Unit 4
Administration of Cancer Systemic Therapy
Systemic therapy for cancer treatment may be given orally, parenterally or, occasionally, topically. Parenteral therapy may include intravenous, subcutaneous, intramuscular, intrathecal, intravesicular, intraperitoneal, intra-arterial or intrapleural administration. The most common routes of administration are by mouth and by intravenous administration.

The principles of safe handling and administration apply to all routes of administration.

Procedures of administration can be highly specialized depending on the route of administration. Administration of parenteral systemic therapy is a post-entry level competency requiring certification. Administering a medication via a specific route usually requires the nurse to be deemed competent in that specific procedure (i.e. administration of medication by a central venous access device is a post entry level competency). Administration of oral systemic therapy will be based upon the nursing care plan that is developed by the oncology nurse and identifies the acuity, complexity and predictability of the oncology patient, as well as takes into consideration the patient’s environment and supports available. This care plan will be used to direct the patient’s care including determining the most appropriate nurse to administer the treatment (i.e. RNCC/RN/LPN).

Double click the “Push Pin” icon below to access the National Strategy for Chemotherapy Administration (NSCA) Standards and Competencies for Cancer Chemotherapy Nursing Practice document.

Health care professionals who administer systemic therapy should have access to the current active treatment plan or research plan to ensure that the patient receives treatment in accordance with the correct regimen. Any amendments or revisions to the treatment plan must also be available.

Systemic therapy is administered in accordance with district and provincial policies and best practice procedures.

**LEARNING OBJECTIVES**

At the completion of this unit the learner will be able to:

- Describe safe nursing practices prior to the administration of systemic therapy
- Discuss safe nursing practices during the administration of systemic therapy
- Identify safe nursing practices following the administration of systemic therapy
LEARNING ACTIVITIES

To complete this unit you must complete the following learning activities:

1. Calculate the Absolute Neutrophil Count (ANC) from two lab reports.
3. Read the case study and verify your answers to the questions.
4. View Infuser System presentation.
5. View the Chemotherapy Administration presentation.

INFORMATION

Pre-Administration Nursing Responsibilities

- **Complete a comprehensive patient health assessment**: Safe administration of systemic therapy begins with a comprehensive patient health assessment prior to initial treatment and continuing at each visit and/or other times as appropriate to certain regimens and the patients changing health status. Nursing assessment data is used in conjunction with assessments of other health team members, and laboratory and diagnostic findings, to evaluate any changes that might need to occur in the plan of care and to provide a baseline against which to measure progress. This assessment is also used to prevent or minimize potential side effects, to identify learning needs, and to identify appropriate support groups and services. The comprehensive assessment is coordinated among health care providers, is shared with patients, families and health team members in a timely and accurate manner and is regularly reviewed and updated throughout the patient’s treatment.

The comprehensive pre-treatment nursing assessment includes:

- Past and present health status: past medical history including previous medical history, cancer history, and response to prior treatments, current status of disease and disease presentation, medications (including medication reconciliation processes in each institution), history of allergic and anaphylactic reactions, use of complementary and alternative health care practices, pregnancy and reproductive status (including date of last menstrual period if applicable), treatment goals and plan of care.

- Physical health status: physical assessment / review of systems to assess the effects of the disease and side-effects and toxicities of treatment, performance status, actual height and weight to calculate the body surface area (BSA), vital signs, and pain and
distress assessment. Double click the “Push Pins” provided to access additional information on specific assessment tools are utilized such as the site specific nursing assessment, chemotherapy toxicity criteria tool, pain scale and the Eastern Cooperative Oncology Group (ECOG) scale.

- Age-specific concerns: older adults often have multiple co-morbidities requiring them to take multiple medications. It is important to be aware of the potential for any drug interactions with systemic therapy.

- Psychosocial, spiritual, and cultural assessment: concerns, fears, anxiety related to: disease process, prognosis, treatment, plan of care, health care system; family/friend career/lifestyle changes; intimacy; finances; transportation; coping strategies/supports; influences of religious and spiritual practices/resources; barriers to treatment (culture, language, literacy, etc.); advanced care planning.

- Learning needs: preferred language for verbal and written information, literacy level, and the patient’s understanding of the disease, treatment goals, plan of care, side effects and self-care management, individual/family’s preferred role in decision making, ability and willingness to participate in self-care, support services, and potential eligibility in clinical trials.

