Intravenous Medication Administration Competency Guide For Licensed Practical Nurses (LPNs)

Clinical Education
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Review process: This self-directed competency guide will be reviewed/revised every 3 years or earlier in the event of policy/practice changes. The next scheduled review/revise date is Fall 2018.

Reviewed by:
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PURPOSE

This self-directed competency guide provides the background theory to safely apply best practice guidelines and processes in order to provide high quality care for the individual requiring IV Medication Administration. This guide outlines the steps necessary for the Licensed Practical Nurse (LPN) to achieve competency in the administration of intravenous medications.

ELIGIBILITY

LPNs employed at NSHA, Central Zone whose practices involve direct care to patients requiring IV medication administration may administer specific IV medications only in approved practice settings.

Only clinical areas that provide sufficient opportunities to maintain proficiency will support the practice of LPNs to administer specific IV medications to patients who are progressing according to an established plan of care with predictable outcomes. Both the patient outcomes and the outcomes of the medication being administered must be predictable. (Refer to Table 2. Beyond the Scope of Practice of a LPN, page 8)

KNOWLEDGE REQUIREMENTS

1. To learn about administering intravenous medications, the LPN will have successfully completed one of the following options:
   a. A recognized Practical Nurse program which includes intravenous medication administration competencies OR
   b. An accredited/approved post-graduate program, such as ones offered at Nova Scotia Community College (NSCC) or other institution for LPNs who graduated prior to 2012 OR
   c. Employer based learning process (which includes completion of this learning module)

2. Complete the Intravenous Medication exam. If any answers are incorrect, review the appropriate content to understand the correct answer. If unsuccessful at achieving a pass mark of 80%, discuss the discrepancy with an experienced nurse, team leader or Clinical Educator.

3. Read the following policies on the OP3 site: http://policy.nshealth.ca/Site_Published/dha9/policy_search.aspx
   a. MM 05-020 Medication Administration Times
   b. MM 10-001 Medication Transcription, Administration & Documentation
   c. CC 80-019 Peripheral IV Therapy Initiation and Maintenance
   d. MM 50-010 High Alert Medications
4. Know how to use electronic medication information resources on the intranet:
   a. IV drug monographs
   b. Micromedex
   c. E-CPS

5. Successfully complete the eLearning module Hospira RN Advanced on eLearning NS Healthcare, specifically:
   a. To set up a Secondary Medication Delivery (attachment)
   b. Program a Secondary Infusion
   c. Piggyback
   d. Alerts
   e. Concurrent Mode

6. Complete a paper-based training checklist Plum A+ Infusion Pump Training for Secondary Infusion Programming available on LMS.

**PROFICIENCY SKILL STANDARDS**

To demonstrate the procedure performed according to the Proficiency Standard Skills Checklists the nurse will:

1. Perform according to the Proficiency Standards Checklist for Intravenous Medication Administration while being observed by a qualified nurse designate. A minimum of 80% proficiency is to be achieved before performing the procedure unsupervised. If all aspects of the skills checklist are not achieved on the skills checklist, recommendations will be identified and a repeat demonstration may be recommended.
   a. Completed Proficiency Standards Skills Checklists are submitted to the Health Services Manager and a copy kept by the individual nurse.

2. Each nurse is responsible and accountable for attaining and maintaining competency with intravenous medication administration within her/his context of practice. Competency will be initially validated at the time of employment and reviewed:
   a. After unit based orientation (generally within 4 weeks of beginning orientation depending on the care area)
   b. On an ongoing periodic basis or following an extended leave of absence.
   c. When scope of practice changes
   d. With the introduction of new equipment, technology, products or standards
3. Each nurse is accountable to discuss with their manager to determine whether sufficient opportunities to perform the skill have occurred in order to maintain clinical competency.

4. Further education and/or practice may be required to ensure that the nurse can perform the skill safely and competently if performed on a low frequency.

**Challenging learning process and maintaining competence:**

1. The nurse will provide evidence of completing IV medication administration education from an accredited / approved post graduate program.
2. The nurse will maintain her/his proficiency by consistently performing the procedure successfully with minimal errors and meeting the standards of the proficiency skills checklist. Maintenance of competency needs to be reviewed periodically by the nurse.
3. The nurse will complete one or more of the following options for infusion pump training annually:
   a. Complete the Hospira IV Pump eLearning module
   b. Complete a paper based infusion pump scenario related to IV medication administration while being supervised.
4. The learning process may be *challenged* by a nurse who has already received training in their formal program or has taken an approved external course. The LPN must feel confident they can perform the skill competently, passes the exam and is able to meet the objectives of the proficiency skills checklist while being observed by a Registered Nurse or Clinical Nurse Educator.

