Transfer Drug Course

Instructor Manual

September 2006
Topics

• Ventilators
• Chest Tubes
• Foley Catheters
• NG/OG Tubes
• IV Infusion Pumps
• Fluid and Blood Therapy
• Thrombolytics
• Pharmacology
Ventilators

• Objectives
  – Identify the indications for ventilatory support
  – Identify the types of ventilators
  – Discuss the various ventilator controls and their corresponding settings
  – Define the four major types of ventilator delivery modes
  – Discuss ventilator complications with their associated remedies
Ventilators

• Objectives
  – Name the major complication associated with barotrauma and describe its treatment
  – Explain the rationale for using a ventilator versus a BVM
  – Defend the need to reassess the patient throughout transport with a ventilator
Indications for Ventilators

• Central nervous system dysfunctions
• Neuromuscular problems
• Musculoskeletal and pleural dysfunctions
• Dysfunctional airways
• Difficulties in gas exchange
Types of Ventilators

- Pressure cycled
- Time cycled
- Volume cycled
Ventilators

- Normal tidal volume is 5 ml/kg
- Most mechanical ventilators are set at 10 ml/kg
Ventilator Controls

• Fractional inspired oxygen
• Respiratory rate
• Tidal volume
• Peak flow
• Pressure limit
• Sensitivity
• Positive and expiratory pressure
• Sigh
Ventilator Modes

- Assist
- Control
- Assist-control
- Intermittent mandatory ventilation
Average Ventilator Settings

- **FiO₂:** 1.0
- **Tidal volume:** 10-15 ml/kg
- **Respiratory rate:** 10-15 breaths per minute
- **Inspiratory flow:** 40-60 liters/sec
- **Sensitivity:** -2 cm water
- **Sigh rate:** 1-2 times per minute
- **PEEP:** 0-5 cm water
Ventilator Precautions

- Use PEEP with caution in volume depleted patients
- Utilize a heater whenever possible
- Humidification of the oxygen is mandatory
- Suctioning must be performed when bronchi is auscultated.
Ventilator Complications

- Airway complications
  - Aspiration
  - Combativeness
  - Infection
- ET tube problems
  - Tracheal stenosis
  - Occlusion of the tube
- Mechanical problems
  - Leaks in the tubing
  - Disconnected tubing
  - Kinked tubing
  - Retained secretions
  - Bronchospasms
  - Coughing
  - Biting the ET tube
Barotrauma

• Increased pressure may weaken alveoli
• May lead to development of a tension pneumothorax
Chest Tubes

• Objectives
  – Identify the indications for a chest tube
  – Discuss the most serious potential problem of a chest tube and its related treatment
  – Explain the importance of drainage monitoring
  – Discuss what should be observed for in the drainage
  – State the procedure to re-establish chest tube patency
Chest Tubes

• Objectives (continued)
  – Discuss the four primary functions of a chest tube
  – Discuss the proper maintenance of chest tubes
  – Explain the significance of constant bubbling in the seal chamber
  – Defend the rationale for not routinely “milking” the chest tube
  – Explain the importance of maintaining a dependent loop
Chest Tubes

• Four primary functions
  – Act as a drain
  – Replace negative pressure
  – Provide a water seal
  – Prevent return into patient
Chest Tubes

• Chambers of the drainage system
  – Collection chamber
  – Water seal chamber
  – Suction control chamber
Chest Tubes

• Indications
  – Any event which significantly disrupts chest wall integrity
Maintenance of Chest Tubes

- Semi-Fowler’s position is ideal, if permitted
- Turn the patient every two hours, if permitted
- Frequently lift tubing to drain contents into collection chamber
- NEVER raise drainage system above level of patient’s chest
- Fluctuations in the water seal chamber are normal
- Avoid creating loops in the system
- Encourage patient to breathe deeply and to cough
- Watch for signs of subcutaneous emphysema
Problems with Chest Tubes

- Tension pneumothorax
- Chest tube removal
Drainage Monitoring

• Watch for:
  – Color
  – Consistency
  – Amount

• Any sudden changes in the amount of drainage, whether an increase or decrease, is a cause for concern.
Procedure for Re-establishing Tube Patency

