IV Therapy

Introduction

- Course Intro
- Instructor Info
- Participant Intro
- Fire and Safety

IV Therapy

Intro to IV Therapy

- IV therapy has been around since the 1600s
- Lots of problems in the 1600's. Lots of people died
- 1834, *Dr. Quinn* IV infusions!
- 1900's we got smarter
- 2000's we are doing well with all the new technologies, products, etc.

IV Therapy

Purpose of IV Initiation

- Hydration
- Medication Administration
- Blood Product Replacement
- Nutrition
- Electrolytes, etc.

IV Therapy

Veins

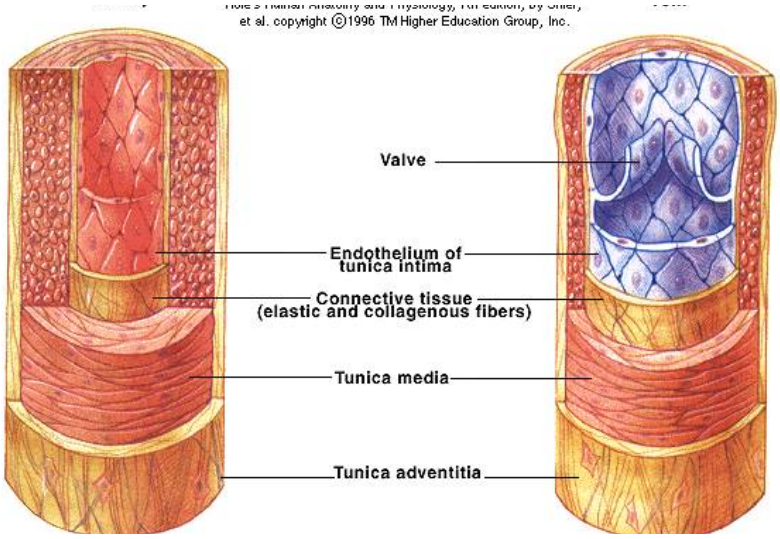
- Carry blood towards the heart for re-oxygenation and re-distribution
- Close to the skin – makes for good IV
- Weak, rely on surrounding muscle and valves to control circulation

IV Therapy

Arteries

- Carry blood away from the heart
- Thick, muscular, deeply imbedded vessel
- Not ideal for IVs

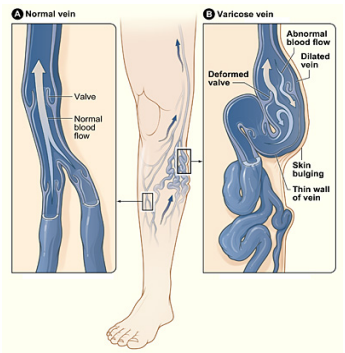
IV Therapy



IV Therapy

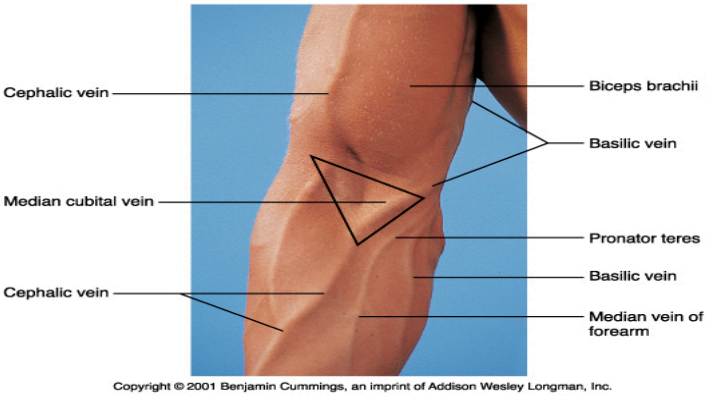
Valves

- Keep blood flowing the right direction
- Made up of the intima layer of the vessel
- Lots of them in large veins.