- **Ensure lab and diagnostics are within acceptable parameters:** Review the most recent lab and diagnostic results as ordered by the physician/nurse practitioner (NP) (within regimen-specific parameters - see Systemic Therapy Manual). Examine the complete blood count (CBC) for the white cell count (WBC), hemoglobin (HGB), platelet count and differential and pertinent chemistry results (i.e. renal function tests, liver function tests, electrolytes). The CBC and chemistry reports should be within acceptable parameters for drug administration as determined and ordered by the physician/NP and as indicated in the treatment protocol.

It is particularly important to examine the number of neutrophils reported in the CBC report. Neutrophils are a type of white blood cell and are the body’s first line of defense against infection. The neutrophil count is the most important determinant of the patient’s risk of infection; the lower the neutrophils, the greater the risk of infection. Chemotherapy causes a decrease in neutrophils. Administering chemotherapy to a patient with a low neutrophil count could be potentially life threatening.

The absolute neutrophil count (ANC) quantifies the total number of neutrophils and therefore provides a more accurate assessment of neutrophil status. The ANC includes mature neutrophils (also called granulocytes, segs or polymorphonuclear neutrophils) and immature neutrophils (bands) and is determined by multiplying the total WBC count by the differential portion of the combined bands and mature neutrophils. An absolute neutrophil count is calculated for every patient prior to administration of chemotherapy.
Laboratories may measure the white blood cell differential by a machine or manual method. The manual technique provides a more specific report. Specific criteria guide lab personnel in determining when a manual differential should be done.

The following are two methods of calculating the ANC:

1) If the differential is reported as a percentage:

\[
\text{If Neutrophils and Bands reported as percentages:}
\]
\[
\text{ANC} = \frac{\text{(\% neuts + \% bands)} \times \text{WBC}}{100}
\]

For example, if the WBC = 2.1, neuts = 41%, bands = 7 %
\[
\text{ANC} = \frac{(41 + 7) \times 2.1}{100}
\]
\[
= \frac{48 \times 2.1}{100}
\]
\[
= 1.008 \text{ or } 1.0
\]

\[
\text{If Neutrophils and Bands reported as decimal points:}
\]
\[
\text{ANC} = \frac{\text{(neuts + bands)} \times \text{WBC}}{100}
\]

For example, if the WBC = 2.1, neuts = 0.41, bands = 0.07
\[
\text{ANC} = (0.41 + 0.07) \times 2.1
\]
\[
= 0.48 \times 2.1
\]
\[
= 1.008 \text{ or } 1.0
\]

2) If the automated differential is reported as absolute counts/\times 10^9/L:

\[
\text{ANC} = \# \text{neutrophils} + \# \text{bands}
\]

For example, if the WBC = 2.1, \#neuts = 0.86, \#bands = 0.14
\[
\text{ANC} = 0.86 + 0.14 = 1.0
\]

Any abnormalities or questionable findings need to be reported and discussed with the oncologist/oncology delegate prior to administration as this may warrant treatment being delayed.

Specific diagnostic imaging tests may also be ordered before or during treatment depending on the specific chemotherapy protocol ordered. For example, cardiac
ejection fractions or MUGA scans may be ordered for high risk patients receiving anthracyclines such as doxorubicin.

It is important that the oncology nurse confirm that the physician/NP has reviewed all assessment data including lab and diagnostic tests prior to proceeding with chemotherapy administration.

**LEARNING ACTIVITY 1**

Do the following calculations. You will find the answers for these calculations in the "**Push Pin**" icon to the right.