• Reposition patient, if permitted
• Check for clots in the system
• Squeeze and release tubing to dislodge clot
• “Milking the tube” is the last resort
  – “Milking the tube” is to be avoided due to:
    • Excessive pressures
    • Rupture of the alveoli
    • Pleural leak
Foley Catheters

• Objectives
  – Identify the two components in assessing a foley catheter
  – Identify the three primary indications for the placement of a foley catheter
  – Define the normal urinary output
  – State the treatment for accidental removal of a foley catheter
  – State the treatment for a clotted catheter
  – Defend the rationale for not raising the collection bag above the level of the patient
  – Explain the reasoning for performing hourly, or sooner, recording of fluid input/output
Foley Catheters

• Indications
  – Urinary incontinence
  – Monitoring accurate fluid output
  – Inability to void

• Normal urinary output
  – 1 ml/kg/hr
Assessment of Foley Catheters

• Assess drainage
  – Color
  – Amount
  – Consistency

• Assess entrance site
  – Redness
  – Swelling
  – Warmth
  – Discharge
  – Pain
Problems with Foley Catheters

• Accidental removal
• Clotting
• Raising the collection bag above the level of the patient
• Sudden reduction in urine flow
• Moving the patient
• At least an hourly record of urine output needs to be kept
Accidental Removal

• Provide supportive treatment
• Apply loose dressing if severe bleeding present
• Document
Clotting of Catheter

• Maintain aseptic technique
• Flush with 50cc of sterile saline
• If resistance is encountered, Stop!
• Document procedure and time performed.
Nasogastric/Orogastric (NG/OG) Tubes

• Objectives
  – Recall the five indications for the placement of an NG/OG tube.
  – Explain some of the problems associated with NG/OG tubes.
  – Discuss what the drainage from a NG/OG tube should be assessed for.
  – Defend the need to avoid lying the patient supine when a NG/OG tube is in place.
Indications for NG/OG Tubes

- Short term enteral feeding
- Administer medications
- Gastic lavage and/or decompression
- Removal of pills
- Hemostasis in upper GI bleeding
Problems with NG/OG Tubes

- Vomiting
- Dehydration
- Aspiration pneumonia
Drainage Monitoring

• Check for:
  – Amount
  – Color
  – Consistency
  – Odor
Tips for NG/OG Tubes

• Avoid lying the patient flat, if possible.
• Irrigate tube before and after medication administration.
• Precise record of input and output.
• Irrigate tube every four hours, or sooner.
IV Infusion Pumps

• Objectives
  – Differentiate between an IV controller and an IV pump.
  – Recall the tips for using an IV controller.
  – Differentiate between a peristaltic pump and a piston pump.
  – Name the two primary indications for the use of an IV infusion pump.
  – Describe the two basic infusion pump controls.
  – Describe the three basic pump alarms.
  – Explain why being alert for extravasation is important with IV infusion pumps.
  – Explain the rationale for periodically moving the tubing in an IV controller.
  – Defend the reasoning for not using a peristaltic pump on “fragile” solutions.
  – Explain the rationale for evacuating air from the tubing and the drip chamber in infusion pumps.
  – Explain the rationale for setting the volume control 50cc less than the volume in the bag.
IV Controllers

- Regulates gravity flow
- Not as accurate as infusion pumps
Tips for the Use of IV Controllers

• Drip chamber must be 30 inches above the infusion site.
• Drip chamber no more than half full.
• Liquid should not be clinging to the sides of the chamber.
• Periodically move the tubing to prevent damage.
IV Infusion Pumps

• Peristaltic
• Piston Driven

• Indications
  – Administration of a specific amount of agent
  – Prevention of fluid overload

• Pump Controls
  – Flow rate
  – Volume settings

• Pump alarms
  – No flow
  – High pressure occlusion
  – Volume infused
Tips for the Use of IV Infusion Pumps

• Follow manufacturer’s instructions
• Evacuate all air out of the system
• Clamp tubing when opening door or changing IV
• Prevent jarring unit
• Completely fill drip chamber
• Periodically move tubing (peristaltic)
• Watch for infiltration
• Set volume control for 50cc less than volume in bag
Fluid and Blood Therapy

