential before the insertion. Sutures must be removed after consultation with the surgical team and OPD appointments may be necessary for suture removal.
- Consult the medical staff to determine when the central access device is ready for use after insertion.

III-A. Peripheral Cannula:

- Chose a good vein with no phlebitis
- Avoid cannulation distal to any recent vein puncture
- Avoid cannulation of the arm on the same side of a recent surgery (e.g., mastectomy, debridement, etc.)
- Avoid Cannulation at the site of a joint (e.g., dorsal aspect of wrist & antecubital fossa)
- Avoid cannulating a limb that has reduced sensitivity including where a patient is experiencing pain and where axillary node clearance has been performed
- Avoid applying topical anesthetics when inserting a cannula for chemotherapy infusion as it masks the pain of extravasation
- Avoid cannulation of a vein that has recently undergone venipuncture unless new cannulation is proximal to old site to avoid drug leakage from the vein
- Avoid direct manipulation of the device and unnecessary cannula movement. Attaching an extension set with clamp to the cannula after insertion will help avoid such unnecessary movement
- Avoid cannulating with a winged infusion device (W.I.D/butterfly). These devices are associated with an increased risk of infiltration
- Use a cannula that has been clinically shown to reduce the incidence of phlebitis in patients
- Check blood backflow immediately before starting the IV infusion
- Change cannula that has been inserted for 72 hrs or longer

- Always use appropriate clear film dressing to secure the cannula in place
- Using an existing cannula is not optimal practice due to risk of extravasation and infection. It is safer to site a cannula prior to commencing chemotherapy delivery
- If a decision has been made to consider the use of an existing cannula, a complete assessment should be undertaken to ensure it is well positioned, patent and not at risk of extravasating. Nurses should:
 1. Ensure venous return can be easily established from the cannula
 2. Ensure when connected to infusion running on gravity, the drip rate is rapid and consistent. Vasoconstriction is an early sign of phlebitis and causes the drip rate to slow
 3. Ensure the cannula site is free from signs of swelling, infection or phlebitis
 4. Ensure the patient is not experiencing pain from the cannula site
 5. Ensure the cannula has not been in situ for more than 48 hours

III-B. Central Venous Access Devices (CVADs):

Central venous access devices provide access to the central circulatory system and enable vascular peripheral venous access is not possible. CVADs can be used for the administration of chemotherapy, hyperalimentation (i.e., TPN), long-term antibiotic therapy, gamma-globulin therapy, and frequent blood-sampling. There are three types of CVADs:

1. Peripherally-inserted central catheters
2. Skin-tunneled catheters
3. Implanted ports

III-B-1. Peripherally-Inserted Central Catheters (PICCs):

- Are peripherally-inserted venous access devices that are inserted in a peripheral vein (e.g., basilic or brachial vein) and the catheter is passed to the superior vena cava or right atrium.
- The catheter can be inserted on the patient's bed.
- The catheter gauge is smaller than other CVADs, it may be single- or double-lumen
- PICs are rarely associated with blood stream infections but they are commonly associated with phlebitis, a condition that is mainly physiochemical or mechanical phenomenon rather than infectious
- To reduce the risk of infection the catheter must be inserted following proper aseptic techniques, proper hand washing, and having specialized 'IV teams' maintain the catheters rather than inexperienced staff
- Apply semi-permeable polyurethane dressings for the catheter insertion site to allow visual inspection of the insertion site
- Antimicrobial/antiseptic ointments may be applied to catheter insertion site
- An X-ray should be taken to verify placement of the catheter.

- Blood products take longer time to infuse, flush with normal saline between units and as needed, and raise the IV pole (IV stand) to enhance flow by gravity
- Apply warm soaks for any complaint of tenderness
- To obtain blood samples for laboratory studies:
 1. do not draw PTT from PICC
 2. If drawing blood cultures, follow aseptic technique, do not discard blood
 3. To draw blood for chemistry, CBC, etc., Use a 10 cc syringes one-inch needles to prevent rupturing the catheter, do not use vacutainers, discard 3 cc blood before obtaining the needed samples, then flush with 10 cc normal saline followed by Heparin 3 cc (100 u/cc)
- Redressing of the catheter should be done 24 hours post insertion and weekly (or PRN) after that
- With each redressing, measure the arm circumference (10 cm above the insertion site) and chart the length of the external catheter. Change the extension set with each redressing
- If you are using an IV pump, adjust pump pressures to a maximum of 500mm/Hg if pump alarms occlusions with a patent catheter
- Do not take blood pressure, perform venipunctures, or insert any additional IVs in the PICC arm

- Do not splint the arm where the PICC is inserted and encourage arm activity
- Catheter occlusion may be caused by kinked tubing or clotting, if so attempt the following:
 1. Reposition the external catheter to rule out kinking of the tube
 2. If blood is noted in the external catheter, or if there is a delay in flushing the PICC after infusion, suspect a blocked lumen, try simple but vigorous aspiration, if this proves unsuccessful, a thrombolytic agent (e.g., Urokinase) may be indicated. After filling the line with the thrombolytic agent, attempt to aspirate every 5 minutes, if aspiration does not result in patency in 30 minutes, the line may be capped for 30 to 60 minutes. If obstruction remains after 90 minutes, the thrombolytic agent may be repeated. If patency is restored, aspirate 5 ml of blood, then flush with 10 ml 0.9% saline and resume catheter use
- Upon removal, measure the total catheter length and inspect the distal end for an intact beveled tip, place a 2x2 sterile gauze over the insertion site

III-B.2. Skin-Tunneled Catheters (STCs):

- STCs include trade-name catheters such as Hickman, Broviac, and Groshing catheters. All may have single, dual, or triple lumen, and are either made of silicone or polyurethane

- STCs are tunneled subcutaneously from the entry site- at the skin surface- to the access point into the vascular system (either the jugular or subclavian vein).
- Are frequently used as the CVADs of choice, and in particular where use is intensive and expected to extend beyond 30 days. They can remain *in situ* for many months or even years
- More recent modifications include STCs with an antibacterial or antimicrobial coating, and silver-impregnated cuffs to reduce the risk of infections
- Contraindications to STCs insertion include:
 1. Psychological issues such as a negative body image
 2. Allergies relating to the material of the catheter (all CVADs are latex-free to reduce such complications
 3. local tissue factors that prevent stabilization of the catheter such as previous extensive radiotherapy or surgery or previous thrombosis of the jugular or subclavian veins
 4. Patient refusal
- Patient preparation before insertion includes routine preoperative care with special emphasis on CBC and clotting screening. Studies have shown that routine antibiotic prophylaxis before or during the procedure does not prevent colonization

- The insertion is performed using local anesthesia with or without sedation. General anesthesia is used for patients who display extreme anxiety or those undergoing another invasive procedure at the same time
- Sutures or a securing device such (as Statlok) is used to secure the catheter until the Dacron cuff has fibrosed with the subcutaneous tissue. Sutures or the securing device are removed after 21 days
- Nursing care following catheter insertion:
 1. Administer analgesics to relieve discomfort
 2. Close monitoring of vital signs and oxygen saturation
 3. Observe wound for signs of bleeding. The initial theater dressing should remain in place for 24 hours and re-padded if oozing occurs. Change the dressing after 24 hours using an antiseptic solution and apply a transparent semi-occlusive dressing
 4. An X-ray needs to be performed at the earliest opportunity and is mandatory before the catheter is used to confirm placement of the catheter and to rule out pneumothorax that might have occurred during insertion
 5. A further X-ray will be required if the patient experiences dyspnea or lateral chest pain or discomfort as a slow pneumothorax may develop after insertion