1. Calculate the ANC from the following lab data:

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Units</th>
<th>Ref Range</th>
<th>Collected Date</th>
<th>Collected Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>WBC</td>
<td>x10^9/L</td>
<td>[4.50-11.00]</td>
<td>2014/12/08</td>
<td>11:15</td>
</tr>
<tr>
<td>RBC</td>
<td>x10^12/L</td>
<td>[4.50-6.50]</td>
<td>2.96 L</td>
<td></td>
</tr>
<tr>
<td>Hgb</td>
<td>g/L</td>
<td>[140-180]</td>
<td>106 L</td>
<td></td>
</tr>
<tr>
<td>Hct</td>
<td>%</td>
<td>[0.420-0.540]</td>
<td>0.324 L</td>
<td></td>
</tr>
<tr>
<td>MCV</td>
<td>fl</td>
<td>[80.0-97.0]</td>
<td>109.5 H</td>
<td></td>
</tr>
<tr>
<td>MCH</td>
<td>pg</td>
<td>[26.0-32.0]</td>
<td>35.8 H</td>
<td></td>
</tr>
<tr>
<td>MCHC</td>
<td>g/L</td>
<td>[315-350]</td>
<td>327</td>
<td></td>
</tr>
<tr>
<td>RDW</td>
<td>%</td>
<td>[11.5-14.5]</td>
<td>15.1 H</td>
<td></td>
</tr>
<tr>
<td>PLT</td>
<td>x10^9/L</td>
<td>[150-350]</td>
<td>68 L</td>
<td></td>
</tr>
<tr>
<td>MPV</td>
<td>fl</td>
<td>[9.0-12.5]</td>
<td>10.7</td>
<td></td>
</tr>
<tr>
<td>Neut</td>
<td>%</td>
<td>[45.0-70.0]</td>
<td>70.5 H</td>
<td></td>
</tr>
<tr>
<td>Lymph</td>
<td>%</td>
<td>[15.0-41.0]</td>
<td>17.5</td>
<td></td>
</tr>
<tr>
<td>Mono</td>
<td>%</td>
<td>[2.0-10.0]</td>
<td>10.3 H</td>
<td></td>
</tr>
<tr>
<td>Eos</td>
<td>%</td>
<td>[0.0-7.0]</td>
<td>0.7</td>
<td></td>
</tr>
<tr>
<td>Baso</td>
<td>%</td>
<td>[0.0-1.5]</td>
<td>0.7</td>
<td></td>
</tr>
<tr>
<td>Immature Grans</td>
<td>%</td>
<td>[0.0-5.0]</td>
<td>0.3</td>
<td></td>
</tr>
<tr>
<td>NPB/C/100 WBC's</td>
<td>%</td>
<td>[0.0-0.0]</td>
<td>0.0</td>
<td></td>
</tr>
<tr>
<td>Neut</td>
<td>x10^9/L</td>
<td>[2.00-7.50]</td>
<td>2.05</td>
<td></td>
</tr>
<tr>
<td>Lymph</td>
<td>x10^9/L</td>
<td>[1.50-4.00]</td>
<td>0.51 L</td>
<td></td>
</tr>
<tr>
<td>Mono</td>
<td>x10^9/L</td>
<td>[0.10-0.90]</td>
<td>0.30</td>
<td></td>
</tr>
<tr>
<td>Eos</td>
<td>x10^9/L</td>
<td>[0.00-0.50]</td>
<td>0.02</td>
<td></td>
</tr>
<tr>
<td>Baso</td>
<td>x10^9/L</td>
<td>[0.00-0.10]</td>
<td>0.02</td>
<td></td>
</tr>
<tr>
<td>Immature Grans</td>
<td>x10^9/L</td>
<td>[0.00-0.09]</td>
<td>0.01</td>
<td></td>
</tr>
</tbody>
</table>
2. Calculate ANC from the following Lab data.

### Routine Hematology

**Profile**

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Units</th>
<th>Ref Range</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>WBC</td>
<td>x10[9]/L</td>
<td>4.50-11.00</td>
<td>3.47 L</td>
</tr>
<tr>
<td>RBC</td>
<td>x10[12]/L</td>
<td>3.80-5.60</td>
<td>3.20 L</td>
</tr>
<tr>
<td>Hgb</td>
<td>g/L</td>
<td>120-160</td>
<td>101 L</td>
</tr>
<tr>
<td>Hct</td>
<td>%</td>
<td>37.0-47.0</td>
<td>32.1 L</td>
</tr>
<tr>
<td>MCV</td>
<td>fl</td>
<td>80.0-97.0</td>
<td>100.3 H</td>
</tr>
<tr>
<td>MCH</td>
<td>pg</td>
<td>28.0-32.0</td>
<td>31.6 H</td>
</tr>
<tr>
<td>MCHC</td>
<td>g/L</td>
<td>315-350</td>
<td>315 H</td>
</tr>
<tr>
<td>RDW</td>
<td>%</td>
<td>11.5-14.5</td>
<td>16.2 H</td>
</tr>
<tr>
<td>PLT</td>
<td>x10[9]/L</td>
<td>150-350</td>
<td>346</td>
</tr>
<tr>
<td>MPV</td>
<td>fl</td>
<td>9.0-12.5</td>
<td>9.6 H</td>
</tr>
<tr>
<td>Neut</td>
<td>%</td>
<td>45.0-70.0</td>
<td>27.1 L</td>
</tr>
<tr>
<td>Lymph</td>
<td>%</td>
<td>15.0-41.0</td>
<td>38.6 H</td>
</tr>
<tr>
<td>Mono</td>
<td>%</td>
<td>20.0-10.0</td>
<td>28.5 H</td>
</tr>
<tr>
<td>Eos</td>
<td>%</td>
<td>0.0-7.0</td>
<td>1.2 H</td>
</tr>
<tr>
<td>Baso</td>
<td>%</td>
<td>0.0-1.5</td>
<td>1.4 H</td>
</tr>
<tr>
<td>Immature Grans</td>
<td>%</td>
<td>0.5-5.0</td>
<td>5.2 H</td>
</tr>
<tr>
<td>NRB/C100 WBC's</td>
<td>%</td>
<td>0.0-0.0</td>
<td>0.0 H</td>
</tr>
</tbody>
</table>