• Objectives
  – List the indications for crystalloid therapy
  – List the indications for colloid therapy
  – Recognize examples of the following
    • Hypertonic
    • Isotonic
    • Hypotonic
  – Recognize examples of colloids
  – List the indications for parenteral therapy
  – Define TPN
Fluid and Blood Therapy

• Objectives (continued)
  – List the four indications for blood therapy
  – Identify commonly used blood products
  – Identify the four components that blood must be checked for prior to administration
  – State the proper procedure to administer blood
  – List the three major types of reactions associated with blood product administration
  – Describe the proper patient management for the three major types of blood infusion reactions
  – Defend the need to watch for signs of fluid overload with colloidal administration
  – Explain the rationale for using a sterile technique when changing solution bags of TPN
  – Defend the reason why blood is initially infused slowly
Indications for Crystalloid Therapy

• Rehydration
• Replenish Na and Cl
• Provide energy
Solutions

• Isotonic
  – Ringer’s
  – Lactated Ringer’s
  – 2.5% Dextrose/Lactated Ringer’s
  – .9% Normal Saline

• Hypertonic
  – 10% Dextrose
  – 20% Dextrose
  – 50% Dextrose
  – 3% Saline
  – 5% Saline
  – 5% Dextrose/.45% Saline
  – 5% Dextrose/.9% Normal Saline
  – 5% Dextrose/Lactated Ringer’s

• Hypotonic
  – 2.5% Dextrose
  – 5% Dextrose
  – .45% Saline
Crystalloid Precautions

• Hypertonic solutions should be administered slowly
• Monitor flow rate to prevent overload
Indications for Colloid Administration

• Rapid replacement of intravascular fluid
• Hypotension
• Correct albumin and protein levels
Colloid Examples

- 5% Albumin
- 25% Albumin
- Plasma protein fraction
Colloid Precautions

• Due to the extreme osmotic gradient be alert for signs of fluid overload
Indications for Parenteral Therapy

• Provide calories
• Spare the body’s protein
• Maintenance of nutritional status
Parenteral Therapy

• Examples
  – Amino acids
  – Fat emulsions
  – TPN
Parenteral Therapy Precautions

- Fat emulsions are incompatible with electrolytes
- Adverse reactions to fat emulsion therapy:
  - Nausea and vomiting
  - Headache
  - Dyspnea
  - Allergic reactions
- Avoid using an in-line filter for fat administration
- Use an IV pump to administer TPN
- Use a sterile technique when changing IV bags
- Watch for signs of glucose intolerance when administering TPN
Blood Therapy

• Indications
  – Decreased hemoglobin
  – Decreased hematocrit
  – Large volume/blood loss
  – To increase oxygen carrying capacity
Blood Therapy

• Types of Blood Products
  – Packed red blood cells
  – Platelets
  – Fresh frozen plasma
  – Whole blood
Blood Therapy

• Blood must be checked for
  – The right patient
  – The right blood product
  – The right blood type
  – Expiration date
Blood Therapy

• Points to consider
  – 18 gauge needle or larger
  – Flush tubing with normal saline
  – Use a blood administration set
  – Never “piggyback” blood with anything else
  – Start infusion slowly
Blood Therapy - Infusion

• No more than 1 drop every 5 seconds initially.
• 5-10 ml of blood required to initiate a reaction.
• Increase rate in 15 minutes if no reaction.
• Complete infusion in 1 to 1 ½ hours.
• Blood can remain at room temperature for four hours.

