The following is based on current research and regional standards of care.

At completion you will be able to identify

- Basic equipment needed at the bedside.
- Aldrete scoring system.
- The most common cause of hypoxemia.
- Increased metabolic oxygen demand.
- The most common cause of hypotension.
- Complications of spinal and epidural anesthesia.
Basic Equipment

**Must be at the bedside:**
- Oxygen source
- Bag-valve-mask device
- Suction device & catheters
- Monitors: EKG, pulse oximeter and NiBP

**In the immediate vicinity:**
- Crash cart
- Ventilator
- Emergency airway supplies
- Forced air warming blanket
Anesthesia Admission Report

- **General information**
  - Patient name, age, surgical procedure, name of surgeon and anesthesia provider
  - Intra-operative management
  - Anesthetic agents used, time of last narcotic, use of muscle relaxants and reversals, intra-op meds (antibiotics, vasopressors, etc.) EBL, fluid & blood administration and urine output

**Intra-operative course**

- Unusual responses to anesthesia, unexpected surgical course, lab results, any central/arterial lines placed in the OR and epidural catheter placement
Anesthesia Admission Report

- **Patient history**
  - Acute (indication for surgery)
  - Chronic (medical and past surgical history)

- **Post-anesthesia plan**
  - Potential and expected problems
  - Suggested interventions
Initial Assessment

- **Basics**
  - Level of consciousness
  - Airway
  - Breathing pattern
  - Circulation
  - Head to toe assessment

A combination of the Aldrete scoring system and a major organs system assessment is the simplest approach.
Aldrete Scoring System

- Hospital directive #94 – scoring system used in evaluation conscious sedation
  - B/P
  - Pulse
  - Respirations
  - Oxygen saturation
  - Operative side
  - Color
  - Movement
Ongoing Assessment
The goal of post-anesthesia care is to identify potential problems and intervene prior to crisis

- **Common post-op problems**
  - Airway compromise (obstruction)
  - Respiratory insufficiency (hypoxemia & hypercarbia)
  - Cardiovascular compromise (hypotension, hypertension, dysrhythmia)
  - Neurologic compromise (emergence delirium)
  - Pain
  - Hypothermia
  - Nausea/vomiting
Ongoing Assessment

- **Airway compromise risk factors**
  - Anatomy (obesity, large/short neck)
  - Poor muscle tone (secondary to narcotics, residual paralytic agents)
  - Swelling or obstruction secondary to surgical manipulation

The tongue causes most upper airway obstructions in the post-anesthetic patient. The patient will snore and/or use accessory muscle to breathe.
Ongoing Assessment

- **Treatment**
  - Stimulate the patient to take deep breaths
  - Use a jaw-thrust or chin lift
  - Place an oral or nasal airway
  - Re-intubation if the patient can’t maintain a patent airway

Laryngeal obstruction (laryngospasm) is more serious. Symptoms include agitation, decreased oxygen saturation, absent breath sounds, acute respiratory distress. Partial obstruction will manifest with crowing or stridor.

Intervention must be **immediate**. Initially, positive pressure ventilation with 100% oxygen may break the spasm. Steps must be taken to summon an airway expert and assemble emergency airway equipment for possible re-intubation.
Ongoing Assessment

- **Respiratory insufficiency (hypoxemia, hypercarbia)**
  - Hypoxemia is characterized by a PaO2 of <60 mmHg. Symptoms are non-specific and can manifest as hyper- or hypotension, brady- or tachycardia, agitation or somnolence.
  - When the oxygen saturation is <90%, hypoxia (oxygen deficit at the tissue level) can ensue.
Ongoing Assessment

- The treatment of hypoxemia depends upon the cause:
  - Atelectasis
  - Pulmonary edema
  - Pulmonary embolism
  - Aspiration
  - Bronchospasm
  - Laryngospasm
  - Upper airway obstruction
  - Hypoventilation
  - Shivering
Ongoing Assessment

- Hypoventilation is the most common cause of hypoxemia and can be treated with the administration of supplemental oxygen and maintaining a patent airway.

