

Harbor-UCLA Medical Center  
Department of Nursing

# **INTRAVENOUS THERAPY: PART I SELF-STUDY GUIDE**

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## IV Therapy: Part I

### Objectives:

At the end of completing this self-study guide, the nurse will be able to:

1. Identify the RN and LVN scopes of practice as it relates to IV therapy.
2. List the indications of IV therapy.
3. Identify four complications of IV Therapy and discuss its related nursing interventions and preventive measures.
4. Identify frequency of IV site inspection and dressing changes.
5. Discuss information to document on site, tubing and solution labels.
6. Discuss the role of RN & LVN in preparing, administering and monitoring patient for blood transfusion.
7. State measures to avoid complications in intravenous therapy.
8. State the nursing responsibilities associated with labeling of an IV site.
9. Describe the risks and benefits of intravenous medication administration.
10. State the nursing actions related to transfusion reaction.

## Complications of IV Therapy: Identification, Prevention and Management

- I. Assessment of the IV site - The patient can be protected from serious harm if infiltration is detected early. The following nursing considerations should be used as guidelines when caring for a patient with an IV:
  - A. Assess the IV site every two hours in adult patients and every hour in pediatric patients. Check IV tubing for kinks or leaks. If a filter is being used, check to see that it is patent and free of trapped air.
  - B. Assessment of the site includes checking for an infiltration or thrombophlebitis. The first signs of infiltration or thrombophlebitis will develop at the cannula tip, near the edge of the dressing. Assess for redness, blanching streak formation, palpable cord, temperature change, induration, pain, leakage or swelling. If swelling is present, compare the area to the same area on the patient's other arm. Sometimes, what appears to be swelling from infiltration can be dependent edema or the normal shape of the patient's arm.
  - C. Palpate the IV site. If there is pain on palpation, it is an early sign of thrombophlebitis. Compare skin temperature at the IV site to skin temperature of the same area on the other arm. Cool skin may be an early site of infiltration. Warm skin may indicate thrombophlebitis even before the skin is red or tender.
  - D. Infiltration may slow the flow rate of an IV flowing by gravity (eg, as used for a fluid bolus). However, if a patient has poor skin turgor the flow rate may increase because resistance is lower in the tissue than the vein. If a change in the flow rate is noted, apply pressure to the vein about 1-2 inches distal to the cannula tip. If the IV solution continues to flow, an infiltration has developed. If the vein stops the flow of the IV solution when pressure is applied, it can be a sign also of phlebitis.
  - E. Document signs of phlebitis or infiltration and the actions taken. Always include notification of the physician.
  
- II. Complications of IV Therapy
  - A. **PHLEBITIS.** Phlebitis is an inflammation of the intima of the veins.
    1. Causes
      - a. Mechanical factors related to rubbing of the cannula against the vein wall
      - b. Contamination by transference of microscopic particles in the infusion fluid
      - c. Chemical irritation by fluid being infused
    2. Clinical manifestations include:
      - a. Pain
      - b. Erythema along the vein path
      - c. Swelling
      - d. Tenderness
    3. Preventive measures
      - a. Always follow aseptic technique
      - b. Select smallest cannula and largest vein for delivery of the fluid or medication. Select large veins for infusing irritating fluids. Larger veins have higher blood flow which rapidly dilutes irritants.
      - c. Select a site away from a joint
      - d. Check IV sites frequently (every two hours in adults, every hour in pediatrics) for complications. Palpate area at tip of catheter

- e. Use recommended types and amounts of diluents
- f. Change IV cannula and rotate sites every 72 hours (Exception: do not routinely rotate IV sites in pediatrics unless clinically indicated)
- g. Change IV cannula at first sign of inflammation, tenderness, or redness

4. Nursing interventions

- a. Stop the infusion at once
- b. Select a new site and restart the infusion
- c. When restarting an IV use new tubing and solution
- d. Notify MD
- e. Document assessment, intervention, and patient's response

**B. THROMBOPHLEBITIS.** Thrombophlebitis is inflammation of a vein in conjunction with formation of a clot (thrombus).

1. Causes

- a. Injury to vein during venipuncture, large bore needle/catheter use, prolonged needle or catheter use
- b. Irritation to a vein due to rapid infusions or irritating solutions. Smaller veins are more susceptible
- c. Clot formation at the end of needle or catheter due to slow infusion rates
- d. More commonly seen with synthetic catheters than steel needles