6. It is recommended to use a transparent, semi-occlusive dressing that allow the device to be reliably secured, and allow for visual inspection and showering without the dressing becoming saturated.
 7. Documentation of catheter insertion should include gauge and length of the device, the product name, batch and lot number, the number of attempts to insert the catheter, the anatomical location confirmed by X-ray, and the patient's response
 8. If the patient is well following the procedure, he/she might be discharged within a few hours, and a review is arranged after 24 hours either on the ward or in the clinic
- Dressing applied to the insertion site of the STC should be replaced every seven days, until the sutures have been removed and the wounds have healed. Once the sutures have been removed and the wounds have healed, STC require no dressing.
 - The insertion site should be cleaned aseptically using a non-touch technique. It is recommended to use an alcoholic chlorhexidine gluconate solution, and to allow to air dry before applying the dressing
 - To ensure the catheter remains patent, it is essential to flush it at regular intervals using an aseptic no-touch technique. The RCN (2005) recommend routine flushing of CVADs with an anticoagulant when the catheter is not in regular use, unless

advised otherwise by the manufacturer. The following should be taken into consideration:

1. The volume of flush should be equal to at least twice the catheter volume and any added-on devices-usually 5 – 10 ml- and should contain the lowest possible concentration of heparin (10 units/ml) to maintain catheter patency
2. To prevent an air embolus, the catheter must always be clamped when not in use, and before disconnecting or attaching administration sets or injection caps
3. At the start of the flushing procedure, it is necessary to aspirate the catheter to ensure blood return to confirm patency before the administration of medications or solutions
4. Intraluminal thrombosis is a common problem. To prevent it, it is recommended flush with a 0.9% sodium chloride before, between, and after the administration of medications and/or solutions. When the catheter is not in regular use, flush with an anticoagulant, unless advised otherwise by the manufacturer
5. If the STC is occluded and the cause is a suspected blood clot within the device or the result of a fibrin sheath, a 5,000 iu/ml urokinase or alteplase solution should be instilled into the catheter. The instilled volume should not exceed the volume capacity of the catheter (10,000

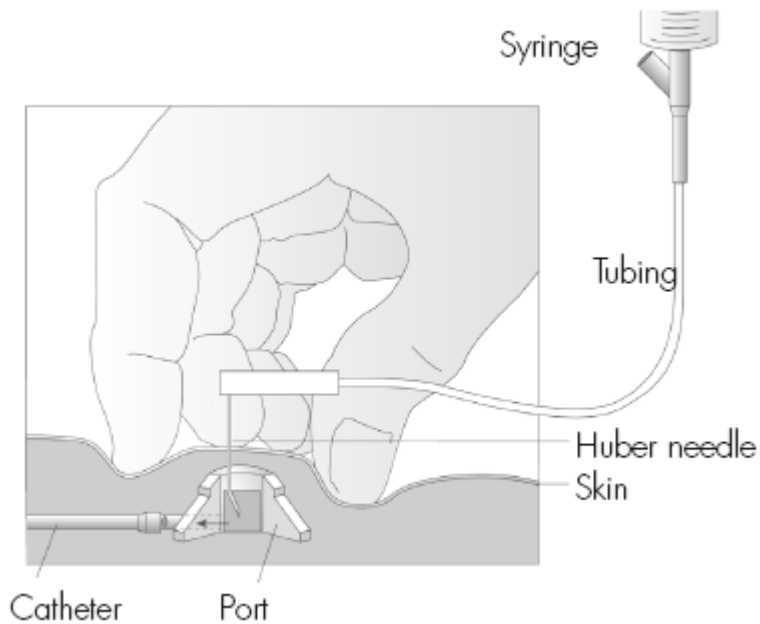
units dissolved in 3 mls of water for each lumen is recommended), and should be instilled with a 10 ml syringe and left for 10 – 16 minutes (some recommend waiting 1 hour though) before aspiration

- Leakage or extravasation via an STC can cause pain and discomfort over the shoulder or along the tunnel site, and possible swelling. If these symptoms are present, stop the infusion promptly and inform the physician. An X-ray will identify a line which is incorrectly positioned. Removal of the catheter may be needed.
- A pinch-off syndrome may occur when the catheter is pinched between the patient's clavicle and the first rib. Do not flush forcefully trying to open the occluded catheter as this may result in fracture of the line and serious extravasation. An X-ray will be needed to confirm the catheter position
- Persistent withdrawal occlusion (inability to obtain venous return from the catheter) may occur because of fibrin sheath formation around the tip of the catheter. Any attempt to infuse chemotherapy through the catheter in such a case can result in extravasation. Refrain from using the catheter and consult with the physician.
- Before administering chemotherapy via an STC, assess the line to ensure patency and any leakage by flushing the line with 10 ml normal saline through each lumen

- Removal of the catheter should be done at the completion of the treatment, if there is catheter-related infection, if there is persistent catheter occlusion, or if the catheter is damaged.
- Removal of the catheter can be done by specially trained nursing and medical staff. A local anesthetic is instilled along the tunneling site and minor surgical cut down is performed to remove the Dacron cuff. If the catheter has been in situ for less than 3 weeks, simple traction may remove the catheter and cuff. If infection is suspected, the tip should be sent for microbiology culture

III-B.3. Implanted Ports:

- An implanted port (e.g., Porta Cath) is a thin, soft, plastic tube inserted in the OR under general anesthesia. The port is implanted under the skin in the anterior chest wall and the catheter is tunneled under the skin inserted in the subclavian vein and extended to the superior vena cava. The disc is about 2.5 – 4 cm in diameter (see the figure below).



- Use a Huber (non-coring) needle only when obtaining blood or giving medications in an implanted port because the Huber (non-coring) needle does not biopsy the rubber disc. Never use regular needles.
- Implanted ports are more cosmetically appealing and bear less possibility for infections than skin-tunneled catheters
- Extravasation from ports can occur by four major mechanisms: incomplete needle placement and needle dislodgement, thrombus or fibrin sheath formation, perforation of the superior vena cava, and catheter fracture
- The degree of tissue injury with extravasation may vary but may be enough to require that a simple mastectomy be performed to manage chest wall necrosis. *See the Management of Extravasation chapter for further details.*
- In order to use an implanted catheter for obtaining a blood sample or for chemotherapy infusion, do the following:
 1. Wash hands thoroughly, and put on surgical gloves

2. Detect the site of the port disc in the chest wall using the finger pads
 3. Clean the skin over the port disc meticulously using povidone iodine and followed by alcohol 70%
 4. Flush the line and the Huber (non-coring) needle from air and insert it into the port disc
 5. Use a 10 cc syringe to aspirate and check for blood backflow
 6. If you are obtaining a blood sample, draw 3-4 cc of blood and discard, and then using a new syringe draw the amount of blood required
 7. Flush the port with 500 units Heparin in 5 ml normal saline after you are done with the infusion or blood withdrawal
- To ensure the port remains patent, it is essential to flush it with 500 units Heparin in 5 ml normal saline using Huber (non-coring) needle at regular intervals* using an aseptic technique.
** Some practice guidelines require a repeat every three months when the port is not in regular use*
 - To unblock an implanted port, the following should be taken into consideration unless advised otherwise by the manufacturer:
 1. Use a Huber (non-coring) needle and a 3-way stop cock
 2. Inject Streptokinase 10,000 iu per ml
 3. Turn stop cock while applying pressure so that 0.1-0.2 ml remain in the reservoir
 4. leave 30 – 45 minutes and try to aspirate

5. If not successful, repeat streptokinase

- Implanted ports are only removed by the surgeon under general anesthesia. Patient is prepared for surgery using routine preoperative procedures.