**Information**

**Thoroughly review the systemic therapy order for completeness, comprehensiveness, and discrepancies:** All orders for cancer systemic therapy must be written and signed by an oncologist/oncologist delegate. Telephone orders/verbal orders are not acceptable (telephone/verbal orders for clarification are acceptable). The order is scrutinized in its entirety. Any inconsistencies, discrepancies or uncertainties in the chemotherapy order must be discussed with the oncologist/oncologist delegate.

Many orders are written on preprinted orders; these orders provide complete dosing and administration instructions. For orders NOT written on preprinted orders, the written order is compared with the chemotherapy protocol in the plan of care (outlined by the oncologist in the dictated notes) and the treatment protocol as detailed in the Systemic Therapy Manual or other approved reference (i.e. published protocol). The drugs ordered must be consistent with the treatment plan, cycle, week, or day. The order must also contain the relative dose, absolute dose, route and rate of drug administration and diluent volume and solution, if appropriate and must be administered on the appropriate date.
An informed consent for treatment should be signed and available on the chart.

**Verify the accuracy of the ordered systemic therapy dose:** As with any medication, the nurse is responsible for assuring that the dosage is within a usual dosage range and verifying that the dosage has been calculated accurately for the individual patient.

As per district policies, parenteral systemic therapy dose verification must be completed by two or more oncology health professionals independently from one another, and calculations will be documented as per District Health Authority (DHA) procedures. Often these will be the oncology pharmacist and one or two oncology nurses.

For oral systemic therapy orders, order verification must be completed by one oncology health professional before the prescription is given to the patient. When verifying the oral systemic therapy order, plan in collaboration with the community pharmacist, a time with the patient and family for a follow up telephone call or visit within 48-72 hours of the start of the cycle. This is to monitor adherence and any adverse effects experienced. This call may be made by either the oncology health care professional or the community pharmacist.

Guidelines for systemic therapy dosing are provided in the treatment protocols and/or written on the preprinted order. Because of the potential toxic effects of systemic therapy, there are a number of factors that may influence the patient's dosage (i.e. age, nutritional status, prior systemic therapy or radiotherapy, CBC with differential, renal and hepatic function, expected drug tolerance, cumulative or dose limiting toxic effects (i.e. cardiotoxicity), physical condition, performance status, etc. Cumulative doses of drugs with specific organ toxicity (especially cardiac, renal, and pulmonary) should be within safe limits and consistently updated.

Dose modifications, and the rationale, must be indicated on the physician’s order, plan of care and/or progress notes.

Generally, the body surface area and absolute dosage calculated is based on the actual weight of the patient, i.e. present weight. Therefore, the nurse is responsible for confirming the initial BSA (if used to calculate the does) or recalculate the BSA if the weight has changed by greater than 10% from baseline. Accuracy of weight and height measurements is essential to correct systemic therapy dosing. In some situations, an ideal body weight (preferred weight based on height) or adjusted body weight may be used to calculate drug doses. For example, an obese patient (>20% of ideal body weight) may require dosage adjustment downward because the ordered dose may be too toxic to normal cells. Dosage adjustments are individualized and based on a number of factors (i.e. age, general health, organ dysfunction, aggressiveness of disease, physician experience and preference). The weight that is used should be documented in the individual treatment protocol. (Approved references for weight adjustments may be found in the Systemic Therapy Manual.)
Three main methods are used to calculate the chemotherapy dose: Body Surface Area (BSA), Area Under the Curve (AUC), and mg/kg.