2. Clinical manifestations include:

- a. Tenderness at first, then pain along the course of the vein
- b. Swelling, warmth, and redness at an infusion site
- c. A vein may appear as a red streak above an insertion site

3. Preventive measures

- a. Always follow aseptic technique
- b. Select smallest cannula and largest vein for delivery of the fluid or medication. Select large veins for infusing irritating fluids. Larger veins have higher blood flow which rapidly dilutes irritants.
- c. Select a site away from a joint
- d. Check IV sites frequently (every two hours in adults, every hour in pediatrics) for complications. Palpate area at tip of catheter
- e. Use recommended types and amounts of diluents
- f. Change IV cannulas and rotate sites every 72 hours (Exception: do not routinely rotate IV sites in pediatrics unless clinically indicated)
- g. Change IV cannula at first sign of inflammation, tenderness, or redness

4. Nursing interventions

- a. Notify MD immediately
- b. Apply cold compresses immediately to relieve pain and inflammation
- c. Later follow with moist compresses to stimulate circulation and promote absorption
- d. Document assessment, intervention and patient's outcome

**C. INFILTRATION.** An infiltration is the inadvertent administration of a non-vesicant solution into the tissue surrounding an IV cannula.

- 1. Cause: the most common cause of infiltrations is dislodgement of an IV catheter from the vein.

2. Clinical manifestations include:
  - a. Swelling, blanching, coolness of surrounding skin and tissues
  - b. Discomfort, depending on the nature and amount of solution
  - c. Decrease in IV fluid flow rate or failure to flow
  - d. Absence of blood or backflow in the IV catheter or tubing when aspirated
  
3. Preventive measures
  - a. Ensure that IV and distal tubing is secured sufficiently to prevent dislodgement
  - b. Splint arm or hand as necessary
  - c. Check IV sites frequently (every two hours in adults, every hour in peds) for complications
  - d. Provide patient/family with information on measures to reduce the chance of infiltration, such as not manipulating the cannula, pulling on the tubing, picking at the dressing, or using the extremity excessively
  
4. Nursing interventions
  - a. Stop the infusion at once
  - b. Evaluate affected extremity
  - c. Depending on solution or medication infused, apply warm or cold compress to site to alleviate discomfort and help absorb infiltration by increasing circulation to affected area
    - 1) If the infiltrate is small and involves a non-caustic solution or medication, warm packs are helpful.
    - 2) Moist warm packs must be used with caution especially on large infiltrates because they can lead to maceration, necrosis, or rapid movement of the drug into the tissue.
    - 3) Sloughing can occur from the application of warm compresses to an area infiltrated with certain medications, such as potassium chloride. In these cases, the application of cold compresses is recommended.
    - 4) Warm compress also should not be used if the infiltrated solution is blood or a vesicant.
  - d. If leaking from the tissues occurs because of extensive infiltration, apply sterile dressing to affected area. Dressing should be applied loosely and with minimal amount of tape to avoid further damage to surrounding tissues. Remove dressing when leaking stops.
  - e. Select a new site and restart the infusion (if patient still requires and IV). Notify MD
  - f. Document assessment, intervention, and patient's response

**D. EXTRAVASATION.** An extravasation is an infiltration with a vesicant solution or medication into surrounding tissues.

1. Cause: A vesicant is a solution or medication that causes the formation of blisters, with subsequent sloughing of tissues occurring from tissue necrosis (Table 1).