**LEARNING OBJECTIVES**

1. Describe the advantages of intravenous medication administration.
2. Identify methods of intravenous medication administration.
3. Describe the risks associated with the different methods of intravenous medication administration.
4. Identify nursing precautions and risk reduction strategies for administering IV medications.
5. Identify the assessments and observations necessary for safe administration of IV medications.
6. Identify the interventions required for unexpected outcomes of intravenous medication administration.
7. Identify the context of practice by which it would be appropriate for LPN’s to administer intravenous medications.

CLINICAL OBJECTIVES

1. Demonstrate the correct administration of intravenous medications by piggyback and concurrent delivery by infusion pump, using drug therapy options and delivery by volume over time.

2. Demonstrate the correct calculations in determining the rate of administration for piggyback or intermittent intravenous medication administration by gravity.

3. Demonstrate the correct addition of medications to intravenous fluid bags.

SECTION 1: OVERVIEW OF IV MEDICATION ADMINISTRATION

Introduction

Intravenous (IV) medication administration is the injection of medication directly into a vein. The IV route of medication administration is prescribed based on the medication’s properties, the medication’s desired effect, the patient’s condition and when applicable the patient’s preference. In this time of fiscal responsibility, it is also necessary for prescribers to consider all aspects of medication administration, including costs.

Medication can be administered intravenously through an existing IV infusion line or an IV access site (saline lock) by the following methods:

- Piggyback or concurrent – an infusion of a solution containing the prescribed medication by a secondary IV set through an existing IV line. Large volume continuous infusions – medications are mixed in large volumes (250-1000 mL) of compatible IV fluids. The addition of the medication to the IV fluids is often done by the manufacturer or the pharmacy to ensure aseptic technique is maintained. This method of administering IV medications is often considered the safest and easiest. Vitamins and potassium chloride are two types of medicated infusions.

- IV direct – an injection of a small volume of medication through an existing IV infusion link or intermittent IV access site. **NOTE:** IV direct method is not within the practice context of LPNs at central zone

**Safety Alert:** IV medication should never be administered through tubing that is infusing blood or blood products as the medications may cause blood cells to clump or clot.
Beyond LPN Practice Context

Certain patient situations will not support the LPN to administer IV medications regardless of the product to be administered. Situations where patients needs are complex, the plan of care is unknown/un-established, or whose conditions are frequently changing with complex or poorly understood outcomes would preclude the LPN from performing IV medication administration regardless of the medications to be administered.

Table 2. List of situations that patient care needs are beyond the scope of practice of a LPN.

<table>
<thead>
<tr>
<th>Patient situation</th>
<th>Rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lack of established plan of care (verbal or written).</td>
<td>The overall predictability of the patient’s needs have not been established.</td>
</tr>
<tr>
<td>Initial doses of medication.</td>
<td>The client’s response to the medication has not been determined.</td>
</tr>
<tr>
<td>Medication orders requiring titration based on patient assessment findings</td>
<td>Active titration would indicate that the client’s needs are changing and unanticipated.</td>
</tr>
<tr>
<td>Crisis situations</td>
<td>Requires advanced priority decision making.</td>
</tr>
<tr>
<td>Any medication that could immediately (within 5-10 minutes) impact the</td>
<td>Requires advanced assessment and decision making. Is listed as a HIGH ALERT® medication.</td>
</tr>
<tr>
<td>hemodynamic stability of the client.</td>
<td></td>
</tr>
<tr>
<td>A product that requires the interpretation of additional assessment parameters</td>
<td>Interpretation of the data requires advanced decision making and assessment.</td>
</tr>
<tr>
<td>before, during or after administration (e.g. Octaplex or diltiazam)</td>
<td></td>
</tr>
<tr>
<td>A medication that requires the interpretation of additional assessment</td>
<td>Interpretation of the data requires advanced decision making and assessment.</td>
</tr>
<tr>
<td>parameters before, during or after IV (IE cardiac, hemodynamic or fetal</td>
<td></td>
</tr>
<tr>
<td>monitoring).</td>
<td></td>
</tr>
<tr>
<td>A medication that is to be administered by IV direct route.</td>
<td>This is the most dangerous method for administering medications because there is no time</td>
</tr>
<tr>
<td></td>
<td>to correct an error; and cause direct irritation to the lining of the blood vessel.</td>
</tr>
<tr>
<td>LPNs can not administer any medications by IV route appearing in the ISMP High</td>
<td>Monitoring of these patients require advanced skill and decision making.</td>
</tr>
<tr>
<td>Alert list.</td>
<td></td>
</tr>
</tbody>
</table>

Each nurse is accountable to make certain she/he possess the necessary knowledge and skill to competently care for patients, regardless of their level of predictability or complexity.
Advantages and Disadvantages of IV Medication Administration

As with any route of medication administration there are both advantages and disadvantages to administering medication intravenously. The following table describes both advantages and disadvantages or contraindications.

