Introduction to

**IV Therapy**

What is it?

*Intravenous (IV)* therapy is the administration of a fluid substance (solution) directly into a vein as a therapeutic treatment.

Purpose

- Maintain fluid and electrolyte balance
- To administer medications
- Transfuse blood and blood products
**Arteries VS. Veins**

- **Arteries**
  - Located deep in the tissue by muscle and bone
  - Carry oxygenated blood from the heart to the rest of the body
  - Pulsate
  - Do not have valves

- **Veins**
  - Superficial, located close to the surface
  - Carry deoxygenated blood from the body to the heart
  - Have valves to ensure one-way flow
  - Can collapse
  - Do not pulsate

**Vein Selection**

- Dorsal/Meta-carpal and forearms veins are ideal for IV therapy
- Start low then move your way up
Availability of Veins....

Although veins are found in the same location in most people with minor variations, certain situations might make it more difficult to find them such as:

- Body Fat
- Burns and scarred skin
- Edema
- IVDA

Review!

Maintaining Fluid and Electrolyte Balance
Down to the Cellular Level

- The adult body is about 50-60% water
- Body fluids consist of water and dissolved particles
- These body fluid compartments exchange continuously through a semi-permeable membrane via osmosis
- Changes in body fluids and electrolyte imbalance affect all of the bodily processes

Electrolytes

Osmolarity:
- The concentration of osmotically active particles in solution, which may be quantitatively expressed in osmoles of solute per liter of solution.
- Overhydration and dehydration
- Na+ and K+

Tonicity

- Isotonic
- Hypotonic
- Hypertonic
Osmolarity > body fluid (more particles) = osmolarity = body fluid = osmolarity < body fluid (less particles)

<table>
<thead>
<tr>
<th></th>
<th>Osmolarity &gt; body fluid</th>
<th>Osmolarity = body fluid</th>
<th>Osmolarity &lt; body fluid (less particles)</th>
</tr>
</thead>
<tbody>
<tr>
<td>D5LR</td>
<td>3%-5% NaCl</td>
<td>0.9% NaCl</td>
<td>0.33%NaCl</td>
</tr>
<tr>
<td>D5NaCl</td>
<td>LR</td>
<td>D5W</td>
<td>0.45%NaCl</td>
</tr>
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How does this Relate?

Your body is always working to maintain equilibrium through the following regulating mechanisms:
- Kidneys (Adrenal glands)
- Lungs
- Skin
- Pituitary Gland

How does this Relate?

If any of these regulating systems are interrupted, part of the treatment will require IV electrolyte therapy with different types of solutions.
Before Administering Medications...

- Patient's Allergy History
- Patient 5 Rights
  - Give ceftriaxone 500mg IV Q 12 hours, first dose stat
  - Compatibility of meds with other meds and/or solutions
Incompatibilities

- **Physical** - See visible changes (cloudy, precipitate)
- **Therapeutic** - Two drugs are given too close together it may change the affect
- **Chemical** - One drug may change the chemical compound of the other.

How to give IV Medication

- Drugs diluted in a large volume of fluid
- I.V.P.B.
- Intermittent Injection (IV Push)
- Continuous via syringe or IV pump

Review!
Transfusion of Blood Products

Indications

- Maintain/Restore blood volume
- To increase the O₂ carrying capacity of blood by supplying red blood cells
- To provide coagulation factors
- To provide protein
- To provide white blood cells
- To provide passive immune protection and treat hypogammaglobulinemia

<table>
<thead>
<tr>
<th>Type</th>
<th>Components</th>
<th>Indication</th>
<th>Amount</th>
</tr>
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<tbody>
<tr>
<td>Whole Blood</td>
<td>RBCs, Plasma, Plasma proteins</td>
<td>Massive bleeding, Expanding volume</td>
<td>Up to 500 mL, Within 4 hours</td>
</tr>
<tr>
<td>Packed RBCs</td>
<td>RBCs and small amount of plasma</td>
<td>Increase organ oxygenation with minimal volume expansion</td>
<td>250-300 mL, Within 4 hours</td>
</tr>
<tr>
<td>Platelets</td>
<td>Platelets in small amount of plasma</td>
<td>Thrombocytopenia, Platelet dysfunction</td>
<td>50-400 mL, 20-60 minutes</td>
</tr>
<tr>
<td>FFP</td>
<td>Clotting factors, plasma proteins, and water</td>
<td>Blood loss, clotting disorders, DIC, anti-anticoagulation, clotting factor deficiencies</td>
<td>200-250 mL, 15-30 minutes, 20 min to 1 hour, Use as soon as ready</td>
</tr>
<tr>
<td>Cryoprecipitate</td>
<td>Clotting factors, Fibrinogen in plasma</td>
<td>Hemophilia, Von Willebrand’s disease</td>
<td>10-20 mL, 5-15 minutes</td>
</tr>
<tr>
<td>Colloid Solutions</td>
<td>Albumin 5% or 25%, Immunoglobulins</td>
<td>Volume expanders, Congenital or acquired autoimmune deficiency syndromes</td>
<td>Depends on order</td>
</tr>
<tr>
<td>Granulocytes</td>
<td>Granulocytes and lymphocytes</td>
<td>Serious microbial infections in a patient with severe neutropenia</td>
<td>200-400 mL, 1-2 hours</td>
</tr>
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</table>
Transfusion Equipment