Methods of Intravenous Chemotherapy Administration

A. Bolus Chemotherapy Administration :

A. 1. Administering bolus chemotherapy through a peripheral IV cannula requires that you:

- Wear protective equipment when administering bolus chemotherapy
- Ensure a dressing towel or absorbent pad is placed beneath patient's arm to absorb accidental chemotherapy spillage
- Check all drugs against prescription and check patient details
- Check patency of vein for flashback and ensure infusion of 0.9% saline is running freely
- Administer chemotherapy bolus injections via side arm of the intravenous administration set. Safe practice recommends the use of needle free sets
- Use gauze beneath side arm of the administration set to absorb accidental spillage of drugs
- administer Vesicant drugs first when the vein is likely to have greatest integrity

- When giving more than one vesicant, administer drugs according to drug volume giving smallest volume first
- Vesicant drugs that cannot be given as IV bolus doses should be given as an infusion via a central line. If this is not possible or practical then extra vigilance will be required. **Note that vesicant drugs should not be infused peripherally using an infusion pump.**

A. 2. Administering bolus chemotherapy through a central venous access line requires that you:

- Use strict aseptic technique when accessing any central venous catheter
- Assess the line to ensure patency and leakage. This is done by flushing the line with 10 ml normal saline through each lumen
- Administer vesicants first, then irritants, followed by non-irritants.
- If the patient experiences discomfort/pain/swelling or leakage, stop the infusion immediately and investigate. Inform physician immediately, and instigate extravasation procedure.

B. Duration of intravenous Infusions and Specific Care Issues:

B.1. Short Intravenous Infusions:

- Often used for administration of vesicant drugs either through cannula inserted to a large vein or a CVAD and an intravenous giving set is attached to a solution with freely flowing infusion to dilute medication and minimize irritation.

- Site of administration should be observed frequently during administration for signs of extravasation or irritation
- Flush the line between each drug and another with 20-30 ml saline (variable according to body weight) to prevent mixing of incompatible drugs

B.2. Continuous Intravenous Infusions:

- Chemotherapy is added to an infusion solution bag and administered over a prolonged period of time from hours to days
- Vesicant drugs should be administered through a central venous access device
- Photosensitive chemotherapeutic agents should be protected from light by using special dark giving sets and by wrapping the IV solution bag with aluminum foil or any concealing material.

IV. Intraperitoneal Administration of Chemotherapy:

Its delivery of chemotherapy directly into abdominal cavity through a temporary catheter or an implanted port such as those used in central venous access. The nurse should:

- Rule out any intra abdominal infections before chemotherapy administration
- Assess the patency of catheter and perform routine care of the catheter (including dressing and heparinization after use)

- Teach pt about side effects that may occur during and after administration of medication (abdominal distention, pain, cramps, nausea, vomiting, diarrhea, constipation, shortness of breath & esophageal reflux)
- Aspirate any ascitic fluid before chemotherapy as it prevents optimal circulation and distribution of chemotherapy
- Maintain pt in a semi-fowler's position during intraperitoneal chemotherapy administration
- Infuse chemotherapy according to the protocol prescribed
- Intraperitoneal chemotherapy is often reconstituted in two liters normal saline, warmed to 37 Celsius by an external warming device (microwave warming is not recommended), and flows by gravity as rapidly as possible; it may take 30 – 180 minutes to infuse.
- Do not use infusion pumps because of the potential of high-volume pump pressure
- If severe abdominal pain occurs during administration, stop the infusion and notify medical staff immediately
- After completion of the infusion, turn pt from side to side and rotate patient on abdomen every 30 minutes for 4 hrs to promote drug distribution. Patients with arthritis, previous hip or spine surgeries, and those with restrictive lung diseases may have difficulty tolerating these post-infusion rotations
- Recognize the contraindications for intraperitoneal chemotherapy administration which include symptomatic peripheral neuropathy,

malnutrition, adhesive disease in the abdomen, gastrointestinal dysfunction, hypovolemia, massive ascitis, and abnormal baseline renal function

V. Intrathecal Administration of Chemotherapy:

Chemotherapy is directly injected into the cerebrospinal fluid by a specially-trained physician. This delivery method is often used in patients with leukemia and lymphoma to prevent central nervous system involvement. The role of the nurse is to consider the following:

- First and Foremost note that intrathecal administration of Vinca Alkaloids is invariably **FATAL**. Therefore, Vinca Alkaloids should not be administered via this delivery method
- All DOCTORS who administer intrathecal chemotherapy must have been trained and deemed competent to do so. This includes performing a competency of at least 2 supervised procedures on 2 separate occasions
- Teach pt about routine access procedures such as lumbar puncture or Ommaya reservoir
- Intrathecal chemotherapy should, wherever possible, be administered within working hours
- Only methotrexate, cytarabine (cytosine arabinoside), hydrocortisone, and (rarely) thiotepa may be given intrathecally
- All intrathecal chemotherapy should be stored at the pharmacy until the patient is ready to have their lumbar puncture. Intrathecal

therapy should not be stored in the ward or clinic areas for longer than 2 hrs and should be returned to pharmacy where practical

- All intrathecal doses must be dispensed and packaged separately from other chemotherapy
- Check that medication dissolved in normal saline 0.9% not in any solvent with preservative
- Check pt for signs and symptoms of increased intracranial pressure (e.g., altered level of consciousness and decreased responsiveness, drowsy, etc.). Notify the medical staff of any abnormal changes.

VI. Intravesical Chemotherapy Administration:

This method is used in the treatment of superficial bladder cancer which involves installation of chemotherapy through a urinary catheter into the bladder. The nurse must take into consideration the following:

- A Foley catheter is inserted and the chemotherapy is infused into the bladder, a dwell time 1-2 hrs is allowed by clamping the catheter, then the medication is drained
- While in dwell, encourage pt to change position every 15 mint for better distribution of the chemotherapy
- All waste should be treated as biohazard chemotherapy waste and pt should be educated to flush the commode 3 times at least after each use for 48 hours

VII. Intrapleural Chemotherapy Administration:

This method is used to administer chemotherapy through chest tube to treat lung cancer. The nurse should consider the following:

- Fluid accumulated in pleural space is drained then chemotherapy instilled and chest tube clamped for 1-2 hrs to dwell.
- Encourage pt to change position frequently, then unclamp tube and connect to water seal system after dwelling time is finished
- monitoring pt for side effects and assess for signs of pleural irritation

VIII. Intra-arterial Chemotherapy Administration:

Chemotherapy is given by an arterial catheter to allow for regional delivery of drug via an artery that supplies the tumor. The nurse have to take into consideration the following:

- Systematic anticoagulant may be necessary to prevent clotting
- Hepatic artery chemotherapy can given by an implanted or external infusion bump
- To prevent bleeding from the insertion site after catheter removal, apply pressure on the site of insertion for 10 – 15 minutes
- Keep patient in supine position for 6 hrs
- Observe vital signs every 30 minutes for the first 2 hrs then every two hours for the next 4 hours

Management of Side effects of Cytotoxic Drugs

Chemotherapeutic agents are potent and have the potential to present many adverse effects. Toxicities and side effects are often a result of damage to dividing cells. These side effects include:

1. Gastrointestinal adverse effects:
 - nausea and vomiting
 - constipation
 - diarrhea
 - stomatitis
2. Cutaneous reactions
 - alopecia
 - erythema
 - hyperpigmentation
 - photosensitivity
3. Neurotoxicity
4. Hematological adverse effects:
 - Thrombocytopenia
 - Leucopenia/neutropeia
 - anemia
5. Sexual and reproductive dysfunction
6. Pulmonary toxicity
7. Cardiac toxicity
8. Flare reaction.
9. Nephrotoxicity

Gastrointestinal Adverse Effects

1. Nausea and vomiting

Nausea is defined as an unpleasant feeling, wave like feeling of distress in the epigastrium, back of the throat, or through out the abdomen, nausea often proceeds vomiting or belching.

Vomiting is the forceful expulsion of stomach contents through the mouth. Vomiting is usually accompanied by the following manifestation:

- Excessive salivation
- Tachycardia immediately before vomiting
- Bradycardia during the vomiting
- Decrease in blood pressure
- Weakness
- Dizziness
- Increased rate and depth of respiration

Types of nausea and vomiting:

- Acute(immediate) nausea and vomiting

Occurring soon within 20 minutes to few hours after administering chemotherapy.