• Never reuse the same administration set if further units are required.
• Stop infusion immediately if a reaction occurs.
• Save the blood.
• Avoid pressure infusing blood.
Types of Transfusion Reactions

- Circulatory overload
- Febrile reaction
- Allergic reaction
Circulatory Overload

- **Signs and Symptoms**
  - Dyspnea, coughing, and cyanosis
  - Headache, sudden anxiety
  - Increase in systolic blood pressure
  - JVD
  - Pulmonary edema followed by peripheral edema

- **Treatment**
  - Stop the infusion
  - IV normal saline at TKO
  - Place patient upright
  - Oxygen
  - Consider
    - Diuretics
    - Analgesics
    - Aminophylline
Febrile Reaction

- Most common reaction with blood transfusions
- Caused by immune reaction
- Usually occurs within 30 minutes
Febrile Reaction

• Signs and Symptoms
  – Elevated temperature
  – Chills
  – Stable vital signs

• Treatment
  – Stop the infusion
  – Change the tubing
  – Maintain venous access
  – Aspirin or Tylenol for fever
  – Document
    • Episode
    • Time
    • Amount of blood
    • Treatment performed
Allergic Reaction

• More common in patients with history of receiving multiple transfusions.
• More common in patients with a history of allergies.
• Reactions may be grouped into two classifications, mild and severe.
Mild Allergic Reaction

• Signs and Symptoms
  – Aching joints
  – Urticaria
  – Mild fever

• Management
  – Stop the infusion and change tubing
  – Benadryl
  – Maintain IV access
  – Aspirin or Tylenol for fever
Severe Allergic Reaction

- **Signs and Symptoms**
  - Occurs after a small amount has been administered
  - Absence of fever
  - Wheezing and/or coughing
  - Tracheal edema
  - Respiratory distress
  - GI complaints
  - Anaphylaxis

- **Management**
  - Stop the infusion and change tubing
  - IV fluids to support BP
  - Treat as for anaphylaxis
Thrombolytics Objectives

• Discuss the purpose of thrombolytic therapy
• List the five types of thrombolytic agents with their respective doses
• List the potential side effects of thrombolytics
• Explain the purpose of the five adjunctive pharmacologic agents during thrombolytic therapy
• Describe the proper methods for administering the five thrombolytic agents
• Identify the proper dosage and potential side effects of the seven pharmacologic agents during thrombolytic therapy
Thrombolytics Objectives

- Describe the pathophysiology involved in an acute myocardial infarction
- Recall that thrombolytic agents may be used for other thrombic emergencies
- State the sequential management to handle bleeding problems
- Explain the importance of handling a thrombolytic patient gently
- Explain the rationale for dividing the contraindications to thrombolytics into potential and absolute
- Defend the reasons for adjunctive pharmacologic therapy
Pathophysiology of an AMI

• Damage to the interior of a blood vessel
• Platelets adhere to the damaged area
• Serotonin, ADP, and thromboxananes are released
• Clot increases in size
• Occlusion of the artery produces an AMI
Transport Considerations

- Reperfusion arrhythmias usually occur within 1 ½ hours from onset of treatment
- Watch for development of bundle branch blocks
Types of Thrombolytic Agents

- **Alteplase**
  - Dosage - 100 mg IV over 3 hours
    - 60mg in the first hour
      - 6-10mg is bolused over 1-2 minutes
    - Remaining 40mg infused at 20 mg/hr

- **Anistreplase**
  - Dosage – 30 units over 2-5 minutes

- **Streptokinase**
  - Dosage – 140,000 units followed by maintenance infusion
    - Loading dose is 20,000 units
    - Maintenance infusion is 2,000 IU/min over 1 hour

- **Urokinase**
  - Dosage
    - 6,000 IU/min for up to 2 hours
    - Typical dose is 500,000 IU total

- **Reteplase**
  - Dosage
    - Double bolus of 10 U + 10 U given over 2 minutes
    - Second bolus is administered in 30 minutes if no adverse reactions have occurred
Potential Contraindications

• Absolute Contraindications
  – Active internal bleeding
  – History of CVA, intracranial neoplasm, AV malformations, or aneurysm
  – Recent intracranial or intraspinal surgery or trauma
  – Past or present bleeding disorder
  – Uncontrolled hypertension
  – Pregnancy

• Relative Contraindications
  – Hemorrhagic ophthalmic conditions
  – Prolonged CPR
  – Recent surgery at a non-compressible site
  – Documented cerebrovascular disease
  – Recent GI or GU bleeding
  – Liver dysfunction
  – Physically advanced age
  – Oral anticoagulants
  – Previous thrombolytic therapy
  – Recent head trauma
  – Recent surgery
  – Recent trauma
Side Effects