- Y tubing
- Normal Saline (another with separate soluset in case of reaction)
- Extra Leukocyte filter
- Blood warmer

RN Role in Transfusion (cont.)

- NEVER keep blood product on the unit for more than 30 minutes prior to starting transfusion
- Return to the blood bank
- Specially designated refrigerators may be used in specialty areas
- Obtain and record baseline vital signs prior to starting transfusions
- If patient has a fever notify MD first (may mask reaction)
- Assess patients understanding of the procedure
  - Instruct patient to notify nurse of:
    - Chills and fever
    - Back pain
    - Flushing
    - Palpitations
    - Difficulty breathing

- Proper and complete patient identification is extremely important during the entire process of transfusion therapy, from the initial acquisition of a blood sample for compatibility testing, to the actual transfusion of blood NO SHORT CUTS! Checks must be done at patient bedside.
- Inspect blood for, expiration date, any discolorations, and/or frothiness

During Transfusion

- Observe patient frequently for any adverse reactions
- Observe site frequently for signs of infiltration
- Administer at prescribed rate
  - (No longer than 4 hours)
- Monitor Vital signs and document as per hospital policy usually:
  - Within one hour before starting the transfusion
  - 15 minutes after starting the transfusion
  - Every 30-60 minutes
  - Whenever patients condition requires
  - At completion of transfusion
### Febrile, Non-hemolytic Reaction

- **Cause**: Sensitivity to donor white cells, platelets, or plasma proteins (antigen-antibody reaction)
- **Clinical Presentation**:
  - Chills and fever
  - Headache
  - Flushing
  - Anxiety
  - Muscle pain
  - Chest pain
  - Dyspnea
  - Nausea & vomiting
- **Onset**: Immediate to 6 hours post-transfusion
- **Management**:
  - Antipyretics
  - Do NOT restart
- **Prevention**: Consider leukocyte poor blood products

### Anaphylactic Reaction

- **Cause**: Infusion of plasma containing IgA proteins to an IgA deficient recipient who has developed IgA antibodies from a previous transfusion or pregnancy
- **Clinical Presentation**:
  - **Respiratory**
    - Bronchospasm
    - Wheezing
    - Dyspnea
    - Tachypnea
    - Cyanosis
  - **Cardiovascular**
    - Tachycardia
    - Hypotension
    - Shock
    - Possible Cardiac Arrest
  - **GI**
    - Nausea
    - Vomiting
    - Cramping
    - Diarrhea

### Acute Hemolytic Reaction

- **Cause**:
  - Infusion of ABO incompatible blood products
  - Antibodies in the recipients plasma stimulate an antibody-antigen response causing red blood cell destruction
- **Clinical Presentation**:
  - Chills and high fever
  - Low back pain
  - Flushing
  - Tachycardia
  - Tachypnea
  - Hypotension
  - Cardiac collapse
  - Hemoglobinuria
  - Hemoglobinemia
  - Bleeding
  - Nausea & vomiting
  - Dyspnea/chest pain
  - Hemolysis
  - Hemorrhage
  - Shock
  - Cardiac arrest
  - Death
- **Onset**: Usually in the first immediately - 15 minutes but may occur at any time
- **Management**:
  - Supportive
  - Send blood and urine specimen to lab for serology
- **Prevention**: Meticulously verify patient identification
Nurse’s Responsibility in Transfusion Reactions

- Stop the transfusion
- KVO with N.S. (change tubing)
- Report reaction to:
  - Attending MD
  - Blood Bank
- Do clerical check at bedside to verify patient, compatibility, expiration and unit #
- Monitor V.S. and clinical status of patient
- Follow Hospital policy including:
  - Draw blood for chemistry panel
  - Draw blood for CBC and reticulocyte count
  - Send urine specimen
  - Send unused blood to lab
  - Fill out transfusion reaction forms

Review!