IV Therapy

Common Veins for IV



IV Therapy

Continued

IV Therapy

Patho

- Viscosity
  - Resistance of a liquid to the flow
- Flow
  - Laminar – fluid flowing through the vessel
  - Turbulent – when constricted

IV Therapy

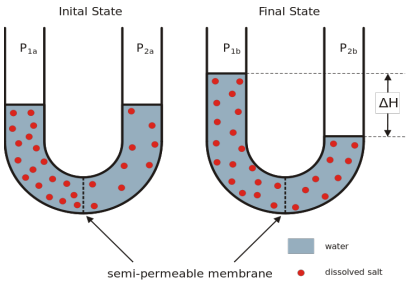
Diffusion

Diffusion

- Movement of a substance from a region of high concentration to an area of low concentration

IV Therapy

Osmosis

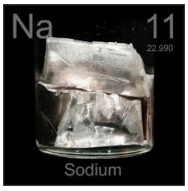


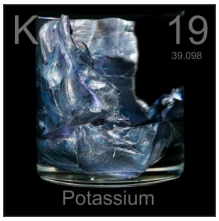
- Movement of a solvent across a semipermeable membrane towards a higher concentration of the solute.

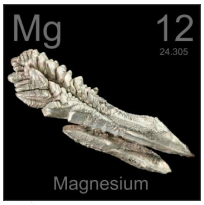
IV Therapy

Crystalloids

- Sodium
- Chloride
- Potassium
- Calcium
- Phosphate
- Magnesium
- Dextrose

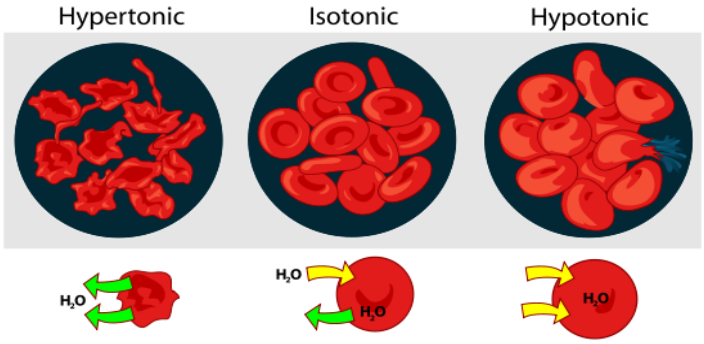






IV Therapy

Tonicity



IV Therapy

Solutions

Solution	Indication	Contraindication
5% Dextrose	• Prevention and treatment of dehydration • Pre and post-op fluid replacement • IV administration of various drugs • Prevention of ketosis in starvation, vomiting, diarrhea • Adequate glucose infusion protects liver against toxic substances • Correction of hypernatremia	• Cerebral edema, neuro surgical procedures • Acute ischemic stroke • Hypovolemic shock • Hypnatremia (water intoxication) • Same line as a blood transfusion (clumping occurs) • Uncontrolled DM (severe hyperglycemia)
Normal Saline	• Water and salt depletion • Hypovolemic shock	• Avoid in pre-eclamptic patients, CHF, renal disease and cirrhosis

IV Therapy

	• Alkalosis with dehydration • severe salt depletion • initial fluid therapy diabetic ketoacidosis • Hypercalcemia • Drug administration	• Dehydration with severe hypokalemia • Large volume may lead to hyperchloremic acidosis
D5NS	• Conditions with salt depletion • Hypovolemic • Correction of vomiting or nasogastric tube aspiration induced alkalosis and hypovolemia.	Severe hypovolemic shock.
Lactated Ringers	• Correction in severe hypovolemia • Replacing fluid in post op patients, burns • Diarrhea induced hypokalemic metabolic acidosis • Fluid of choice in diarrhea induced dehydration in paediatrics • DKA, provides water, corrects metabolic acidosis, and supplies potassium • Maintaining normal ECF fluid and electrolyte balance	• Liver disease, severe hypoxia and shock • Severe CHF, lactic acidosis takes place • Addisons disease • Vomiting or NGT induced alkalosis • Simultaneous infusion with blood • Not compatible with certain drugs (ampicillin, doxycycline, etc).