### Table 3. Advantages and Disadvantages of IV Med Administration

<table>
<thead>
<tr>
<th>Advantages</th>
<th>Disadvantages or Contraindications</th>
</tr>
</thead>
<tbody>
<tr>
<td>An alternative route for administration when other routes are contraindicated</td>
<td>Risk of introducing infection</td>
</tr>
<tr>
<td>A more rapid absorption of the medication than other routes (i.e.- when a fast acting drug must be administered quickly)</td>
<td>Higher risk for reactions due to higher rates of absorption</td>
</tr>
<tr>
<td>Provides a route for long-term medication therapy</td>
<td>Some intravenous medications are Expensive</td>
</tr>
<tr>
<td>Provides a less uncomfortable route for medications that are highly alkaline and irritating to muscle and subcutaneous tissue</td>
<td></td>
</tr>
<tr>
<td>Constant therapeutic blood levels can be established</td>
<td></td>
</tr>
</tbody>
</table>

### Nursing Precautions

Patients receiving IV medication must be observed closely for symptoms of adverse reactions. Once a medication enters the bloodstream, it begins to act immediately, and cannot be stopped. Therefore, adherence to the ten ‘rights’ of medication administration are essential. The ten ‘R’s or ‘rights’ of medication administration include:

1. The right medication                    6. The right reason/assessment
2. The right dose                          7. The right education
3. The right client                        8. The right to refuse
4. The right route                         9. The right evaluation
5. The right time                          10. The right documentation

Knowledge of the absorption, metabolism, and excretion rate, route of IV medication, desired action and side-effects of the medication administered are also required. If the medication being administered has an antidote, it must be available during the administration of the medication. Patient allergies must always be checked prior to administering medication.

**Medication errors are often the result of nurses becoming distracted, losing focus, or failing to follow standard medication administration protocols or procedures.**
Increased caution and focus should be used when calculating neonatal and pediatric medication doses as infants and children metabolize medications at different rates than adults. Medications dosages are weight based and not standardized.

**Risk Reduction**

The IV route of medication administration is prescribed based on the medication’s properties, the medication’s desired effect, and the patient’s condition. Medications given via the intravenous route enter directly into the venous circulation, therefore causing rapid effects.

**Safety Alert!** The rate of administration should always be verified with a drug reference before administering the IV medication. This step ensures the medication is administered safely over the appropriate amount of time. (Perry and Potter 2010)

Methods of risk reduction include:

- Use of standard drug concentrations.
- Using accurate weights for proper medication dose calculation for standard concentrations and rates of IV administration.
- Clarify illegible handwriting or unclear orders with prescriber.
- Clarify dosages that are not within the recommended range.
- Minimize or eliminate distractions during medication preparation and administration.
- For minibags prepared by pharmacy, check the label on the bag with the entry on the MAR and/or written order and the patient ID label.
- Check dosage calculations and have a second nurse independently verify them.
- Request verification of reconstituted medications added to IV fluids by a second nurse/pharmacist.
- Add medications to new IV fluid containers. Existing IV containers have an inexact amount of fluid remaining in them; therefore the exact concentration in the IV solution cannot be determined.
- Use at least two patient identifiers when administering a medication.
- Document medications as soon as administered.
Case Study A

Jolene Smith has been admitted to hospital and has a urinary tract infection confirmed by a urine culture sent for C&S. She has been ordered IV antibiotics. Please respond to the following questions:

1. Which of the following factors would the prescriber consider when prescribing an IV antibiotic?
   a. The medication’s properties
   b. The medication’s desired effect
   c. The cost of the medication
   d. The patient’s condition
   e. All of the above

2. One disadvantage of IV medication administration is that constant therapeutic blood levels cannot be established.
   a. True
   b. False

3. Match the following nursing actions to the correct ‘right’ of medication administration.
   a. Verify at least two of the following patient identifiers: patient’s full name, date of birth, medical unit number
   b. Calculate a medication dose and have a second nurse verify the calculation.
   c. Verify the medication order. Triple check medication by reading the label or medication form when selecting the drug, when drawing up the medication and just before administering.
   1. The right medication
   2. The right dose
   3. The right patient
   4. The right route
   5. The right time
   6. The right reason/assessment
   7. The right education
   8. The right to refuse
   9. The right evaluation
   10. The right documentation
Section 2: IV Medication Administration: Secondary infusions by Piggyback /Concurrent delivery methods

Introduction

Piggyback / Concurrent delivery are volume controlled administration methods in which IV medications can be administered in small amounts (50 – 100 mL) of compatible IV fluids. The IV fluid with the medication is in a separate fluid container from the main IV fluid bag. The advantages of using volume-controlled infusions include:

• Medications are infused over longer periods of time (20 – 60 mins) compared to IV direct method reducing the risk of rapid-dose.
• Medications that are stable for only a limited time in solution (i.e. some antibiotics) can be administered.
• IV fluid intake can be controlled.

The risk to this method of administration is an incorrect rate of infusion, especially if the user is unfamiliar with the infusion pump or infusing by gravity.