- **Body Surface Area**

  In order to calculate drug dose using the BSA, the nurse needs to both determine the body surface area of the patient and verify the usual dosage range of the drug in mg/m².

  Most systemic therapy doses are calculated according to the individual's body surface area (BSA). BSA is calculated using the patient’s current height and weight and is expressed in square meters (m²). The accepted formula to calculate BSA is Mosteller’s formula; this formula is available in the Systemic Therapy Manual, Appendix 1A. Other formulas or nomograms can be used to calculate the BSA, but these are not the currently accepted standard practice.

  The dose of the drug in mg/m² is usually provided in the physician’s order and can be verified in the Systemic Therapy manual found at: http://www.cancercare.ns.ca/en/home/healthprofessionals/stp/default.aspx.

  Once the BSA is determined and the drug dosage range has been ordered/verified per mg/m², the individual drug dosage can then be calculated.

  The following is an example of how the calculation is performed:

  ![](image)

  According to calculations, the patient would receive 113.4 mg of Cisplatin. This dose would likely be rounded off in pharmacy to 113 mg of drug in order to accurately draw up the dose.

- **Area Under the Curve**

  The AUC is the standard of practice used to calculate the dose of Carboplatin. Renal function, especially glomerular filtration rate (GFR), plays a major role in determining efficacy and toxicities of Carboplatin and is a major variable in determining the dose of Carboplatin to administer.
The Calvert formula is the formula used for AUC dosing.

The following information is needed to determine the Carboplatin dose:

- The Cockcroft-Gault formula is used to estimate creatinine clearance (unless an actual glomerular filtration is available). Several formulas used to determine creatinine clearance and ideal body weight are outlined in the Systemic Therapy Manual found at: http://www.cancercare.ns.ca/en/home/healthprofessionals/stp/default.aspx.

- The most commonly used is the Cockcroft-Gault formula depicted below.

<table>
<thead>
<tr>
<th>CREATININE CLEARANCE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Males:</strong></td>
</tr>
<tr>
<td>Estimated Creatinine Clearace (ml/min) = (140 - age) x (ideal body weight kg) / 72 x serum creatinine</td>
</tr>
<tr>
<td><strong>Females:</strong></td>
</tr>
<tr>
<td>Estimated Creatinine Clearace (ml/min) = (140 - age) x (ideal body weight kg) x 0.85 / 72 x serum creatinine</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>IDEAL BODY WEIGHT</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Men:</strong> 50 kg + 2.3 kg/(inch &gt; 5 ft.)</td>
</tr>
<tr>
<td><strong>Women:</strong> 45 kg + 2.3 kg/(inch &gt; 5 ft.)</td>
</tr>
<tr>
<td>OR</td>
</tr>
<tr>
<td><strong>Men:</strong> 51.65 kg + 1.85 kg/(inch &gt; 5 ft.)</td>
</tr>
<tr>
<td><strong>Women:</strong> 48.67 kg + 1.7 kg/(inch &gt; 5 ft.)</td>
</tr>
</tbody>
</table>

- Target AUC. The target AUC is ordered by the physician and referenced in the systemic therapy protocol.

- The Calvert formula is used to determine AUC dosing and can be found in the http://www.cancercare.ns.ca/en/home/healthprofessionals/stp/default.aspx. The estimated creatinine clearance obtained from the above formula is used in the Calvert formula to determine the recommended dose of Carboplatin. The Calvert formula is described below.

\[
\text{Dose of Carboplatin (mg)} = (\text{target AUC}) \times (\text{Creatinine Clearance} + 25)
\]

* Note: the number 25 is a formula constant that denotes unexcreted drug bound to protein and drug that is secreted by the renal tubules.
It is important to note that doses in the Calvert formula are mg, not mg/m².

- Mg/kg

Milligrams/kilogram formulas are used to calculate systemic therapy doses in children less than one year of age or less than 10 kilograms in weight. Many biological and targeted agents also use this method of dose calculation for both children and adults (some may use micrograms/Kilogram).