- Sub-acute nausea and vomiting

Occurring within 6-12 hours after chemotherapy administration.

- Delayed nausea and vomiting

Occurs in up to 7 days after chemotherapy treatment

- Anticipatory nausea and vomiting

Occurs prior to chemotherapy. It may occur with sight, smell, or hearing any thing associated with chemotherapy

- Breakthrough nausea and vomiting

Occurs while receiving prophylactic antiemetic therapy

Agents that cause nausea and vomiting

Very high >90%	High 60%-80%	Moderate 30%-60%	Low 10%-30%	Very low <10%
Cisplatin*	Cyclophosphamide	Carboplatin*	Gemtabin	Fludrabin
decarbazine	Etoposide*	5-FU	Vinblastin	Hydroxyurea
melphalan	Methotrexate*	Idarubicin	Topotecan	Vinicrestin
dactinomycin	Procarbazine	Ifosfamide	Docetaxel	vinblastin
Lomustine	Carmustin*	Doxorubicin*	Daunorubicin*	paclitaxel
Streptozocin	Cisplatin*	Cytarabine*	Capecitabine	Vinorelbine
Pentostatin	Busulfan	Epirubicin	Lomustine*	chlorambucil
meclizolamine		Mitomycin-c*	teniposide	

*dose-related, potential increases with higher doses

Management of nausea and vomiting

1. pharmacologic measures:

- Serotonin antagonists such as ondansetron (Zofran), and granisetron (Kytril). These medications are used as first-line antiemetic medications. They block serotonin receptors of chemoreceptor-trigger-zone and vagal nerve endings.
- Substituted benzamide such as metoclopramide HCL (Plasil). It is a dopamine antagonist; enhances stomach emptying

- Corticosteroid such as dexamethasone (Decadron), or prednisolone (Deltasone). These medications inhibit prostaglandin synthesis
- Drugs used as adjuvant antiemetics such as lorazepam (Ativan) and diazepam (Valium). They are CNS depressants- induce sedation and as such decrease the chances for vomiting.

2. Nonpharmacologic management:

Instruct patient to:

- eat foods served cold or at room temperature
- drink clear liquids in severe cases of nausea
- sip liquid slowly
- avoid spicy hot foods
- rinse mouth with lemon water
- avoid sweet ,fatty, and highly salty foods
- avoid foods with strong odors
- avoid eating or drinking 1-2 hours before and after chemotherapy
- eat light meals throughout the day
- use distraction such as music, TV, games and reading whenever possible
- Listen to relaxation tapes before, during, and after receiving chemotherapy.
- Sleep during intense periods of nausea
- Practice good oral hygiene

- Provide emotional support through counseling and behavioral therapy (relaxation, music, hypnosis)
- Encourage exercise
- Follow up after discharge through telephone assessment and counseling

2. Constipation

Infrequent or irregular passage of hard feces, related to decrease peristalsis or paralytic ileus. Agents that cause constipation include vinca alkaloids (e.g., Vincristine and Vinorelbine).

Management of Constipation

- Assess patient's normal bowel pattern
- Assess patient's medication profile for drugs that may decrease peristalsis such as narcotics or anticholinergics
- Assess the presence and character of bowel sounds
- Explain to patient that chemotherapy can cause constipation
- Assess patient's dietary habit including high fiber foods and plenty of liquid in diet
- Avoid the use of enemas and suppositories in the presence of leucopenia and thrombocytopenia
- Encourage patient to exercise (walking)
- Assess signs and symptoms of constipation
- Place patient on prophylactic stool softeners

3. Diarrhea

It is the passage of frequent stools that are soft or liquid in consistency.

Certain chemotherapeutic agents destroy epithelial cells of the gastrointestinal tract causing an inadequate absorption and digestion of nutrients. Agents that usually cause diarrhea include antimetabolites (e.g. 5-FU, & Cytarabine)

Management of Diarrhea

- Assess patient's normal bowel pattern
- Explain to patient that chemotherapy can cause diarrhea
- Assess for signs and symptoms of diarrhea
- Assess patient's medication profile for drugs that may increase diarrhea (e.g. antibiotics)
- Assess dietary habits including the use of tube feeding and nutritional supplements that may predispose the patient to diarrhea
- Include low-fiber , high protein foods and plenty of liquids in diet
- Instruct patient on the signs and symptoms of diarrhea
- Avoid food that irritate the GI tract
- Explain need for antidiarrheal agents
- Encourage rest periods
- Assess fluids and electrolyte status , avoid dehydration and replace as necessary
- Assess skin integrity (perineal care)
- Review with the medical staff the chemotherapeutic agents causing diarrhea and chances for modification of the regimen

4. Stomatitis

It is damage to the rapidly dividing cells of the oral mucosa resulting in inflammation of the oral and intra-oral soft tissue which can progress to painful ulceration and infection. Agents that cause stomatitis include Antimetabolites , and alkalyting agents.

Management of Stomatitis

- Assess oral cavity before each treatment , a baseline dental exam should be encouraged too
- Assess patient's oral hygiene routinely
- Institute frequent oral hygiene
- Explain to patient that the chemotherapy may cause mouth sores
- Assess for sign and symptoms of Stomatitis, bleeding and infection
- Avoid use of improperly fitting dentures
- Keep lips well-lubricated
- Avoid the use of commercial mouth washes containing alcohol
- Avoid substances that are irritating to the oral mucosa such as tobacco and alcohol
- Maintain good nutritional intake and drink plenty of liquids
- Avoid foods that are irritating to the oral mucosa such as spicy, hot and acidic foods (lemon juice and tomato)
- Consider use of topical antifungal or antiviral agents for infection e.g. Miconazole and Acyclovir.

- Assess the need for topical or systemic analgesics and topical protective agents for painful ulceration (e.g. paracetamol and NSAID)

Cutaneous reactions

Specific chemotherapeutic agents may produce alteration in the integumentary system that may be generalized or localized including alopecia , erythema , hyperpigmentation, and photosensitivity.

1. Alopecia

Temporary loss of hair is the effect of chemotherapy on the hair follicle. Agents that cause alopecia include Adriamycine, Taxol, Cisplatin, and Etoposide

Management of Alopecia:

- Prepare patient for hair loss, reinforcing that hair loss is temporary
- Advice patient to cut hair short before starting therapy
- Provide an environment that encourage expression of feeling
- Assess impact of hair loss on patient and effects on life style
- Encourage patient to purchase a wig , wear scarves, and/or hats before losing hair
- Use a scalp tourniquet or use a scalp ice cap (hypothermia) to prevent or decrease hair loss if medically indicated. Explain that these interventions are not always effective

- Instruct patient to avoid excessive shampooing and hair combing
- Instruct patient to use mild shampoo and hair conditioner
- Avoid excessive blow drying of hair
- Avoid use of chemicals on hair e.g. permanents, hair sprays and dyes
- Encourage support groups within the hospital and in the community
- Remind patient that hair loss is temporary and that hair begins to grow usually within 3-6 months of completing therapy
- Explain to patient that hair may come back in a different texture ,color and thickness

2. Erythema

Erythema or urticaria may be a generalized or localized response to the chemotherapy. Agents that cause erythema include Adriamycin and Vincristin

Management of Erythema:

- Assess skin integrity before administering any chemotherapeutic agents.
- Use a large vein for drug administration
- Assess venous patency before administering chemotherapy

- Assess for onset ,pattern ,severity and duration of erythematous reaction. Report findings to medical staff for decision
- Severe reaction may be indicative of hypersensitive reaction to the chemotherapy and may require discontinuing the drug
- Administer antihistamine or corticosteroid as ordered

3. Hyperpigmentation

A generalized or localized response to chemotherapy, hyperpigmentation may involve: nail beds, skin over joints and pressure points, interphalangeal and metacarpal joints, mucous membranes, and along veins used for chemotherapy administration. Agents that can cause hyperpigmentation include 5-FU, and navilbine.

