PCA, Epidurals, Central Lines

**PCA (Patient-Controlled Analgesia)**
With a PCA, the patient controls the IV delivery of an analgesic. This is indicated for trauma, post-op, cancer and chronic disease patients. The patient MUST be mentally alert and able to understand/follow the directions. You have to also be sure the family understands NOT to push the button for the pt. If your patient is on a PCA, you need to know the med and the dose. Also, make sure you assess respiratory status and O2 sats q 2 hours.

**The PCA Set-Up**
The orders for the PCA should include:
- loading dose (given by IV push at the start of therapy)
- appropriate lock-out interval
- maintenance dose (basal rate)
- amount the pt will receive when they push the button
- maximum amount the pt can receive within a specified time period

**Advantages of a PCA**
- no need for IM analgesics (reduces risk of infection and pt discomfort)
- pain relief tailored to the patient’s size and pain tolerance
- gives the pt a sense of control, reduces anxiety about pain management
- lower narcotic use compared with non-PCA pts
- improved post-op breathing, coughing and ambulation

**Nursing considerations**
- The primary adverse effect of a PCA is respiratory depression. So you will monitor RR and LOC. You will also need to know the antidote/reversal drug. For narcotics it is Narcan/Naloxone (0.02 to 0.04 q min for adults > 40 kg until response obtained).
- You also need to keep an eye on the IV site...check for infiltration into subQ tissues. Signs of infiltration include coolness, swelling, pain at IV site.
- Check for catheter occlusion
- Monitor and record the following q 2 hours:
  - Amount of analgesic infused
  - Respiratory rate
  - Pt’s assessment of pain relief

**Epidural Catheters**
The epidural catheter is placed into the epidural space (wow, that makes perfect sense!). This type of med is given via an infusion pump. The pump looks like an IV pump, and you will mainly see these in OB and the ICU. You will want to make sure the pt turns from side to side hourly to spread the medication evenly.

**Indications for Epidural Catheter**
- Manage acute and chronic pain
  - post-op patients, especially thoracotomy surgery.
  - cancer patient
  - patients with degenerative joint disease (may not be able to place safely)
  - labor and delivery
Advantages of Epidural Catheter

- Opioid receptors are located along the entire spinal column, and narcotic drugs act directly on the receptors of the dorsal horn to produce localized analgesia without motor blockade (pt can still walk around)
- Analgesics are administered alone or in combination with bupivicaine (a local anesthetic)
- Allows smaller drug doses to be given continuously

Contraindications for an Epidural Catheter

- Local or systemic infection
- Neurologic disease
- Coagulopathy
- Spinal arthritis
- Spinal deformity
- Hypotension
- Marked hypertension

Complications of Epidural Catheters

- Respiratory depression
- Numbness and leg weakness (so maybe won’t be able to walk?)
- Itching
- N/V
- Urinary retention (pt will probably need a Foley)
- Infection
- CSF leak during removal

Nursing considerations

- Assessments for first 24 hours:
  - assess RR and BP q 2 hour for 8 hours, then q 4 for 8 hours
  - assess sedation level, mental status and pain relief q hour initially, then q 2-4 until pain control achieved
  - assess lower extremity motor strength q 2-4 hrs
- After 24 hours, follow agency policy (usually q4 hours)
- If you notice respiratory depression or depressed neuro fxn, stop the infusion and call the MD.
- Apply an epidural infusion label to the catheter, infusion tubing and infusion pump.
- NEVER inject anything into the epidural line (but this won’t happen b/c you labeled it!)
- ALWAYS have a peripheral line for immediate administration of emergency meds
- Change the dressing over the site per agency protocol

Practice Alert!

If your trauma pt has lower extremity injuries, he may not be able to tell you if there is numbness, or tingling in lower extremities...so maybe an epidural is not the best choice for him.

There are 5 types of central catheters

1. PICC (Peripherally Inserted Central Catheter)
2. Tunneled central venous catheter
3. Implanted port
4. Dialysis catheter (Quinton)
5. Nontunneled central venous catheter (Swann and ?)
**PICC**
A PICC is a central venous catheter that is inserted via a peripheral vein such as the basilic or cephalic (basilic is preferred). The catheter tip rests in the superior vena cava.
- verify placement with a CXR prior to using this line!
- 1-3 ports
- low infection rate
- good for weeks or months (pt can wear it home)
- the “Purple Power PICC” is a line that a specially-trained nurse can insert...you can get pressure readings off this line.