- Anaphylaxis
- Hemorrhage
Bleeding Management

• Avoid IM Injections
• Avoid unnecessary handling of patient
• Pad side rails of cot
• Reduce venipunctures to a minimum
• Apply direct pressure to active bleeding sites for 15 minutes
• Keep involved extremity straight
• Watch for internal hemorrhage
• Avoid nasotracheal intubation and NG tubes
Sequential Bleeding Management

• Apply manual pressure to bleeding site
• Administer crystalloid volume replacement
• Interrupt anticoagulant therapy
• Interrupt thrombolytic therapy
Adjunctive Pharmacologic Agents

- Nitroglycerin
- Lidocaine
- Heparin
- Aspirin
- Beta Blockers
- Morphine Sulfate
- Oxygen
Nitroglyercin

• Effects
  – Smooth muscle relaxant which decreases the demand of oxygen while at the same time increasing supply of the same.

• Dosage
  – IV form typically initiated at 10-20 mcg/min and titrated to effect.

• Contraindications
  – Hypersensitivity to agent
  – Hypotension

• Side effects
  – Headache
  – Orthostatic hypotension
  – Tachycardia
  – Flushing
  – Palpitation
  – Nausea and vomiting
Lidocaine

• Effects
  – Class IB antiarrhythmic
  – Decreases excitability and conduction
  – Increases the fibrillation threshold
  – Works only on the ischemic portions of the myocardium

• Dosage
  – 1-1.5 mg/kg IV bolus
  – Maximum bolus is 3 mg/kg
  – 4:1 infusion at a rate of 2-4 mg/min

• Contraindications
  – Hypersensitivity to the agent
  – Heart blocks
  – Sick sinus syndrome

• Side effects
  – Seizures
  – Confusion
  – Tremor
  – Hypotension
  – Bradycardia
  – Worsened arrhythmias
Heparin

• Effects
  – Inhibits the formation of new clots by deactivating thrombin

• Dosage
  – Patient specific
  – Typical dosing is 5,000 to 7,500 units IV bolus
  – Infusion rate of 1,000 units/hr

• Contraindications
  – Coagulation disorders
  – Ulcers
  – Recent surgery
  – Active bleeding
  – Hypersensitivity to the agent

• Side effects
  – Hemorrhage
  – Increased clotting times
Aspirin

• Effects
  – Blocks prostaglandin formation which decreases production of thromboxanes

• Dosage
  – 240 mg PO

• Contraindications
  – Known hypersensitivity to the drug
  – Bleeding disorders
  – Use with caution in patients with known hypersensitivity to NSAIDS

• Side effects
  – Tinnitus
  – Dizziness
  – GI disorders
Beta Blockers

• Effects
  – Decreases the workload on the heart
  – Reduces automaticity of the heart

• Dosage (Metoprolol)
  – 5 mg IV every 5 minutes
  – Total of three doses
  – 25-50 mg PO every 6 hours (after IV dose)

• Contraindications
  – Known hypersensitivity to the drug
  – Heart rate <45 BPM
  – 2nd or 3rd degree heart block
  – PR interval >.24 seconds
  – Systolic BP <100 mmHg
  – Moderate to severe cardiac failure

• Side effects
  – Fatigue
  – Dizziness
  – Bradycardia
  – Hypotension
Morphine Sulfate

• Effects
  – Vasodilator
  – CNS depressant
  – Potent analgesic

• Dosage
  – 1-3 mg every 5 minutes, titrate to effect

• Contraindications
  – Known hypersensitivity
  – Hypotension

• Side effects
  – Respiratory depression
  – Hypotension
  – Lightheadedness
Oxygen

• Effects
  – Elevates the arterial pressure of oxygen increasing the perfusion to the cells

• Dosage
  – AHA recommends beginning at 4 L/min via nasal cannual and increasing level until pulse oximetry is >97%

• Contraindications
  – There are no contraindications to the administration of oxygen in the setting of an acute myocardial infarction

• No side effects