Secondary infusions – The medicated solution using a secondary IV set is connected to a primary IV set at a point above the pump/the highest available access port to the IV solution. This method of infusion may be via an infusion pump or by gravity. The more accurate and preferred method is by using an infusion pump but the nurse needs to also be prepared and familiar with the method of administering secondary infusions by gravity.

Secondary Method - During piggyback infusions, the main line does not infuse when the piggybacked medication is infusing. Only one line infuses at a time. When using an infusion pump using Piggyback delivery, the pump automatically pauses the main line until the secondary infusion is complete. It is not necessary to adjust the height of the bags of fluid when using the Hospira Plum A+ infusion pump.

When infusing by gravity, the smaller bag with the medication is set higher than the primary infusion bag. The primary IV tubing has a back-check flow valve that prevents the primary line from infusing when the piggybacked medication is infusing. When the piggyback medication is complete and the fluid in the piggyback tubing is lower than the primary IV fluid drip chamber, the back-check flow valve reopens allowing the primary IV fluid to flow again.
**Concurrent Method** – During concurrent delivery, the secondary infusion and the main line infuse simultaneously. This can be achieved by attaching the secondary tubing to the secondary port on the Plum A+ IV tubing cassette and setting the delivery option on the Hospira Plum A+ infusion pump to Concurrent. It can also be administered by using a separate pump for the medicated infusion and attaching the IV tubing to the lowest port of the main line IV tubing or through a separate IV site.

**Picture B: Concurrent method by Hospira Plum A+ infusion pump**

**Intermittent venous access** is an IV catheter with an extension set and needleless adaptor that is referred to as a saline lock. Intermittent venous access devices can increase the mobility, safety, and comfort of the patient as well as decreasing the risk of excess fluid volume.
Refer to Perry and Potter for the following procedures:
“Administering Intravenous Medications by Piggyback, Intermittent and Intravenous Infusion sets”
### Assessment

#### Table 4: Assessment, Observations and Rationale

<table>
<thead>
<tr>
<th>Assessment</th>
<th>Observation</th>
<th>Rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Original medication order</td>
<td>Check for accuracy and completeness of each MAR entry</td>
<td>Decreased errors associated with this process</td>
</tr>
<tr>
<td>Patency</td>
<td>Note infusion rate of primary IV fluid line and /or access blood return</td>
<td>Patent IV is necessary for safe and accurate delivery of medication</td>
</tr>
<tr>
<td>Insertion site</td>
<td>Signs of redness, pallor, swelling, or tenderness on palpation</td>
<td>Increased risk of phlebitis with administration of hyperosmolar drugs by IV route</td>
</tr>
<tr>
<td>Medication information</td>
<td>Action, purpose, peak onset, usual dose, side effects, nursing implications</td>
<td>Allows nurse to give medication safely &amp; monitor the patient's response to the medication</td>
</tr>
<tr>
<td>Rate of infusion</td>
<td>mL per hour or mg per minute</td>
<td>Allows nurse to administer medication at a safe rate</td>
</tr>
<tr>
<td>Compatibility</td>
<td>Use drug reference to determine compatibility of medication with IV solution</td>
<td>Medications that are incompatible with IV solutions may cause clouding or crystallization in the tubing</td>
</tr>
<tr>
<td>Allergies</td>
<td>Check history of medication Allergies</td>
<td>Avoids administering a contraindicated medication</td>
</tr>
<tr>
<td>Diseases/conditions</td>
<td>History or presence of renal or liver disease</td>
<td>History or presence of these diseases increase the risk of toxicity</td>
</tr>
<tr>
<td>Lab values</td>
<td>Assess appropriate lab Values</td>
<td>Determines medication efficacy &amp; toxicity</td>
</tr>
<tr>
<td>Understanding</td>
<td>Patient/family’s ability to state purpose, side effects, frequency of medication therapy</td>
<td>May reveal need for Education</td>
</tr>
</tbody>
</table>

**Safety Alert!** Never give a medication intravenously if the insertion site appears puffy or edematous or if the IV fluid cannot flow at the proper rate.
Hourly/Minute Rate Calculation for Piggyback delivery mode by gravity

NOTE: The preferred method for LPNs to administer IV medication is by using an infusion pump.

1. First calculate the hourly rate by dividing the volume to be infused by the hours it is to be infused in:

   \[
     \text{Total infusion in mL} = \frac{\text{mL}}{\text{hours}}
   \]

2. Calculate the minute rate based on drop factor of infusion set. The drop factor or calibrations in drops per milliliter (gtts/mL) of infusion sets are found on the tubing package.

