Intravenous Therapy

Timby & Smith, Chapter 19

- Tunica Intima – inner layer
- Tunica Media – middle layer
- Tunica Adventitia – outer layer
Elderly Population

- Tunica Intima becomes thicker and less smooth
- Increased risk of platelet aggregation and thrombus formation
- Lumen is smaller due to thickening

Elderly Population

- Slower perfusion
- Small spidery veins

Valves
IV Therapy

• **Benefits:** Immediate results

Most rapid and effective route of medication administration.

It is the injection of a solution/medication/blood or blood product in the venous system.

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IV Therapy

• **Purpose:**

Maintain daily fluid balance
Restore & maintain acid-base balance
Route for medication administration
Route for blood/blood product admin.
Nutritional support (TPN)

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IV Flow

• **Gravity:** the higher the bag of solution is over the site, the faster the solution will infuse/flow.
Terminology

- You MUST know:
  
  Flow Rate
  Drop Factor
  Primary Bag
  Primary Line
  Secondary Bag

Flow Rate

- The number of drops per minutes (gtts/min) delivered. This is determined by the principle of IV flow.

Drop Factor

- The number of drops per mL. This information is marked on the tubing package. It is determined by the size of the lumen in the drip chamber of the IV tubing.
  - Microdrip = 60 gtts/mL
  - Blood tubing = 10 gtts/mL
  - Standard or primary = 15 gtts/mL
Primary Bag

• The main bag of solution that is considered the base solution or the main solution that is ordered.

• There are several different size bags of solution. 1000 mL, 500 mL, 250 mL

Primary Line

• The main IV tubing that connects to the primary solution.
Secondary Bag
• AKA IVPB or “piggyback”. Usually a smaller bag that is attached to the primary line for the purpose of medication administration.

Secondary Line
• The tubing attached to the secondary bag of solution.

Prime
• IV tubing is primed by “flushing” the solution through the tubing to remove the air.
Spike

- This is the puncturing of the bag with the sharp part of the tubing.

Flush

- A set amount of solution through an intermittent injection cap. This technique is used to ensure patency of a device that is not in continuous use. Solutions are typically normal saline (0.9%) or heparin solution that is 100 u/mL.

Peripheral Venous Sites

- IV therapy that is administered through a vein in the hand, arm, or less frequently the leg or foot.
- Ideal for SHORT term use.
Central Venous Sites

• CVL – IV therapy that is administered through a large central vein such as the R/L subclavian or the jugular.
• Used for large volumes of fluid, hypertonic solution, medications, TPN
• Ideal for LONG term use.

Saline/Heparin Lock

• Provides IV access by means of an intermittent injection cap. To infuse solutions/medications:
  – Cleanse port with alcohol
  – Flush with Normal Saline
  – Infuse medication
  – Flush with Normal Saline

Equipment for IV Therapy

• IV Catheter
  – Lumen size
  – Length
Tubing

• Tubing
  — Vented
  — Non-Vented

Tubing

• Roller Clamp -

Drip Chamber

• The size of the lumen in the drip chamber determines the drop factor.

The chamber should be half-full.
IV Pumps

- Electronic device that controls the rate of flow.

Fluid Compartments

- Intracellular
- Interstitial
- Intravascular

<table>
<thead>
<tr>
<th>TABLE 5-1</th>
<th>Direction of Osmosis</th>
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<tr>
<td>Condition</td>
<td>Net movement of water</td>
</tr>
<tr>
<td>External solution is hypotonic to cytosol</td>
<td>into the cell $\text{H}_2\text{O}$ $\text{H}_2\text{O}$</td>
</tr>
<tr>
<td>External solution is hypertonic to cytosol</td>
<td>out of the cell $\text{H}_2\text{O}$ $\text{H}_2\text{O}$</td>
</tr>
<tr>
<td>External solution is isotonic to cytosol</td>
<td>none $\text{H}_2\text{O}$ $\text{H}_2\text{O}$</td>
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IV Solutions

- Body fluid compartments are effected depending upon the osmolarity of the IV solution in comparison the patient’s serum osmolarity.

- IV solution can actually expand one compartment while depleting another.

Isotonic Solutions

- Equal concentration (osmolarity) as serum and other body fluids.

% In Solution

- The percent (%) means grams of drug per 100 mL of fluid.

- Example: D5W is 5% Dextrose in Water
Nursing Considerations

• Isotonic
  – Monitor for s/s of fluid overload
  – Don’t give LR to patient’s with liver disease due to the inability to metabolize the lactate
  – Avoid D5W for pt’s with increased ICP, as it increases the risk for further swelling.

Hypotonic Solutions

Nursing Considerations

• Hypotonic Solutions
  – May cause sudden fluid shifts from blood vessels to cells. (cardiac collapse)
  – Don’t give to pt’s with or at risk for increased ICP.
  – Don’t give to pt’s at risk for third space shifts (burns or liver disease).
Hypertonic Solutions

Nursing Considerations

• Hypertonic Solutions
  – Greatly EXPAND the intravascular spaces. Closely monitor for s/s of overload.
  – Pulls fluid from intracellular – don’t give to pt’s with cellular dehydration (DKA).
  – Don’t give to pt’s with impaired heart or kidney functions.