2. Clinical manifestations include:
- Swelling, blanching, and discomfort
  - Coolness of the skin
  - Decrease in fluid flow or lack of blood backflow in the catheter and tubing
  - Blisters
  - Tissue necrosis
3. Preventive measures
- Be familiar with solutions and medications that can cause tissue damage if infiltrated.
  - Avoid administering vesicants in an area of a previous IV site (vesicants can seep through vein entry sites of previous infusion)
  - When available, administer irritating solutions through a central line [ie, peripherally inserted central catheter (PICC), acute or chronic central venous catheter]
  - Ensure that the IV and distal tubing is secured sufficiently to prevent dislodgement
  - Splint arm or hand as necessary
  - Check IV sites frequently (every two hours in adults, every hour in pediatrics) for complications
  - Provide patient/family with information on measures to reduce the chance of infiltration, such as not manipulating the cannula, pulling on the tubing, picking at the dressing, or using the extremity excessively
4. Nursing interventions
- Stop infusion at once
  - Do not remove needle or catheter if the solution was a vesicant or vasoconstrictor. Extravasation of this type may require administration of an antidote through the catheter.
  - Aspirate any remaining fluid/medication in the catheter if catheter appears to be lodged in the tissues. This procedure may decrease the amount of medication/drug at the tissue site.
  - Notify MD
  - Cold compresses are usually used for antibiotic and alkalating vesicants. Warm compresses are applied for extravasation of vinca alkaloids
  - Elevate affected extremity
  - If a vasoconstrictor or vesicant has infiltrated, initiate emergency treatment to the local area. Serious tissue damage, necrosis or sloughing may result if actions are not taken immediately.
  - Educate patient/family to report any sensation change such as pain, burning, or stinging at the site

**Table 1. IV Medications*****Non-Chemotherapeutic Agents***

Acyclovir  
 Aminophylline  
 Calcium  
 Chlordiazepoxide  
 Diazepam (Valium)  
 Digoxin  
 Dobutamine  
 Epinephrine

Mannitol  
 Nafcillin  
 Norepinephrine  
 Penicillin  
 Phenytoin  
 Potassium  
 Vancomycin

***Chemotherapeutic Agents***

Actinomycin D  
 Dactinomycin  
 Daunorubicin  
 Doxorubicin  
 Epirubicin

Idarubicin  
 Mitomycin  
 Vinblastine  
 Vincristine  
 Vinorelbine

- i. Document assessment, intervention, and patient's response

**PLEASE COMPLETE THE STUDY QUESTIONS ON THE NEXT PAGE**

## Study Questions

Select the BEST answer by referring to the preceding text and policies and procedures for the answers.

### *Question*

1. All of the following are signs of phlebitis **EXCEPT**:
  - a. tenderness
  - b. pain at IV site
  - c. skin feels cool around IV site
  - d. redness and/or swelling noted at IV site
  
2. Observation and evaluation of the peripheral IV site in adults and its surrounding tissue should be done every:
  - a. 2 hours
  - b. 4 hours
  - c. 8 hours
  - d. 30 minutes
  
3. The nurse should change peripheral IV tubing every:
  - a. 12 hours
  - b. 24 hours
  - c. 72 hours
  - d. 4 times a week
  
4. On a medical-surgical ward, an antibiotic order should be renewed after:
  - a. 3 days
  - b. 5 days
  - c. 7 days
  - d. 10 days
  
5. The physician's orders for administration of a blood product must state **all** of the following **EXCEPT**:
  - a. number of units to be infused
  - b. type of blood/blood product to be given
  - c. rate of infusion if not given over usual time frame
  - d. specific intervals when vital signs should be taken
  
6. All of the following staff may verify the information on the Transfusion Record form, the blood label on the unit, and the patient's identification band prior to administration **EXCEPT**:
  - a. RN/RN
  - b. RN/LVN
  - c. LVN/LVN
  - d. RN/MD

*Question*

7. The tubing and filter used to administer total parenteral nutrition is to be changed how frequently?
  - a. Every 24 hours
  - b. Every 36 hours
  - c. Every 48 hours
  - d. Every 72 hours
  
8. Cannulation of the lower extremities in adults should be avoided because of the high risk of:
  - a. embolism
  - b. both a and d
  - c. neither a or d
  - d. thrombophlebitis
  
9. Symptoms associated with complications to a peripheral IV include all of the following **EXCEPT**:
  - a. pain
  - b. redness
  - c. tenderness
  - d. crepitation
  
10. A PICC line is:
  - a. a central line
  - b. a peripheral line
  - c. inserted directly into the superior vena cava
  - d. not confirmed by x-ray for placement

**CHECK YOUR ANSWERS TO THE STUDY QUESTIONS ON NEXT PAGE**

**Answers to Study Questions**

- |      |      |      |      |       |
|------|------|------|------|-------|
| 1. c | 2. a | 3. c | 4. c | 5. d  |
| 6. c | 7. a | 8. b | 9. d | 10. a |

**IF YOU MISSED ONE OR MORE QUESTIONS, REREAD THE CONTENT AND REPEAT THE STUDY GUIDE QUESTIONS.**

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