- Shivering causes an increase in metabolic oxygen demand. This may even lead to myocardial infarction in a patient with underlying cardiac disease. It may easily be treated with IV fluid warmers or forced air blanket.
Ongoing Assessment

- Cardiovascular compromise
  - Hypotension
    - is classically defined at BP <20% of pre-op baseline. The clinical signs of hypoperfusion are better indicators of compromise:
      - Disorientation
      - Nausea
      - Loss of consciousness
      - Chest pain
      - Oliguria
      - Anuria

Hypotension in the post-anesthetic period is most commonly caused by hypovolemia. Initial treatment is directed towards restoring volume. If there is no response to fluid bolus, then myocardial dysfunction must be considered.
Ongoing Assessment

- Cardiovascular compromise
  
  **Hypertension** is defined as BP>20-30% of resting pre-op. It is a common finding in the post-anesthetic patient. Some possible causes are:
  
  - Pain (the leading cause)
  - Hypoxemia or hypercarbia
  - Distention of the bladder, bowel or stomach
  - Hypothermia
  - Pre-existing HTN with poor control

  Treatment is cause-specific.
Ongoing Assessment

- **Dysrhythmias**
  - In the post-anesthetic period, dysrhythmias most commonly have an identifiable cause that is not related to an MI.
    - Hypovolemia
    - Hypoxia, hypercarbia
    - Stress-induced hormonal changes
    - Pain
    - Electrolyte imbalance
    - Vagal events
    - Anesthetic agents
    - Acid/base imbalance

Dysrhythmias should be treated according to ACLS guidelines. A cardiology consult is sought out if unresolved.
Spinal/Epidural Anesthesia

- **SPINAL anesthesia:**
  - local anesthetic placed in subarachnoid space

- **EPIDURAL anesthesia:**
  - local anesthetic placed in epidural space
Physiological Changes with Spinal & Epidural Anesthesia

- Neural blockade
  
  Sequence of neural blockade (depends on size of the nerve fibers):
  
  1. Sympathetic block with peripheral vasodilatation and skin temp elevation
  2. Loss of pain and temperature sensation
  3. Loss of touch and pressure sensation
  4. Motor paralysis
Physiological Changes with Spinal & Epidural Anesthesia

- The level of autonomic blockade extends above the level of the sensory blockade by 2-3 segments. The motor blockade is 2-3 segments below sensory blockade.

- With epidural blockade, the onset of block is slower with less profound sensory and motor block.
Physiological Changes with Spinal & Epidural Anesthesia

- Cardiovascular
  - Hypotension
    - directly proportional to the degree of sympathetic blockade
  - Block above T4
    - affects cardiac sympathetic fibers; may cause bradycardia, decreased cardiac output, hypotension
Physiological Changes with Spinal & Epidural Anesthesia

- Respiratory

  The higher the block ascends, the more the intercostal muscles are paralyzed
Physiological Changes with Spinal & Epidural Anesthesia

- **Visceral effects**
  - Bladder: sacral blockade results in atonic bladder
  - Intestine: with sympathectomy, vagal tone dominates and results in a small contracted gut with active peristalsis
Complications of Spinal Anesthesia

- Hypotension
- Parathesia or nerve injury
- Blood tap or vascular
- Nausea/vomiting
- High spinal
- Pain on injection
- Backache
- Postural puncture headache (see next slide)
- Urinary retention
- Infection
Postdural puncture headache characteristics

- Primarily in young females
- May be caused by use of large gauge needles
- Postural component (made worse by upright position)
- Frontal or occipital location
- Tinnitus
- Diplopia
Postdural puncture headache Treatment

- Oral analgesics
- Bedrest
- Hydration: IV fluids or caffeine-containing beverages
- Epidural blood patch
Complications of Epidural Anesthesia

- Dural puncture
- Catheter complications
- Unintentional subarachnoid injection
- Intravascular injection
- Direct spinal cord injury
- Bloody tap