IV Therapy

Colloids

- Contain large molecules

Solutions (natural and synthetic) include:

- Albumin (5%, 25%)
- Hetastarch (6%)
- Pentastarch (10%)
- Dextran (10%)
- Dextran (6%)
- Blood products including human serum albumin solutions

Indications include:

- Hypovolaemia
- Managing burns
- Sepsis and shock
- hypoalbuminaemia

IV Therapy

Blood/Blood Products

Products Available For Infusion

- Whole blood
- Red blood cells
- Red blood cells, leukocyte reduced
- Plasma
- Fresh frozen plasma
- Platelets
- Platelets, apheresis
- Cryoprecipitated antihemophilic factor (AHF) - clotting factors
- Antihemophilic factor (human) - clotting factors
- Factor IX complex (Christmas factor – required for clotting, lack of this will cause hemophilia)
- Albumin (human)
- Autologous blood (pre-operative deposit)
- Plasma volume expanders (ie pentaspan)

IV Therapy

Types of Transfusions

There are two types of blood transfusions

- Autologous (from the recipient himself)
- Homologous (from a donor)

Autologous blood reduces the risk normally associated with transfusions, but it may not be an option

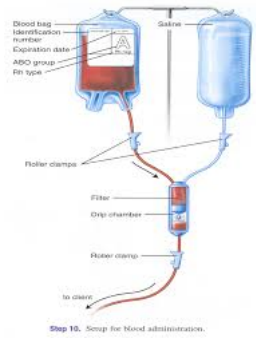
Homologous blood undergoes vigorous screening and testing to ensure its quality

Blood Transfusion

IV Therapy

Equipment

Filters



- Administer through appropriate filter (standard blood set is 170 microns)
- change the set every 4 hours or after 2 units of blood, whichever comes first and following completion of transfusion (coagulation and infection risk)

IV Therapy

Solutions

- Normal Saline (0.9% Sodium Chloride) is the only solution that may be added to blood or blood components
- No medication may be added
- Tubing should be flushed with Normal saline before blood is infused

IV Therapy

Pressure Infusers

- May be used for rapid infusions
- BP cuff can also be used
- Manufacturer's guidelines must be followed
- Used in critical situations

IV Therapy

- Blood Warmers
- Used for massive or rapid transfusion
- Used for exchange transfusion of the newborn or for patients with positive cold agglutinins (cold agglutinins are usually immunoglobulin M (IgM) antibodies that may result in hemolytic anemia due to complement-mediated RBC destruction. Slowing of blood flow with occlusion of superficial blood vessels by agglutinated RBCs can cause a Raynaudlike syndrome)

IV Therapy

Monitoring Blood Transfusion

- Prior to the infusion, a baseline set of vital signs must be documented and also be taken at specific times during the transfusion according to agency policy
- Monitoring the patient for at least 5 to 15 minutes in initiation of each unit and then as established by agency policy
- Knowledge of immediate and delayed reactions and appropriate interventions (see chart)
- Documentation of transfusion as per facility protocol

IV Therapy

Handling

- A unit of whole blood or RBC must be administered within a four hour period
- Blood products should be placed in a refrigerator specifically controlled for this purpose

IV Therapy

Transfusion Reactions

Watch for these signs and symptoms of a transfusion reaction:

- Fever
- Chills
- Rigors
- Headache
- Nausea

If you detect any of these reactions, quickly STOP the transfusion, and re-establish a normal saline solution infusion, record the patient's vital signs, notify the Provider immediately and don't dispose of the blood

IV Therapy

TPN

Three components of total parenteral nutrition consist of:

1) Travasol
2) Lipids
3) Amino acids

- Administer based on facility policies

IV Therapy

IV Meds

- Over 50% of patient meds in hospital administered by IV
- Direct Injection
- Intermittent Injection
- Continuous Infusion

IV Therapy

Compatibility / Prep

- Compatibility biggest issue
- Prep needs to be specific
- Ottawa Manual

IV Therapy

Cannula Selection

- Stainless steel needle with cannula over top
- Many makes and models
- 14G-18G – Trauma, Blood, etc
- 20G-24G – General IV