Hospira secondary sets – macrodrip 15 gtts/mL

Flow Rate Calculation
The following two formulas can be used to calculate flow rate:

   a. \( X \frac{\text{mL}}{\text{hour}} = \frac{\text{mL}}{\text{min}} \)
      \[
      \frac{60 \text{ min}}{\text{hour}}
      \]

   b. \( \text{Drop factor} \times \frac{\text{mL}}{\text{min}} = \text{drops per minute} \)
      \[
      \frac{X \text{ mL/hour} \times \text{drop factor}}{60 \text{ min}} = \text{drops per minute}
      \]

Example:
Order: Gentamicin 60 mg, IV q8h
Available: Gentamicin 60 mg in 50 mL of D5W to infuse over 30 minutes

1. Hourly rate
   \[
   \frac{50 \text{ mL}}{0.5 \text{ hour}} = 100 \text{ mL/hour}
   \]

2. Flow rate calculation
   \[
   \frac{100 \text{ mL/hour}}{60 \text{ min/hour}} = 1.67 \text{ mL/min}
   \]

   Drop factor is 15 drops /mL then the drops per minute are:
   \[
   15 \text{ drop/mL} \times 1.67 \text{ mL/min} = 25 \text{ drops/min}
   \]
Practice Calculations A

The physician has ordered the following three medications:

1) dimenhydrinate 25 mg IV q6h (injection 50 mg/mL)
   The following information is available:
   dimenhydrinate 25 mg administer in 50 mls N/S over 30 minutes.
   The Macrodrip tubing (15 drops per mL) drip rate to be set at ________ drops per minute.

2) clindamycin 600 mg IV q6h
   The following information is available:
   Clindamycin 600 mg administer in 50 mL of 0.9% Sodium Chloride over 60 minutes.
   The Microdrip tubing (60 drops per mL) drip rate to be set at ______ drops per minute.

3) gentamicin 60 mg IV q12h
   The following information is available:
   Gentamicin 60 mg administer in 50 mL of D5W over 30 minutes.
   The Macrodrip tubing (15 drops per mL) drip rate to be set at ______ drops per minute.

Expected Outcomes

The expected outcome of IV medication administration is a therapeutic response to the medication with minimum adverse reactions. In order to achieve this it is expected that the:

- Medication infuses over the indicated time frame.
- IV site remains patent without phlebitis or infiltration.
- Laboratory therapeutic level monitoring is within expected parameters.
- Patient does not experience an allergic reaction, hypersensitivity or severe side effects.
- Patient and/or family are knowledgeable about the medication’s purpose, action and side effects.
<table>
<thead>
<tr>
<th>Unexpected Outcome</th>
<th>Interventions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient has an adverse reaction to the medication</td>
<td>• Stop medication infusion</td>
</tr>
<tr>
<td></td>
<td>• Consult with a Registered Nurse</td>
</tr>
<tr>
<td></td>
<td>• Immediately notify the physician</td>
</tr>
<tr>
<td></td>
<td>• Add adverse reaction information to patient record and notify pharmacy</td>
</tr>
<tr>
<td></td>
<td>• Complete Health Canada adverse reaction form and send to pharmacy</td>
</tr>
<tr>
<td></td>
<td>• Complete Incident/Occurrence report</td>
</tr>
<tr>
<td>Medication does NOT infuse over the desired time frame</td>
<td>• Determine the reason such as: improper calculation of rate,</td>
</tr>
<tr>
<td></td>
<td>malpositioned / occluded IV needle, infiltration</td>
</tr>
<tr>
<td></td>
<td>• Recalculate infusion rate, inform physician re: delay in medication</td>
</tr>
<tr>
<td></td>
<td>administration, and establish patent IV (if applicable)</td>
</tr>
<tr>
<td></td>
<td>• Document actual time administered. Refer to Guides for Adjustment to</td>
</tr>
<tr>
<td></td>
<td>Standard Hours of Administration</td>
</tr>
<tr>
<td></td>
<td>• Do NOT increase rate to ‘catch up’</td>
</tr>
<tr>
<td>IV site exhibits signs of phlebitis such as: swelling, warmth, redness, and</td>
<td>• Stop IV infusion</td>
</tr>
<tr>
<td>tenderness to touch</td>
<td>• Discontinue IV</td>
</tr>
<tr>
<td></td>
<td>• Treat IV site appropriately (refer to Perry and Potter)</td>
</tr>
<tr>
<td></td>
<td>• Insert new IV if continuation of medication or IV fluids is required</td>
</tr>
<tr>
<td>Accidental injection of a medication into the tissues around a vein (extravasation)</td>
<td>• Stop IV infusion</td>
</tr>
<tr>
<td></td>
<td>• Disconnect the IV</td>
</tr>
<tr>
<td></td>
<td>• Attempt to aspirate medication from IV catheter</td>
</tr>
<tr>
<td></td>
<td>• Notify physician</td>
</tr>
<tr>
<td></td>
<td>• Treat site appropriately</td>
</tr>
<tr>
<td></td>
<td>• Document size and shape of any damaged tissue at site</td>
</tr>
<tr>
<td></td>
<td>• Collaborate with RN re administration of antidote as ordered</td>
</tr>
</tbody>
</table>
Case Study B

Mary MacDonald has a positive culture for Group B Strep. Using the information below, respond to the following questions. (May have more than one answer)

Mary has the following order:

Gentamicin 180 mg IV q8h
The pharmacy has prepared gentamicin 180 mg in 60 mL 0.9% sodium chloride.
The medication reference states to infuse over 30 minutes

1. You administer the gentamicin by piggyback method. After 30 minutes you return to find that the piggyback medication bag is still full. Which of the following could be the cause?
   a) ___ You calculated the infusion rate incorrectly.
   b) ___ You hung the piggyback bag at the same level or lower than the main IV fluid bag.
   c) ___ You failed to unclamp the roller clamp on the secondary set.
   d) ___ The patient has developed phlebitis.