Crystalloids

• Consist of water and uniformly dissolved crystals such as salt (sodium chloride) or sugar (glucose, dextrose).
Crystalloids

- Isotonic Crystalloids – NS, LR, D5W
- Hypotonic Crystalloids – 0.45% NS, D51/2NS
- Hypertonic Crystalloids – 3% NS, D10W, D20W, TPN

Colloids

- Consists of water and molecules of suspended (undissolved) substances such as blood cells and blood products.
- For example: protein (albumin), sugar, or starch molecules.

Colloids

- Examples:
  - Blood
  - Blood Products – see page 227
  - Plasma Expanders
TPN

- Total Parenteral Nutrition
  - Hypertonic solution
  - Consists of nutrients
  - Given to malnourished pts or pts that cannot eat or drink for long periods of time.
  - Should be infused into the central circulation

- Observe for HYPERGLYCEMIA

LPN Role in IV Therapy

- Consult hospital policy
- At BAPTISH HEALTH:
  - Dressing and tubing changes
  - Solutions – q thing but blood, albumin, and morphine
  - Converting IV to SL, SL flushes
  - D/C IV therapy
  - Insertion & IV push meds (except narcotics) after receiving post-graduate training.

IV Placement

- Accessory cephalic vein
- Median cubital vein
- Cephalic vein *****
- Basilic vein
- Antebrachial vein
- Radial vein
- Dorsal metacarpal veins (upper side of hand).
IV Placement: **NOT**

- Post mastectomy pt’s affected arm
- Arm with a functioning AV fistula
- Affected arm of a paralyzed pt
- Arm with circulatory or neurologic impairment
- Arm intended for a surgical procedure
- ****Lower extremity – only when ordered

General Info

- **DO**
  - Attempt 2 starts, then request another nurse
  - Use alcohol to cleanse skin
  - Resite IV according to hospital policy (q 72)
  - Ports are flushed q shift at BH
  - All ports can be accessed by LPN’s after training

Complications – Page 235

- Infiltration – leakage of IV fluid or medications into the extracellular tissue. Commonly caused when IV cath slips out of the vein.

- Signs & Symptoms
Complications

• Interventions for Infiltration
  – STOP the infusion
  – May apply heat if not contraindicated
  – Elevate
  – Monitor
  – Resite and Document

  – Prevention: Monitor site & pt teaching

Complications

• Phlebitis – tenderness at the tip and proximal to the venipuncture device; redness at tip and along vein line.
  – May be puffy over the vein
  – Vein may be hard upon palpation
  – Warm at site
  – Elevated temp

Complications

• Thrombus – swelling, discomfort at site, and slowing of infusion.

• Thrombophlebitis
• Hematoma
Complications

- Infection: swelling, discomfort, redness at site and possibly drainage from site.
  - If not treated, may lead to systemic infection
  - Severed catheter

Systemic Complications

- Systemic Infection – bactremia, septicemia
  - S/S: fever, chills, malaise, contaminated IV site.
  - Can be from many causes. Most common cause is failure to maintain proper technique on insertion or failure to care for site properly.

Systemic Complications

- Systemic Infection
  - Prevention
    - Proper insertion technique
    - Maintain sterility when changing supplies: tubing, bag of solution, dressings, secure connections, check IV solution for expiration date.
Systemic Complications

• Circulatory Overload is excessive fluid in the circulatory system. It accumulates faster than it can be excreted. Can lead to CHF or Pulmonary Edema.

  – S/S: discomfort, neck vein distention, SOB, respiratory distress, crackles, orthopnea, elevated BP.

• Circulatory Overload
  – Interventions:
    – Pulse ox check
    – Raise HOB
    – Oxygen as ordered
    – Notify MD
    – Administer meds as ordered (Lasix)

Systemic Complications

• Circulatory Overload
  – Prevention
  – Use pump for elderly or compromised pts
  – Frequent assmt of respiratory status
  – Re-check calculation of flow rate
  – Monitor infusion frequently
Systemic Complications

- **Air Embolism** - air in circulatory system
  - **S/S:** Sudden chest pain, unequal breath sounds, tachycardia, weak pulse, decrease in BP, decrease LOC.
  - **Interventions:**
    - Stay with pt
    - Call for help
    - Administer oxygen

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Systemic Complications

- **Air Embolism**
  - Interventions: TRENDELENBURG position and place on LEFT side.
  - Notify MD
  - Document
  - Prevention: PURGE the air from tubing

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Hypersensitivity

- Allergic reaction or anaphylactic shock
- **S/S:** flushing, chills, anxiety, itching, palpitations, wheezing, convulsions; cardiac arrest.
- **Interventions:** monitor v/s, Notify MD, assess pt frequently, assess allergies, administer meds as ordered, O2, pulse ox
Complications with CVC

• Pneumothorax
• Hemothorax
• Air Embolus
• Arterial Puncture
• Thrombus formation

Documentation

• Must document for legal purposes and for reimbursement from insurance.
• Document in MAR, basic care/activity flow sheet, graphic sheet, nsg care plan or as indicated per unit.
• Site assmt – remember: NOT documented, NOT done!!!!!!!