Management of Hyperpigmentation:

- Know which agents can cause hyperpigmentation
- Assess skin integrity and nails before starting treatment and document any changes
- Inform patient that hyperpigmentation may occur and will gradually disappear when treatment is complete
- Assess impact of hyperpigmentation on body image
- Encourage patient to wear loose-fitting clothing
- Recommend wearing long sleeves and using nail polish to hide hyperpigmentation areas

4. Photosensitivity

An erythematous skin reaction caused by exposure to UV light after treatment with certain chemotherapeutic agents. Photosensitivity can lead to severe tanning or sunburn. Agents that possibly induce photosensitivities are Methotrexate, Adriamycin, and Vincristin.

Management of Photosensitivity:

- Be familiar with agents that can cause photosensitivity
- Assess skin before starting chemotherapy
- Assess onset ,duration, and severity of skin reactions, and report to medical staff for management
- Caution patient that exposure to sunlight (UV light) can cause a severe sun burn
- Instruct patient to use a sun block (sun screen) agent with a SPF of 50% or greater
- Instruct patient to avoid prolonged exposure to direct sunlight especially in the peak hours 10 am – 4 pm.
- Instruct patient to wear protective clothing with brimmed hat , long sleeves and pants

Neurotoxicity

Neurotoxicity includes central nervous system disorders such as encephalopathy, seizures, cerebellar dysfunction, ophthalmologic and ototoxicities, mental status changes, and peripheral neuropathies with

sensory or motor dysfunction. The severity and incidence of Neurotoxicity can vary and are dose- and schedule-dependent. Agents associated with neurotoxicities include: Cytosar, Cisplatin, Vincristin, Cyclophosphamide, Carboplatin, Vinorelbine, Methotrexate, 5-FU, and L-asparaginase.

Management of Neurotoxicity:

- Assess risk factors for developing Neurotoxicity (age, gender, and treatment history)
- Evaluate frequently for signs and symptoms of neurotoxic reactions. Early detection is very important for successful treatment.
- Pretreatment patient/family education regarding potential Neurotoxicity is necessary
- Assessment of baseline neurologic functions such as level of consciousness, orientation, motor and sensory function, deep tendon reflexes and cerebellar functions.
- Encourage patient to plan or adjust work obligations or daily activities
- Educate family members about the special needs that the patient experiencing neurotoxic symptoms may have related to carrying out normal activities of daily living
- For children receiving CNS therapy for leukemia ,the potential for neuropsychological abnormalities and learning deficit must be discussed with parents prior to therapy

The following agents are linked to the following neurological symptoms:

- Vinca alkaloids (e.g., Vincristin, & Vinblastin):

Loss of pain and temperature sensations; autonomic neuropathy; paresthesia in the hand or feet; cranial nerve palsies; and motor weakness

- High-dose Cytosar:

Encephalopathy, cerebellar dysfunction, peripheral neuropathy and change in level of consciousness.

- High-dose Cyclophosphamide:

Syndrome of inappropriate anti-diuretic hormone (SIADH); somnolence; and lethargy

- Cisplatin

Peripheral neuropathy; loss of sense of position and vibration; ringing in the ear (ototoxicity)

- Methotrexate

Acute and delayed neurotoxicities

Hematological Adverse Effects

Chemotherapy, especially in large doses leads to myelosuppression because chemotherapeutic agents are most effective against both malignant and normal rapidly dividing cells including stem cells of the bone marrow. This suppression includes:

- Thrombocytopenia
- Leucopenia/ neutropenia
- Anemia.

1. Thrombocytopenia

is a decrease in the platelet count which can result in bleeding caused by the effects of chemotherapeutic agents on the bone marrow.

Management of Thrombocytopenia:

- Monitor CBC, especially platelet count, before and after chemotherapy
- Assess for signs and symptoms of bleeding including inspection of the mucus membranes of the mouth and other orifices of the body
- Avoid aspirin and aspirin-containing products
- Institute bleeding precautions
- Instruct patient on signs and symptoms of bleeding and how to contact health care professionals in case of bleeding
- Instruct patient when brushing teeth to use a soft tooth brush or toothette and avoid use of dental floss.
- Instruct patient to use electric razor instead of regular shaving razors.
- Avoid use of enemas, suppositories, and rectal temperature.
- Encourage use of stool softeners
- Avoid invasive procedures and frequent venipunctures
- Apply pressure to venipuncture sites for 3-5 minutes or longer until you make sure bleeding has stopped.

- Monitor peri-pad count if the female patient is menstruating.
- Maintain safe injury-free patient environment.
- Administer platelet transfusions as ordered
- Monitor signs and symptoms of transfusion reactions, premedication may decrease the incidence of reaction.

2. Leukopenia /Neutropenia

Leukopenia is decrease in the WBC count. Neutropenia is neutrophil count $<1000/\text{mm}^3$. Febrile neutropenia is fever ≥ 38.3 c with absolute neutrophilic count (ANC) $\leq 500/\text{mm}^3$. The degree of neutropenia can be used as a predictor of the risk of infection in individual receiving chemotherapy.

ANC $>1500/\text{mm}^3$	Normal risk
ANC $<1000/\text{mm}^3$	Moderate risk
ANC $<500/\text{mm}^3$	Severe risk
ANC $<100/\text{mm}^3$	Extreme risk

Management of Leukopenia /Neutropenia:

- Monitor WBC and neutrophil count , chemotherapy should be given only when the WBC/neutrophil count is within normal limits
- Assess for signs and symptoms of infection.
 - Obtain culture of sputum, blood (peripherally and from all parts of indwelling central venous catheter), urine and stool when a

febrile episode occurs, however CXR should be taken even patient shows no pulmonary symptoms.

- Instruct patient on signs and symptoms of infection and to contact health care professional shall these symptoms occur
- Avoid invasive procedure when the patient is neutropenic
- Maintain integrity of skin and mucous membrane
- Encourage good personal hygiene (wash hands with antibacterial soap during the day especially before eating, and after going to the bath room.
- Avoid exposure to potential sources of infection:
 - ❖ Keep patient away from children who have recently been vaccinated
 - ❖ Keep patient away from people who have contagious diseases such as cold, measles and chicken pox
 - ❖ Avoid populated areas such as parties and public transportation especially in the winter (flu) time
- If the patient is admitted to hospital:
 - ❖ patient should be placed in 'protective isolation' when necessary
 - ❖ Temperature is observed every 4 hour or more often
 - ❖ Patient should be kept in a good nutrition and hydration status.
 - ❖ Staff should wash hands with antibacterial soap before any patient contact.

- ❖ Frequent bed making and environmental cleanliness is required.

3. Anemia:

Is decrease in hemoglobin level below normal for age and gender.

Management of Anemia:

- Monitor CBC especially hemoglobin and hematocrit before and after chemotherapy.
- Assess for signs and symptoms of anemia.
- Instruct patient to observe for signs and symptoms of anemia and to contact a health care professional shall these symptoms occur
- Monitor vital signs, and administer oxygen if necessary
- Assess ability to perform activities of daily living, encouraging rest periods
- Maintain safe environment, assist patient as necessary and locate patient's items within reach to prevent episodes of dizziness, syncope and fatigue
- Transfuse blood products as ordered (packed RBCs or whole blood).
- Monitor for signs and symptoms of transfusion reactions.

Sexual and Reproductive Dysfunctions

An alteration in sexual functioning and impairment in the individual's reproductive capacity. Such alterations may be caused by the disease itself, or may result from its treatment including chemotherapy.