If any calculation (dose, BSA, AUC) differs by 10% or more from the order, these values must be clarified with the prescriber before drug administration.

- Review drug pharmacology: A review of pertinent drug information including classification, mechanism of action, indications, route of administration, hypersensitivity profile, extravasation hazard, excretion, and side effects and toxicities can be obtained from the Systemic Therapy Manual, clinical trial protocol, clinical pharmacist or ordering oncologist. For protocols not found in the Systemic Therapy Manual, the ordering physician is responsible to provide background literature to support the systemic therapy order.

The need for premedication is determined, depending on, for example, the emetogenic potential of the drugs, or the potential to cause hypersensitivity or anaphylactic reactions and other drug-specific requirements (e.g. pemetrexed). Similarly the need for pre and/or post hydration is determined.

The extravasation hazard of the drug is reviewed (vesicant and irritant drugs should be labeled as such by pharmacy). Extravasation is infiltration or leakage of fluids or medication from a blood vessel into the tissue surrounding the administration site. Extravasation hazards vary depending on whether drugs administered intravenously are vesicants, irritants, or non-irritants.

Vesicants are drugs that have the potential to cause blistering, severe tissue injury or necrosis when they infiltrate into surrounding tissue. Irritants are agents that may cause inflammation (phlebitis) and/or pain at the venipuncture site or along the vein; however, if infiltrated, they do not cause tissue necrosis.

The nurse must be aware of the drug extravasation hazard as this has implications for vein selection, sequence of administration, and administration procedure. In addition, the nurse needs to be knowledgeable of factors increasing the risk of extravasation, preventative measures and assessment and management strategies, including the extravasation algorithm.

Similarly it is important that the nurse be aware of drugs that are more likely to cause hypersensitivity/anaphylactic reactions, and prevention, assessment and management of these reactions.
Content related to drug extravasation and hypersensitivity/anaphylactic reactions will be covered in detail in a later section.

**LEARNING ACTIVITY 2**

1. Based on the systemic therapy order for FEC100, using the Systemic Therapy Manual, search for the following:


   ![Medication order form](image-url)
Adhere to the six rights of drug administration: Adhering to the six rights (below) will help ensure accuracy and safety in drug administration.

- Right patient
- Right drug
- Right dose
- Right route
- Right time
- Right documentation

Prior to administration, each nurse will independently verify the accuracy of information on the drug label with the PPO or other medication order. This will be confirmed with another health care professional (usually another oncology nurse). The patient’s name, identification number, drug name, relative dose, absolute dose, route, time, infusion rate and duration, and diluent infusion should be identical on the order sheet and on the drug label. The medication bag is inspected for expiry date and compatibility of diluent and particulate matter, discoloration or leaks.

The nurse must also verify the full name and patient identification number on the chemotherapy drug label matches the full name and patient identification number on the patient’s identification armband or equivalent personal identification, as per DHA procedure.

In the instance of IV administration, the nurse must have the rate of the IV pump verified by another oncology health care professional, prior to initiating the infusion.

This process must be documented as per DHA policy and procedure.

David is a 56 year old man who has been diagnosed with advanced non-small cell lung cancer. He has a past history of smoking 1-1½ packs of cigarettes per day but quit 2 years ago. His medical history includes hypertension and hyperlipidemia. He is coming to your unit today to begin his treatment with Cisplatin and Vinorelbine.
Height = 176 cm  
Weight = 75 kg  

1. Calculate his BSA using both the Nomogram by Dubois and Dubois and Mosteller’s formula. Double click the “Push Pin” icon below to print a blank Nomogram. Put your mouse over the yellow text icon below to obtain Mosteller’s formula.  

Mosteller’s Formula  
Blank Nomogram  

Mostellers  
Nomogram  

The following orders are written for cycle #1:  

<table>
<thead>
<tr>
<th>Drug</th>
<th>Dose Calculations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cisplatin</td>
<td>80 mg/m² = 152 mg IV infusion in 500mL normal saline over 1 hour on Day 1</td>
</tr>
<tr>
<td>Vinorelbine</td>
<td>25 mg/m² = 48 mg IV push on Day 1, 8 and 15</td>
</tr>
</tbody>
</table>

2. Verify the dose calculations for each systemic therapy agent. Put your mouse over the agent below to see how you did.  

Cisplatin  
Vinorelbine  

David arrives for his Day 8 Vinorelbine. A CBC is completed
3. Calculate his ANC? Would you proceed with his treatment today? Click yellow note for correct ANC.