IV Insertion, Maintenance and Complications
Selecting a site

- The primary goal of site selection is to choose one that will be least vulnerable to infiltration as well as allow the patient the most freedom to continue with A.D.L.'s
- Start low and move your way up
- Find a vein that is visible and palpable
- Avoid areas of movement - Avoid areas of joint flexion
- Avoid areas affected by mastectomy, CVA, or A-V fistula

Do NOT attempt insertion or phlebotomy on patient if they refused or else it will be considered battery!

Types of Phlebotomy and Angiocath Equipment
Insertion Procedure

- Check for IV Therapy Order
- Gather and prepare equipment
- Wash hands
- Apply clean gloves
- Clean sight with alcohol or chlorhexidine swab with slight friction (up and down, side to side) and allow to dry. Do not touch after cleaning.
- Apply tourniquet 4-6 inches above sight.
- With the mouth of the needle facing up insert the needle with cannula at a 10-30 degree angle until you see flash
- Advance cannula into the vein as needed while holding needle still
- Stabilize the hub of the cannula gently as you withdraw needle
- Attached primed extension set onto angiocath
- Secure with occlusive dressing and tape
- Remove tourniquet
- Attach flush and draw back slightly to check for blood return
- Flush with 1-2 ML of NS then clamp.
- Observe for swelling, leaking, pain

- Label and date sight. IV sight should be changed every 72-96 hours in order to avoid infiltration, phlebitis, and infection
- Check institution’s policies for line flushing.
- All tubing and IV fluid bags must be initialed, dated and timed when opened.

Common Complications

- Hematoma
- Infiltration – tenderness around the site
- Extravasations
- Phlebitis
- Thrombosis
- Thrombophlebitis
Phlebitis

Infiltration

Thrombophlebitis

Extravasation

What to Document

- The specific location of the vein
- The type of venous access, length and gauge
- The number of attempts (even if one)
- Date, time and name of the nurse starting the IV
- The type of solution or medication administered
- The type of infusion (continuous, bolus)
- The method of administration (Pump or gravity)
- Infusion rate
- Quotes from the patient regarding the procedure
- File an incident report for any complications

- 1345 – Inserted 20g angiocath on the back of the R hand. Received good blood return. Attached saline lock and flushed with 2mL of 0.9% NS. Observed no swelling, blanching, color change or leaking at site during flush. Secured with occlusive dressing. Continuous infusion of D5.45% NS started at 45mL/hr by IV pump.

- 1910 – Pt have PIV on left hand. Observed site to be soft, pink, dry, clean, intact, taped with occlusive dressing and clear tape. 0.9% NS infusing at 100mL/hr.

2200 – Patient stated to have slight burning pain at PIV sight in right hand. Observed site to have swelling and blanching 3 inches from insertion site. Removed PIV sight and dressed site with 2x2 gauze and clear tape. Explained to patient about infiltration, and the need for warm compress and elevation of right hand for 5 minutes at a time. Patient stated replied “oh, if it helps.” Applied warm compress to swelling on right hand. Will reassess right hand in 1 hour.
Central Venous Catheters

Why?

• Infusing fluids directly into the central venous circulation, for use of treatment options that are not generally accessible through standard peripheral intravenous access:
  • Minimal or no peripheral access
  • For solutions with dextrose concentration higher than DW12%
  • Continuous Vesicant Infusions (chemotherapy)
  • Length of prescribed therapy is 6 days or longer
  • Drug pH is below 5 or greater than 9
  • Continuous high pressure flow (rapid transfusion)
Types of Catheters

- Non-tunneled catheters
- PICC
- Tunneled
- Implanted Ports

Role of RN

- Ensure aseptic/sterile technique is maintained during insertion
- Ensure that Chest X-Ray is done to check proper placement of catheter tip before use
- Inspection of the catheter, dressing, and insertion site
- Evaluate the integrity of the catheter and monitor for microbial infection
- Changing the dressing and end caps flushing the lumen of the catheter according to facility’s protocol
- Watch for signs and symptoms of pneumothorax: cyanosis, drop in BP, HR increased, lethargy

Place patient in left Trendelenberg position, give O2 and call MD (Rapid Responses)

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<td>Amjad, I., Murphy, T., Nylander-Housholder, L., Ranft, A. New approach to Management of Intravenous Administration. <em>Nurse Practitioners' Health Policy, Education, and Therapy</em></td>
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