Management of Sexual and Reproductive Dysfunctions:

- Assess for risk factors that are related to the disease, such as cancers of the genitourinary system (ovarian, cervical, testicular, and penile cancers).
- Assess for risk factor related to chemotherapy* (see Table below).
- Assess for clinical manifestations of sexual dysfunction (female: decreased libido, dyspareunia; male: erectile dysfunction, premature ejaculation).
- Assess for reproductive dysfunction (females: amenorrhea, menopause; males: azospermia, oligospermia).
 - The menstrual period may become irregular or may stop completely.
 - If patients are of child bearing age, the period may come back once the treatment has stopped.
 - If patient is close to menopause, the period may never come back.
- Infertility in some patients is a temporary condition, in others it may be permanent (sterility).
- The patient should be informed about sperm banking (cryobank) which is storage of sperms under certain conditions for future use. Sperm

banking is currently being used in a variety of situations. our concerns are about those patients who will be undergoing treatment of cancers which may impair their sperms production and/or quality (e.g. chemotherapy, radiation and drugs (methotrexate ,sulfasalazine...etc)

- Women are advised to use birth control throughout their treatment because chemotherapy given early on pregnancy may cause birth defects
- Provide an environment that encourages open expression of feelings and concerns.
- Encourage the use of water-based lubricant or estrogen replacement to reduce vaginal dryness.
- Encourage the individuals and significant others to express concern, feeling, and desire with each others and with the health care team.
- Advise the patient and the significant other to refrain from sexual activities (i.e., intercourse) on the period of chemotherapy treatment (due to feelings of nausea, vomiting and stress)

***Agents Affecting Sexual or Reproductive Functioning:**

Agent	complications
<p>Alkylating Agents</p> <ul style="list-style-type: none"> • Busulfan • Chlorambucil • Cyclophosphamide • Melphalan • Nitrogen mustard 	<p>Amenorrhea</p> <p>Oligospermia</p> <p>Azospermia</p> <p>Decreased libido</p> <p>Ovarian dysfunction</p> <p>Erectile dysfunction</p>
<p>Antimetabolites</p> <ul style="list-style-type: none"> • Cytosine arabinoside • 5-FU • methotrxate 	<p>No ovarian dysfunction as a single agent, may potentiate dysfunction when combined with alkylating agent.</p>
<p>Antitumor antibiotics</p> <ul style="list-style-type: none"> • doxorubicin • plicamycin • dactinomycin 	<p>No ovarian dysfunction as a single agent, may potentiate dysfunction when combined with alkylating agent.</p>
<p>Plant products</p> <ul style="list-style-type: none"> • Vincristin • Vinblastin 	<p>Retrograde ejaculation</p> <p>Erectile dysfunction</p> <p>Decrease libido</p> <p>Ovarian dysfunction</p> <p>Erectile dysfunction</p>

Management of Spillage of Cytotoxic Drugs

Purpose:

To safely manage a chemotherapy spill.

General Guidelines:

- Chemotherapy spill kits to be kept on all units where chemotherapy is routinely administered.
- Initially, clean up is a nursing responsibility; a second clean up will be performed by house keeping
- If Linen is involved in the spill, place in double blue plastic bags.
- If chemotherapy agent comes in contact with the skin, the area must be washed with good amount of running tap water for a minimum of 15 minutes.
- One person should take responsibility of dealing with the spill – to prevent multi-person contamination.
- Responsibilities regarding spillage management and training are as follows:
 - ✓ The head of the department is responsible for the training and application of the employees on the approved procedures.
 - ✓ The education coordinator/ clinical instructors are responsible for employees training.
 - ✓ The In charge nurse is responsible for re-arranging / refilling the spill kit content.

- The Spill kit should include all items listed below:
 1. 2 blue plastic bags
 2. 1 sign (Chemotherapy spill) / تسرب علاج كيمائوي /
 3. 2 absorbent paper towels
 4. 2 non-absorbable/ dry towels
 5. 2 pairs of latex gloves with different sizes
 6. Eye goggles
 7. Face mask
 8. 1 pair overshoes
 9. Water proof gown with long sleeves
 10. Small scoop and brush
 11. Biohazard label

Plus: 1 large absorbent plastic packed pad (for immediate absorbency of large volume spillage, e.g. more than 100 ml.)

Procedure to Follow in Spillage Management:

- 1) Set up the hazard sign and warn all staff not to enter the contaminated area.
- 2) Call for the Code Green (if the amount of spill is more than 10cc).
- 3) Secure the area by alerting the staff that a chemotherapy spill has occurred, and ask the visitors to leave the area.
- 4) Obtain a chemotherapy spill kit.
- 5) Contaminated linen, uniforms, etc. should be removed as soon as possible and treated as contaminated.

- 6) Put on all protective apparels in the spill kit.
- 7) Prepare the blue plastic bag
- 8) Carefully pick up any broken glass
- 9) Using absorbent towels contain spill moving from outside to inside until it the spill area becomes dry.
- 10) Place a dry paper towel over the spill area.
- 11) Dispose all contaminated equipments in the specified plastic bag
- 12) Wash hands
- 13) Notify house keeping for ordinary cleaning
- 14) Notify physician
- 15) Fill the incident report (including patient name, file No., name of the medication spilled and the amount of drug lost, name of the nurse and signature, and name of a witness and signature)
- 16) Document incident in nursing notes

Documentation Requirements:

- ✓ Incident Report
- ✓ Nursing Notes

Management of Extravasations

Purpose:

To standardize the process of extravasation management so that to improve patient safety and reduce risk, and ensure proper utilization of resources. To also ensure prompt & appropriate interventions in the event of extravasation

General Guidelines:

- All extravasations of vesicant drugs should be managed properly by a chemotherapy certified registered nurse:
 1. All extravasation incidents should be documented and reported immediately.
 2. Patient and family should be educated regarding signs & symptoms of progression of extravasations and the need for immediate follow up.
- The head of the department is responsible for training the employees on the approved procedures. All RNs who are working in areas where chemotherapy is given should receive special training in the management of extravasation.

Definitions of terms:

□ ***Extravasation:***

Leakage or infiltration of a vesicant drug or irritant agent from the vein into the subcutaneous tissue which may result in pain, necrosis or sloughing of tissues. nerves ,tendons, joints ,some drugs (vesicants) can cause extensive necrosis and the damage can continue for several weeks or months after the incident. The extent of trauma may result

in surgical excision of the affected area, skin grafting and functional loss .

□ ***Vesicant:***

Is the cytotoxic agent that causes extensive tissue necrosis with or without ulceration or blistering; it may cause permanent tissue damage.

□ ***Non-vesicant:***

Has no significant soft tissue toxicity

□ ***Irritant:***

Likely to cause pain at the site or along the vein within minutes of the beginning of infusion

Risk Factors for extravasation (Patient-Related):

- 1) Vein size & quality
 - small
 - fragile
 - sclerosed
- 2) Vascular access device
- 3) Obstructive process such as lymphedema
- 4) Peripheral neuropathy
- 5) Duration of tissue exposure- prolonged
- 6) Vein puncture site- at the joints

Immediate manifestations of extravasations:

- Severe pain or burning
- Blotchy redness at site
- Severe swelling
- Loss of blood return in the IV line

Delayed manifestations of extravasations:

- Pain & swelling occur up to 48 hrs following drug administration
- Tingling at site
- Cellular destruction leading to:
 - Dry desquamation
 - Blistering
 - Ulceration
 - Permanent joint stiffness
 - Loss of function
 - Infection/ cellulites
- Delay in recovery, longer hospital stay, and increased cost of care

Prevention of Extravasations:

- 1) Use care in selecting vein puncture site
- 2) 'Clean' smooth cannula insertion
- 3) Insert cannula on opposite arm of lab draw, mastectomy site, etc.
- 4) Secure IV so that catheter site is visible
- 5) Administer vesicant through free-flowing IV infusion
- 6) Monitor blood return after each 2-3cc of vesicant administered
- 7) Check with patient frequently regarding pain, sensation of cold, burning, pressure, etc.
- 8) Flush well with normal saline after administration of vesicants.

- 9) If vesicant drug is administered as a continuous infusion, drug must be given through a central line.