Point to Ponder: David’s serum creatinine increases from 82 umol/L to 130 umol/L after his 2nd cycle of chemo. Would this impact his treatment? If so, how? Click yellow note for correct answer.

INFORMATION

Nursing Responsibilities

- Ensure a safe environment for the administration of systemic therapy drugs:
  - Ensure correct administration tubing is used where indicated
  - Ensure that emergency drugs and emergency equipment are available
➢ Wear PPE and ensure that a spill kit and proper disposal equipment is available
➢ Provide supplies for patient comfort (emesis basin, Kleenex, warm blankets, etc)
➢ Ensure availability of physician in case of emergency
➢ Ensure that monitoring equipment is available
➢ Limit traffic in systemic therapy administration area to required personnel and support persons

- **Administer premedication/prehydration as ordered**

- **Implement appropriate sequencing of drugs.** The following are guides to drug sequencing: vesicants, then irritants, then non-irritants; smaller volumes before larger volumes; drugs with less hypersensitivity potential before those with greater risk of hypersensitivity reactions. An exception to this is an established protocol that has a specific sequence requiring a specific agent to be administered first due to pharmacokinetic reasons.

- **Protect light sensitive drugs**

- **Verify blood return:** Blood return is verified immediately prior to initiating systemic therapy. The frequency that blood return must be verified during administration is determined based on the vesicant and irritant potential of the drugs as well as the route.

- **Monitor for potential side effects and complications:** Monitor the IV rate closely. Ensure the drug is infusing at the required rate; too rapid an infusion may increase side effects. Monitor the site for extravasation or phlebitis. Monitor the patient for specific immediate side effects as indicated in the drug profile or for allergic/hypersensitivity reactions. Monitor vital signs, fluid status, intake/output, urine specific gravity, etc., as indicated in the treatment protocol and monitor effectiveness of antiemetic medication, etc.

- **Flush between drugs with compatible IV solution:** Following systemic therapy administration and/or between drugs, the line is flushed with 50 mls of compatible solution. This prevents drug mixing, formation of precipitates, and decreases the risk of vein damage.

**Intravenous Administration of Systemic Therapy**

- Intravenous administration of cancer systemic therapy must be performed by a RNCC.

- Prior to administration the RNCC will assess the patient, provide necessary education and verify the systemic therapy order.
Many systemic therapy drugs are given intravenously. Drugs given intravenously may be given through a peripheral access or through a central venous access device. Methods of intravenous administration are direct IV push or infusional method.

Drugs administered by direct IV push are given using the side arm technique. A mainline of fluid, freely flowing, is connected to the IV cannula. The syringe containing the drug is attached at the injection port closest to the patient. The drug is injected over the recommended time as per the systemic therapy manual; the IV solution is allowed to flow freely thus, diluting the drug. Blood return is assessed prior to administration for both peripheral and central lines and every 2-3 mls during injection for peripheral IVs.

Drugs administered by the infusional method (or piggyback) are attached as a secondary bag to the medication port or the lowest injection port of the mainline IV and may be an intermittent or continuous infusions. An intermittent infusion is administration by infusion of up to 8 hours duration; a continuous infusion is administration by infusion for a period greater than 8 hours duration. Infusional methods of delivery include drug delivery by use of primary or secondary (i.e. minibags) bags or infusor systems.

The procedure for IV administration can vary depending on the classification of drug (vesicant, irritant, non irritant), and also the mode of administration (CVAD, peripherally, infusor).

Appropriate selection and thorough education of patients for continuous infusions with ambulatory infusion pumps are vital to ensure the patient and family can successfully manage these treatments at home.

Great care must be taken in intravenous access for the administration of systemic therapy, particularly because of the danger of extravasation and the potential for tissue necrosis with some drugs. The oncology nurse administering systemic therapy must be competent in: IV initiation, care and maintenance of CVADs, IV direct administration of drugs, and the procedure for managing an extravasation when it is required for specific protocols and/or procedures.

### Oral Administration of Systemic Therapy

The oral route is one of the most common routes for administration. Administration of oral systemic therapy will be based upon the nursing care plan that is developed by the oncology nurse and identifies the acuity, complexity and predictability of the oncology patient, as well as takes into consideration the patient’s environment and supports available. This care plan will be used to direct
the patient’s care including determining the most appropriate nurse to administer the treatment (i.e. RNCC/RN/LPN).