2. Mary has been receiving the same antibiotic for 2 days. Which of the following should you consider when assessing her knowledge of the medication?

   Her ability to state the:
   a) ___ purpose of the medication
   b) ___ side effects
   c) ___ frequency of medication therapy
   d) ___ generic name of the medication

3. The IV site is red, swollen and tender to touch. This is a sign of __________.
Section 3: IV Medication: Large Volume Continuous Infusions

Introduction

Medications administered in large volumes (250 – 1000 mL) of compatible IV fluids can be pre-mixed from the manufacturer or added to compatible IV fluids by pharmacy or nursing staff. The addition of the medication to the IV fluids is preferred to be prepared by the manufacturer or pharmacy to ensure asepsis. The diluted medication administered over a prescribed time frame minimizes the risk of adverse effects. One of the most common pre-mixed medications includes potassium chloride.

Large volume medication administration is not without risk nor are they appropriate for all patients. Circulatory fluid overload can occur if a large volume is infused too quickly. As well, some medications such as potassium chloride can cause serious adverse reactions and should be administered with an IV infusion pump.

In the unusual event that there isn’t a pre-made bag for medicated IV solution, either from the manufacturer or pharmacy, it may be necessary for a nurse to add medications to an IV fluid bag.

Safety Alert! Only add medications to a new IV fluid bag. Existing IV containers have an inexact amount of fluid remaining in them; therefore the exact concentration in the IV solution cannot be determined. In addition, ensure mixing the bag after injecting the medication to prevent a high concentration in the lower portion of the IV bag where the patient would receive a higher concentration of the medication. Label the bag with the patient’s ID label and an “Additive Label”.

Refer to Perry and Potter for the procedure of “Adding Medications to Intravenous Fluid Containers”

Assessment and Unexpected Outcome

As well as the Assessments recommended for IV meds administered by secondary infusions (Table 3, page 12), also assess the following:

<table>
<thead>
<tr>
<th>Assessment</th>
<th>Observation</th>
<th>Rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fluid balance</td>
<td>Skin turgor, body weight (changes from baseline), pulse, blood pressure, lung sounds, edema; intake and output</td>
<td>Rapid infusion of continuous IV therapy can cause circulatory overload.</td>
</tr>
</tbody>
</table>

Unexpected Outcome

As well as the Unexpected Outcomes identified for IV meds administered by secondary infusions (Table 4, page 16), an additional unexpected outcome would be the signs and symptoms of circulatory overload:
Circulatory fluid overload

- Stop IV infusion or decrease rate in order to maintain IV access
- Assess patient for respiratory distress
- Immediately notify the physician
- Collaborate with RN re the change in patient’s condition

**Evaluation**

Evaluation of the administration of IV medications by Large Volume Continuous Intravenous Infusion includes:

- Monitoring the patient during the infusion for adverse reactions such as: urticaria, respiratory distress, tachycardia, hypotension, etc.
- Monitoring the patient during the infusion for signs and symptoms of circulatory fluid overload.
- Observing the patient’s medication infusion periodically for proper rate of administration.
- Assessing the patient’s IV site periodically for signs of complication such as: swelling, pain, tenderness, redness at site, etc.
- Assessing the patient’s and/or families’ knowledge of the medication including: the name, purpose, adverse effects, and frequency.
IV MED ADMINISTRATION POST TEST

1. Which of the following are considered when prescribing a medication for an IV route of administration?
   a. The medication’s properties
   b. The cost of the medication
   c. The medication’s desired effect
   d. The patient’s condition
   e. All of the above

2. Identify the method of IV medication administration depicted in the following pictures:
   a. Secondary infusion concurrent with large volume infusion
   b. Intermittent venous access for IV direct
   c. Piggyback volume controlled administration by gravity method

3. Match the following risks with the method of IV medication infusion in the photos in question #2:
   a. Risk of incorrect infusion rate
   b. Risk of excess fluid volume
   c. Risk of unable to correct error due to rapid-dose action

4. IV medication can be administered through tubing that is infusing blood or blood products as long as a physician has written the order.
   a. True
   b. False
5. Which of the following is considered an advantage of administering medication intravenously:
   a. More work intensive for the health care provider
   b. Provides a route for complementary therapies
   c. Constant therapeutic blood levels can be established
   d. Provides a route that can be distressing for the patient