Management of Extravasation:

- 1) Stop administration immediately & notify physician
- 2) Reassure patient
- 3) Place a piece of dry gauze 2X2 between skin and IV cannula
- 4) Disconnect IV tubing from cannula and connect a sterile cap or covered needle to the end of tubing maintaining a safe-handling technique
- 5) Attach 1cc syringe directly to the IV cannula & attempt to gently aspirate as much as possible (3-5cc drug/blood)
- 6) Elevate the extremity and follow medical instructions .
- 7) Apply cold compresses to the site for all vesicants except for vinca alkaloids (Vincristine or Vinblastin).
- 8) Notify the attending physician about pt progress .
- 9) Administer antidote as ordered then discontinue IV cannula
- 10) Remove cannula if doctor does not wish to give antidote through it .
- 11) Arrange photography if ordered
- 12) Document events in nurses notes
- 13) Complete an incident report
- 14) Monitor site closely & report changes

Documentation of Extravasations:

- 1) Date, time, location of extravasations
- 2) Needle (cannula) size & type

3) Nursing Assessment

- Patient complaints
- Clinical manifestations including (appearance of site)

4) Agent extravasated:

- Estimated amount
- Antidote administered

5) Type of compresses applied (hot , cold)

6) Dimensions of extravasated site

7) Patient education

8) Date & type of photography

9) Follow-up schedule (visits, interventions, etc.)

Vesicant Versus irritant Chemotherapeutic agents:

1. Vesicants

- ❖ Dactinomycin
- ❖ Daunorubicin
- ❖ Doxorubicin (Adriamycin)
- ❖ Epirubicin
- ❖ Idarubicin
- ❖ Vinblastin
- ❖ Vindesine
- ❖ Mitomycin
- ❖ Vincristine

II. Irritants

- Carmustine
- Dacarbazine
- 5-Fu
- Cisplatin
- Mitozantrone
- Etoposide
- Bleomycin
- Mithramycin
- Streptozocin
- Teniposide

Management of Anaphylaxis

Purpose:

To safely manage anaphylaxis.

Definition of terms:

1) Hypersensitivity: an exaggerated or inappropriate, systematic or general immune response.

2) Anaphylaxis: an acute systematic reaction which may be marked by sudden onset of rapidly progressing hives, itching, progressive hypotension and respiratory distress. It may lead to shock or death.

Risk Factors for anaphylaxis:

- A drug known to cause hypersensitivity reactions.
- History of allergies, particularly a drug allergy.
- Previous exposure to the agent
- Failure to administer known effective prophylactic premedications.
- Receiving a biologic agent (i.e. Monoclonal Antibody)

Clinical Manifestations of Hypersensitivity/ Anaphylaxis:

- Urticaria (Hives)
- Localized or generalized itching
- Shortness of breath (SOB)
- Uneasiness/ agitation
- Periorbital edema
- Lightheadedness/ dizziness
- Tightness of the chest

- Abdominal cramping or nausea
- Chills
- Hypotension

Management of a localized Hypersensitivity reaction:

- Observe & evaluate symptoms
- Administer medications
- Monitor VS Q15 min for 1hr or as needed
- Avoid administering subsequent doses or administer premedications if drug critical to treatment plan

Pre-administration Guidelines:

- Take baseline vital signs
- Review patient's allergy history
- Administer premeds as ordered
- Emergency equipment/ meds available
- Orders for emergency meds/ procedures
- Teach patient to report symptoms
- Review reports of previous reactions
- Test dose with those with high likelihood of reaction
- Desensitization not always recommended, consult with medical staff though

Emergency management of anaphylaxis:

- Anaphylaxis usually arises within 15 min of administration
- Stop infusion immediately
- Stay with patient; inform the doctor, and let other staff notify code

- Maintain an IV line with normal saline
- Keep patient in supine position
- Monitor VS Q 2 min till stable, then Q 5min for 30 min, then Q 15min for the next two hours
- Maintain airway: O₂ if necessary
- Administer emergency medications as prescribed
- Provide emotional support to patient & family

Documentation & Notification:

- Detailed account in nurses notes
- Adverse drug reaction form
- Allergy bracelet
- Educate patient/ family
- Complete an incident report

Patient/ Family Education:

- Explain seriousness of anaphylaxis
- Alert to early signs/ symptoms of anaphylaxis
- Emphasize the importance of wearing a Medical Alert bracelet or tag

Anaphylaxis Management:

- List medications that are associated with an increased incidence of anaphylaxis
- Prepare emergency drugs/ equipment prior to chemotherapy administration:
 - a) oxygen b) suction c)epinephrine d) Avil
 - e)Hydrocortisone

- If administering a medication that requires a test dose (i.e. Bleomycin)
 - a- State to patient and family the rationale for test dose
 - b- Obtain baseline vital signs
 - c- Ensure anaphylactic kit/ equipment is available at bedside
 - d- Remain with patient during first 15 minutes of infusion and/ or throughout test dose
 - e- Monitor vital signs closely (every 30 minutes during the infusion)
 - f- Wait for some time after test dose before administering the full dose
 - g- Monitor patient for 30 minutes after full dose administration
- Recognize signs and symptoms of anaphylaxis:
 - a) anxiety
 - b) restlessness
 - c) erythema
 - d) pruritus
 - e) dizziness
 - f) tachycardia
 - g) hypotension
 - h) chest pain
 - i) abdominal cramps
 - j) bronchospasm
- Discontinue drug if you notice any of the previous symptoms
- Maintain the IV line with compatible flush solution
- Apply O₂ and monitor pulse O_x meter

- Notify physician immediately and carry out physician's orders
- Fill an incident report
- Document in nursing notes
- Observe patient for 60 minutes post management of anaphylaxis.

Waste Management of Cytotoxic Drugs

Purpose:

To provide guidelines for the waste management of cytotoxic drugs.

Responsibilities:

All staff that has contact with cytotoxic drugs should follow the guidelines regarding the waste management of cytotoxic drugs as set below.

Waste Management Guidelines:

- Don't clip or recap needles or break used empty syringes
- Place all needles that that are contaminated with cytotoxic drugs in properly labeled sharp container (Yellow bag with the biohazard sign).
- Place all non-sharp disposable contaminated materials in a blue plastic bag labeled with the Biohazard sign or in a properly labeled plastic bag.
- place contaminated linen and clothes in a closed plastic blue bag or in a properly labeled plastic bag.
- All unused drugs should be sent back to the pharmacy and should be documented in the nursing note including date and time, types of drugs and reason for not giving the medication.
- Unused cytotoxic drugs form should be filled out and sent with unused medication back to the pharmacy. Unused drugs should be placed in a closed leak-proof container, appropriately labeled, and sent back to pharmacy.

Cytotoxic Waste Label

Nursing Unit: _____

Date bag closed & time:

Kind of waste materials: sharps

disposable

materials

CAUTION – HAZARDOUS WASTE

References:

Anonymous (2008). Management of Peripheral Intravascular Devices. Australian Nursing Journal, 16(3), 25 – 28.

Bishop, L., Dougherty, L., Bodenham, A., et al. (2007). Guidelines on the Insertion and Management of Central Venous Access Devices in Adults. International Journal of Laboratory Hematology, 29(4), 261 – 278.

Blatzer, L., Haywood, & Cleri, R. (2002). Oncology: Pocket Guide to Chemotherapy. Philadelphia, PA: Mosby-Medical Communications.

Camp-Sorrell, D. (Ed.) (2004). Access device guidelines: recommendations for nursing practice and education. Pittsburg: ONS Publishing Division

Driscoll, M., Bukenmyer, C., Spirk, M., & Molchany, C. (1997). Inserting and Maintaining Peripherally-Inserted Central Catheters. MedSurg Nursing. Dec, 1997.

Green, J. (2008). Care and Management of Patients with Skin-Tunneled Catheters. Nursing Standard, 22(42), 41 – 48.