IV Therapy

Tubing

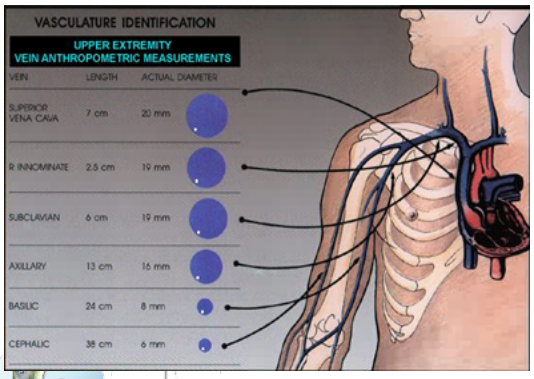
- Micro Drip – 60 drops = 1mL
- Macro Drip – 10, 15, or 20 drops = 1mL
- Buretrol – Chamber with accurate measure
- Saline Lock - extension tubing, intermittent access
- Blood tubing – two ports, filter, etc.




IV Therapy

Selecting the Vein

- Proper vein for proper cannula






IV Therapy

Areas to Avoid

- Joints
- Hematoma or injured areas
- Mastectomy and lymphedema
- AV fistula or shunt
- Area distal to previous cannulation
- Lower limbs

IV Therapy

Prepping for Insertion

- Patient Prep
- Equipment Prep
- Isolation Precautions
- Site Prep – Chlrohex/Alcohol
- Venous Distension– Tourniquet, fist pump, heat, etc.)

IV Therapy

- Inspect equipment
- Approach the vein
  - Top, side
- Insert
- Release Tourniquet
- Site dressing, etc.




IV Therapy

Many Types of Cannulas





IV Therapy

Pumps vs. Gravity

- Many methods to deliver
- Gravity
- Pumps
  - Many Manufacturers

IV Therapy

Drip Rates

- $\frac{\text{Volume per hour x Drops per mL}}{\text{Time to be infused}}$

IV Therapy

[redacted]




IV Therapy

Maintenance

- Solutions – 72h
- Tubing – 72h (unless blood or lipids 24h)
- Cannula/Site – 72h




IV Therapy

Complications

- Phlebitis
  - Irritation of endothelial cells of the veins intima layer.
  - Inflammation
- Infiltration
- Extravasation
- Air embolism
- Catheter Embolism (ALWAYS HAVE A TOURNIQUET)

IV Therapy

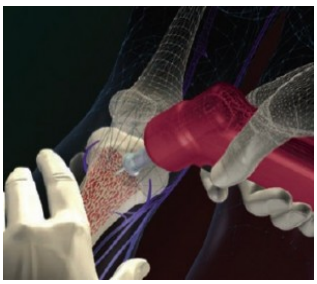
Trouble shooting

- Dislodged/Interstitial IV
- Loose IV Tubing
- Flow Rate Problems

IV Therapy

Intraosseous Infusion

- Infusion directly into the marrow of the bone
- Many devices
- Typically used in trauma within 60-120 sec of failed peripheral access
- PAINFUL!



IV Therapy

Locations for Insertion

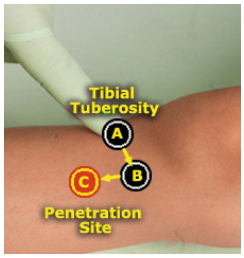
- Depends on the approval for the specific device
- Sternum
- Humerus
- Tibia

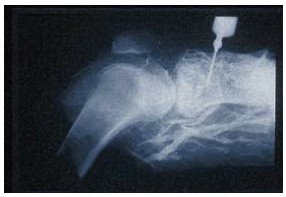
IV Therapy

Most Common Location

- Tibia

Paediatric **Adult**





IV Therapy

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IV Therapy

Discontinuing an IV

- Prep
- Safety (tourniquet)
- Remove parallel to the vein
- Apply pressure and bandage