- Prior to each cycle the RN is responsible to assess the patient, provide any necessary education and also verify the systemic therapy order. The prescription for oral systemic therapy must be verified by at least one oncology health professional each time an order is written for oral systemic therapy, before giving the prescription to the patient or sending it to the community pharmacy.

- An oncology health professional and/or community pharmacist will contact the patient and family by telephone, as scheduled during the verification process, to monitor adherence and adverse effects experienced. This contact may also be used to reinforce patient education on the drug and the overall cancer therapy.

**Intramuscular/Subcutaneous Administration of Systemic Therapy**

- Less frequently used routes of systemic therapy administration are the intramuscular or subcutaneous routes. **These routes are never used for vesicant or irritant drugs.**

- Subcutaneous and intramuscular systemic therapy may also be administered by RNs other than RNCCS, if the RN is knowledgeable about cytotoxic precautions, management of expected toxicities and the care required by oncology patients. Doses may be also be self-administered in the home setting by the patient and/or family with the appropriate education and resources in place.

- Prior to administration the RN will assess the patient, provide and reinforce any necessary education, and verify the systemic therapy order.

- These medications are administered in accordance with institutional policies and procedures. Principles of proper selection of site, volume of medication injected, needle size and administration techniques apply as to injections of non cytotoxic drugs unless specified in the systemic therapy manual or by the manufacturer.

- Consult the physician if platelets are decreased; for thrombocytopenic patients, pressure may be applied to the injection site afterwards to prevent hematoma formation. Safe handling (i.e. gloves as a minimum for administration, disposal of equipment in appropriate cytotoxic containers, and cytotoxic precautions) practices are employed. As above, preparation and teaching reflect developmental considerations.
**Intravesicular Administration of Systemic Therapy**

- The intravesicular route is used to instill antineoplastic drugs or BCG into the bladder for the treatment of bladder cancer.

- Intravesicular administration may be performed by a urologist or a RN with post entry level competency for the procedure unless the agent is cytotoxic, in which case the RN must also be a RNCC.

- Prior to administration of each dose of BCG or intravesicular systemic therapy the RN will assess the patient, provide and reinforce any necessary education, and verify the systemic therapy order.

- This procedure may take place in the ambulatory clinic or in the operating room, depending on the indications. A foley catheter is placed into the bladder, the bladder is drained, the specific drug is instilled, and then the catheter is removed. The drug remains in place for a specific amount of time while the patient follows a protocol of changing body position at regular intervals. At the end of the dwell time the patient is instructed to void. Patient education includes side effects and self-care management and safe handling of urine.

Double click the “Push Pin” icon below to refer to the NS Provincial Policy and Procedure for Administration of Cancer Chemotherapy. You should also refer to your district policies and procedures.

Guidelines for successful intravenous administration are included in the module on Specific Reactions to Chemotherapy under the content on Prevention of Extravasation.
Nursing Responsibilities after Administration

- Flush with 50 mls compatible IV solution.
- Properly dispose of cytotoxic wastes.
- Assess the patient carefully for side effects or toxic effects.
- Educate regarding side effects and self-care management strategies, and how and where to access help, return date/ follow up appointments.
- Refer to appropriate agencies and resources when necessary.
- Communicate treatment information with appropriate personnel; collaborate with interprofessional team to coordinate care with other providers.
- Document the procedure and patient tolerance on appropriate record. Documentation includes assessment, interventions, teaching, patient response, chemotherapy cycle/ week/ day, location of intravenous site/central line, venous patency verification and frequency of blood return, drug and dosage, sequence of administration, intravenous fluids, cathlon type and size, amount and type of flushing solution, description of site pre and post treatment, adverse reactions/ action taken, etc.
- In the case of oral systemic therapy, coordinate with the care team who will be responsible for performing the follow up monitoring/adherence telephone call within 72 hours.

Click on the link to view the Infuser System
http://access.nscc.ca/CCNS/ChemoAdmin_2010_Unit_4b/player.html for this unit.

Click on the link to view the Systemic Therapy Administration
http://access.nscc.ca/CCNS/ChemoAdmin_2014_Unit_4/Unit4_chemo_adm in/player.html for this unit.