Groenwald, S. L., Goodman, M., Frogge, M. H., & Yarbrow, C. H. (2004). Cancer nursing: principles and practice. Boston: Jones & Bartlett Publishers

Mater Health Services, Mater Adult Hospital. Policy Name: Administration of Intrathecal Chemotherapy. Policy No: MHS-MAH-005

Pegues, D., Axelrod, P., McClarren, C. et al. (2006). Comparison of Infections in Hickman and Implanted Port Catheters in Adult Solid Tumor Patients. Journal of Surgical Oncology, 49(3), 156 – 162.

Polovich, M., White, J., & Kelleher, L. (2007). *Chemotherapy and Biotherapy Guidelines and Recommendations for Practice*. Pittsburgh, PA: Oncology Nursing Society.

Potter, K. & Held-Warmkessel, J. (2008). Intraoperative Chemotherapy for Women with Ovarian Cancer: Nursing Care and Considerations. *Clinical Journal of Oncology Nursing*, 12(2), 265-271.

Rodene, S. (2004). *The Red Book: Chemotherapy patient education adapted for the health care professional*. Austin: Nurse Oncology Education Program

Schulmeister, L. (2007). Extravasation Management. *Seminars in Oncology Nursing*, 23(3), 184 – 190.

Schulmeister, L., & Camp-Sorell, D. (2000). Chemotherapy Extravasation from Implanted Ports. *Oncology Nursing Forum*, 27(3), 531 – 541.

Womer, R., Tracy, E., Soo-Hoo, W., Bickert, B., DiTaranto, S., & Barnsteiner, J. (2002). Multidisciplinary Systems Approach to Chemotherapy Safety: Rebuilding Process and Holding Gains. *Journal of Clinical Oncology*, 20(24), 4705 - 4712

Appendices

**The following are forms that nurses may utilize in their oncology
practice**

Self-Check List for Self-Management of Chemotherapy Side Effects

Day when the anticancer drugs were administered: _____

Date	/	/	/	/	/	/	/
Days from Administration							
Body Temperature							
Defecation							
Bleeding (Y/N)							
Coughs/Sore Throat							
Stomatitis							
Fatigue							
Dyspnea							
Dizziness							
Chest Pain							
White Blood Cells							
Neutrophils							
Platelets							
Hemoglobin							

Consent Form

I understand that my doctor has diagnosed my condition as

As a part of my treatment Dr: _____ has recommended
I be given the following chemotherapeutic drugs

: _____

Treatment Alternatives : The treatment alternatives included other chemotherapy drugs, radiation therapy and comfort care only.

Risks: this authorization is given with understanding that and treatment involves some risks and hazards. I understand that it is not possible to anticipate all side effects. Some significant and substantial risks of this particular treatment include :

- Low white blood cells, red blood cells, and platelets with possible need for blood transfusion
- Infection - Bleeding /blood clots - Hair loss - Sore mouth - Shortness of breath
- Sterility - Secondary malignancy - Death - Fatigue - Anaphylaxis
- Loss of appetite - Loss of weight - Nausea, vomiting and diarrhea
- Serious damage to tissue around the vein - Others

Dr: _____ has explained to me the hazards of becoming pregnant while on treatment and has discussed with me a method of appropriate contraception.

Patient's Consent : I have read and fully understand this consent form, I understand that I should not sign this form if all items including all my questions, have not been explained or the or answered to my satisfaction or if I do not understand any of the terms or words contained in this consent form to the chemotherapy treatment and side effects have been explained to me and I consent to treatment.

I give my consent to the administration of the above named drug/s. I understand that I can stop chemotherapy at any time.

(Patient/Guardian): _____ Sig: _____ Date: _____

(Witness): _____ Sig: _____ Date: _____

(Witness): _____ Sig: _____ Date: _____

Physicians Declaration : I have explained the contents of this document to the patient and have answered all the patient's questions ,and to the best of my knowledge ,I feel patient has been adequately informed and has consented .

Physician Name: _____ Signature
: _____ Date: _____

Arabic Consent Form

انا اتفهم بأن الطبيب المعالج قد شخص " صنف " حالتي المرضية بأنها :
وكجزء من معالجاتي الطبية من مرض السرطان اوصى الطبيب
باعطاء ادوية العلاج الكيماوي عن طريق العلاجات التالية :-

- طرق المعالجة " بدائل علاجية "** بدائل العلاج تتضمن اعطاء ادوية العلاج الكيماوي
المختلفة ، العلاج بالأشعة او العلاج بالمسكنات فقط
المخاطرة : ثم اعطاء هذا التفويض بناءً على فهمي الكامل بان أي طريقة علاج تتضمن
مخاطر وعواقب معينة ، وانا اتفهم بانه لا يمكن توقع كافة الجوانب السلبية للعلاج وبعض
هذه الجوانب التأثيرية السلبية للعلاج لها صيغة خطيرة او مضاعفات ومنها :-
- انخفاض عدد كريات الدم البيضاء او الصفائح في الدم والحاجة الى نقل دم
بشكل تعويضي للمريض .
 - الالتهابات المصاحبة لانخفاض المناعة
 - النزف / خثرات الدم
 - فقدان الشعر / الجزئي او الكلي
 - تقرحات في الفم
 - فرط الحساسية للعلاج
 - الاجهاد العام
 - التلف الحيوي للانسجة المحيطة بالوريد
 - العقم
 - تطور سرطاني ثانوي
 - طفح او تغيرات في الجلد
 - الوفاة
 - ضيق التنفس
 - فقدان الشهية
 - فقدان الوزن
 - اضرابات المعدة من غثيان او القيء او الاسهال او الامساك او عسر
الهضم .

- أخرى -----

قام الطبيب ----- بشرح
مخاطر الحمل وأنا قيد المعالجة الكيماوية وقام بتوضيح طرق منع الحمل الملائمة

تفويض المريض :-

بعد قراءتي لهذا التفويض وفهم محتواه والاجابة على جميع استفساراتي وتوضيح طريقة
العلاج المقترحة افوض الطبيب المعالج والكوادر الطبية المعنية اعطائي الادوية والعلاجات
المقترحة اعلاه ، علماً بانني على علم بانه لا يجب التوقيع في حالة عدم شرح العواقب
والاجابة عن أي تساؤل او استفسار بشكل تفصيلي .
انا على علم بأنني استطيع ايقاف هذا العلاج في أي وقت .

المريض / ولي امر المريض ----- التوقيع -----

----- التاريخ :-----

شاهد:----- التوقيع -----

----- التاريخ :-----

شاهد :----- التوقيع :-----
----- التاريخ :-----

إفادة الطبيب المعالج :-

لقد قمت بتوضيح محتوى هذا التفويض للمريض ، والاجابة على جميع تساؤلاته ، وبناءاً
على ما تقدم قام المريض بتوقيع هذا التفويض :-

الطبيب المعالج :----- التوقيع :-----
----- التاريخ :-----

Chemotherapy Preparation Form

<i>P.t Name :</i>		<i>Hospital No:</i>	
<i>Ward &Room No .</i>			
<i>Drug Name :</i>			
<i>Diluent :-</i>			
<i>Storage :</i>		<i>Stable For :</i>	
<i>Route :</i>	<i>Rate :</i>	<i>ml/ hour</i>	
<i>Prep By :</i>		<i>At :</i>	
<i>Date : / /</i>			
<i>Checked by :</i>		<i>Nurse Name</i>	
<i>Checked by :</i>		<i>Nurse Name</i>	
<i>Pt .Name</i>		<i>Hospital No</i>	<i>Ward No</i>
<i>Drug Name :</i>			
<i>Diluent :-</i>			
<i>Storage:</i>		<i>Stable For</i>	
<i>Route :</i>	<i>Rate :</i>	<i>ml / hour At</i>	
<i>Prep By :</i>		<i>Date :- / /</i>	