6. Which of the following is a method of risk reduction:
   a. Document medications at the end of shift
   b. Add medications to existing fluid bags
   c. Ask the ward clerk to interpret the physician’s handwriting
   d. Double-check dosage calculations and verify them with a second nurse

7. Which of the following is considered a volume-control method of IV medication administration:
   a. 1000 mL IV medicated continuous infusion
   b. 50 mL IV minibag for piggyback
   c. IV direct administration
   d. Rapid infuser

8. Select the correct observations and rationale for the following assessments.

<table>
<thead>
<tr>
<th>Assessment</th>
<th>Observation</th>
<th>Rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insertion site</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medication information</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disease/conditions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Compatibility</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Patency</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Observations:
   a. History of renal or liver disease
   b. Refer to drug reference to determine drug compatibility with IV solution
   c. Action, purpose, peak onset, usual dose, side effects, nursing implications
   d. Check distal pressure on IV pump, blood return and ease of flushing
   e. Signs of redness, pallor, swelling or tenderness on palpation

9. Rationale:
   a. Allows nurse to administer medication at a safe rate
   b. Medications that are incompatible may cause clouding or crystallization
   c. Increased risk of phlebitis with hyperosmolar drugs
   d. Increased risk of toxicity
   e. Prevents infiltration and extravasation of medication
10. You are preparing to administer a piggyback infusion by gravity of 80 mgs of gentamicin in 50 mL of D5W with a macrodrip secondary set (delivers 15 drops/mL per minute) over 30 minutes. What should the drip rate be per minute?
   a. 1.6
   b. 6
   c. 25
   d. 100

11. In order to achieve the expected outcome of a therapeutic response with a minimum of adverse reactions, which of the following is expected:
   a. IV site remains patent without phlebitis or infiltration
   b. Medication infuses in the indicated time frame
   c. Lab values are within expected parameters
   d. Patient does not experience an allergy reaction, hypersensitivity or severe side effects
   e. All of the above

12. Which of the following would be considered an appropriate evaluation of administrating IV medications?
   a. Pharmacist ordering and interpreting blood work
   b. Assessing the patient’s IV site for signs of complications
   c. Maintaining aseptic technique
   d. Ensuring the medication is infused at a faster rate when behind schedule

13. Which method of IV medication administration uses a secondary IV line/set?
   a. Piggyback method
   b. Large volume continuous method
   c. Slow direct IV method
   d. Blood warmer and rapid infuser

14. Addition of medications to large volume IV bags is preferred to be done by:
   a. Physicians
   b. Nurses
   c. Manufacturer
   d. Assistive personnel
15. Medication may be added to IV fluid bags already infusing
   a. True
   b. False

16. It is acceptable to inject a medication into a minibag already hanging as long as it is backfilled from the primary line.
   a. True
   b. False

17. A patient is receiving a large volume IV medicated infusion and develops crackles in their lungs, a fall in blood pressure and has a greater fluid intake than output. What do you think is occurring?
   a. Adverse reaction
   b. Medication not effective
   c. IV infusion rate is too slow
   d. Circulatory overload

18. What are the appropriate steps in correctly identifying a patient prior to administering an IV medication?
   a. Checking the patient's room number against the chart back
   b. Asking the patient their address and doctor's name
   c. Comparing two patient identifiers and medication on the MAR, to the medication label and the patient's ID armband
   d. Check the IV record in the patient's room upon entry

19. Which of the following is the most accurate way to regulate the flow rate of a medicated infusion?
   a. Taking the tubing out of the pump to allow the infusion to free flow
   b. Hanging the IV bag as high as possible when infusion is too slow
   c. Setting the rate and volume to be administered on the infusion pump
   d. Asking the patient to open and close their fist to create pumping action
20. Disadvantages of the IV route include:
   a. Drugs have an immediate action and cannot be withdrawn once they have been administered
   b. Drugs take longer to work and there is higher risk of side effects
   c. IV slow direct can be time consuming as a nurse needs to stay with the patient
   d. Damages blood vessels that can be used for blood collection

21. Which of the following is within the practice context of a LPN administering an IV medication?
   a. The initial dose of an IV medication
   b. A patient who has been on medication for 3 days and temperature has increased to 39.5°C
   c. A medication on ISMP’s High Alert list
   d. The patient who has been receiving the medication for 24 hours and is progressing according to the established plan of care
ANSWER GUIDE

Case Study A – page 10
1. e
2. b
3. a –
   b –
   c –

Practice Calculations – page 14
1. 10 drops per minute
2. 50 drops per minute
3. 25 drops per minute

Case Study B – page 16
1. a, b, c
2. a, b
3. phlebitis
Post Test – page 19

1. e
2. b  a  c
3. c  a  b
4. b
5. c
6. d
7. b
8. e
c
   a
   b
d
9. c
   a
d
   b
e
10. c
11. e
12. b
13. a
14. c
15. b
16. b
17. d
18. c
19. c
20. a
21. d
PROFICIENCY STANDARD SKILLS CHECKLIST
Intravenous Medication Administration

Print Name and Professional Designation: ________________________________

Primary Assignment Unit: __________________________

Instructions:
1. Each method applicable to area of practice must be observed twice with 80% accuracy before performing the procedure unsupervised.
2. If all aspects of the skills checklist are not demonstrated, recommendations will be identified and a repeat demonstration may be recommended.
3. Complete a new checklist for each method of administration

<table>
<thead>
<tr>
<th>CRITICAL PERFORMANCE ELEMENTS</th>
<th>COMPETENCY DEMONSTRATED/RECOMMENDATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Method:</td>
<td>Date &amp; Initials</td>
</tr>
<tr>
<td>□ Secondary IV by Concurrent/Piggyback delivery by pump</td>
<td></td>
</tr>
<tr>
<td>□ Secondary IV by Piggyback by gravity</td>
<td></td>
</tr>
<tr>
<td>□ Intermittent access through a saline lock</td>
<td></td>
</tr>
</tbody>
</table>

1. Checks prescribers order for medication, time/frequency, and route of administration

2. Checks for allergies and current status (Is it within the LPN practice context to administer this medication?)

3. Reviews medication reference information to administer medication safely: action, purpose, side effects, normal dose, peak onset, time, rate of administration and nursing implications

4. Performs hand hygiene

5. Gathers the appropriate supplies based on method of administration

6. Prepares the medication using aseptic technique and confirms compatibility with current IV solution if applicable

7. Verifies the 10 rights of medication administration
<table>
<thead>
<tr>
<th>CRITICAL PERFORMANCE ELEMENTS</th>
<th>COMPETENCY DEMONSTRATED/RECOMMENDATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>8. Uses appropriate PPE</td>
<td></td>
</tr>
<tr>
<td>9. Compares two patient identifiers and medication on the MAR, to the medication label and the patient’s ID armband</td>
<td></td>
</tr>
<tr>
<td>10. Explains or verifies patient’s knowledge of medication and procedure</td>
<td></td>
</tr>
<tr>
<td>11. Examines the IV site to ensure there is no puffiness, redness, tenderness. States interventions if present.</td>
<td></td>
</tr>
<tr>
<td>12. Check date on IV tubing.</td>
<td></td>
</tr>
<tr>
<td>13. Confirms IV patency by checking for blood return or by flushing</td>
<td></td>
</tr>
<tr>
<td>14. Uses the correct antiseptic solution and time to cleanse the needleless connector</td>
<td></td>
</tr>
<tr>
<td>15. Connects the secondary set correctly</td>
<td></td>
</tr>
<tr>
<td>16. Programs the infusion pump correctly</td>
<td></td>
</tr>
<tr>
<td>17. Documents administration of medication</td>
<td></td>
</tr>
<tr>
<td>18. Evaluates patient for side effects of medication</td>
<td></td>
</tr>
<tr>
<td>19. If IV is saline locked, returns to disconnect patient from IV, ensuring sterility of the infusion set is maintained. Flushes saline lock with appropriate volume of 0.9% Sodium Chloride</td>
<td></td>
</tr>
</tbody>
</table>

☐ Competency Confirmed ☐ Review and repeat demonstration recommended

Comments:  

Designated Supervisor’s Signature: ________________________________
# LPN IV Medication Competency Checklist

Complete the following steps prior to administering IV Medications to patients

<table>
<thead>
<tr>
<th>Required to complete</th>
<th>Date Completed</th>
<th>Comments/Follow up needed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Read: CLPNNS practice guideline “LPNs and Administration of IV Medications”</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Read: “Intravenous Medication Administration Competency Guide for LPN’s” (self-directed learning module)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Complete Intravenous Medication Exam</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(minimum pass mark 80%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Provide a copy to your Health Services Manager</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Read Policy: Medication Transcription, Administration and Documentation – MM 10-001</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Read Policy: Medication Administration Times – MM 05-020</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Read Policy: Medication Orders – MM 15-003</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Read Policy: High Alert Medications MM 50-010</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Read: ISMP Dangerous Abbreviations “Do Not Use”</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Access the following electronic medication information sources: Micromedix, e-CPS, IV Drug Therapy Manual (IVDTM)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Access and review each IV medication using the IVDTM +/- Micromedex</td>
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<tr>
<td>Complete LMS and checklist for Hospira IV Pump RN module</td>
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<tr>
<td>Complete 4 hour education session with educator</td>
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<td></td>
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</tbody>
</table>

Submit copy of this form to Health Services Manager before performing IV medication administration in the clinical area. The manager will inform the designated preceptors of your readiness to be supervised to administer IV medications.

LPN Signature: ________________________________ Date: ________________________________
REFERENCES

College of Licensed Practical Nurses (2011). *Practice guideline: LPNs and administration of intravenous (IV) medication*. Halifax, NS: CLPNNS