**Tunneled Central Venous Catheter**
This is a large-diameter catheter inserted via subclavian or jugular vein, and the portion of the catheter between the vein insertion site and the skin exit site is tunneled in a subQ tract. The catheter tip rests in the SVC or the right atrium. In general, this type of catheter is being replaced by the PICC.
- placed in the OR w/ placement verification
- lower infection rate than non-tunneled
- good for weeks or months

**Implanted Port**
The implanted port is inserted into the SCV or jugular vein and attached to a fluid reservoir placed in a surgically-created subQ pocket on the upper chest. The catheter tip rests in the SVC.
- access is via a special needle
- no visible port
- lowest infection rates
- good for months or years
- heparin in the reservoir
- also called a “portacath”

**Dialysis Catheter (Quinton)**
This is a temporary venous dialysis catheter that is inserted into the SCV, jugular vein or femoral vein (most common is SCV). It takes about 3 hours to do dialysis with this catheter.
- two ports (red port takes blood out to machine, blue port brings clean blood back into patient)
- used for 2-3 weeks at the most

**Nontunneled Multi-lumen Central Venous Catheter (aka: Central Line, CVP catheter)**
This is the most common central catheter in the ICU. It is a large-diameter catheter with multiple lumens. It is inserted via the SCV, jugular or femoral (though femoral is rare b/c that area is dirty!). The catheter tip rests in the SVC or right atrium
- placement verified with CXR
- higher infection rates (change by 7-14 day mark)
- this is a temporary, emergent Tx...until the PICC can get placed

A type of nontunneled central catheter of special note is the “Swan”...this is the Pulmonary Artery Cather that Dr. Brady refers to as the “Cadillac” of central lines. It is a large-diameter catheter with multiple lumens that is inserted via the SCV, jugular or femoral vein. The catheter tip rests in the PULMONARY ARTERY.
- may give IV fluids through some of the lumens (not all!)
- can monitor PA blood pressure, cardiac output, left heart pressures
- no meds in distal port (pulmonary artery port)
Pulmonary Artery Catheter Ports
- **Cordis/Side Port/Side Arm**
  - outlet is directly in SCV
  - largest lumen in system
  - commonly used for blood products, colloids, medications
- **Proximal Injectate Port (blue)**
  - outlet in right atrium
  - measurement of central venous pressure
  - prone to clotting
  - crystalloids only
  - no vasoactive or antiarrythmia drugs
  - used to inject fluid for a cardiac output measurement
- **Proximal Infusion Port (white) / other medication access ports**
  - no hemodynamic or monitoring value
  - can be a variety of colors
  - outlet in SCV or in right atrium
  - no restrictions on types of fluids infused
- **Pulmonary Artery Distal Port**
  - used for measuring pulmonary artery pressures and cardiac pressures ONLY
  - NEVER give meds or fluids/blood through this port
  - a pressure bag flush solution of NS is attached to keep the blood from backing up in the line

What is the difference between a CVC and a PA?
Both are nontunneled central venous access lines for fluid and drug administration. The CVC or “central line” can measure right side of heart pressures only. The PA catheter measures the right and left side heart pressures, pulmonary artery pressure, and cardiac output and index.

Indications for Central Catheters
- Patients requiring multiple sites for IV access (major fluid resuscitation is definitely included)
- Lack of usable peripheral sites
- Patients requiring central venous pressures monitoring and/or cardiac pressure monitoring
- Patients who need multiple infusions of fluids, meds or chemo
- Patients receiving incompatible meds (how does that work?)
- Infusion of fluids that are hypertonic, hyperosmolar or have divergent pH values
- Infusion of TPN
- Patients requiring a temporary access for hemodialysis (Quinton cath only)

Complications of Central Catheters
- Phlebitis. This is most common with the PICC lines. It is a mechanical irritation or injury to the vein wall. If there is a thrombus in the peripheral vessel, you will see swelling. If your pt has unilateral arm swelling...think DVT!
- Hematoma...basically a bad bruise. The introduce sheath may have been left in place, or there was a traumatic insertion. Coagulapathies or anticoagulants can also contribute to the development of a hematoma.
- Pneumo/Hemothorax. This can be caused by injury to the pleura, vein, artery or thoracic duct during the insertion process. S/S are SOB, decreased O2 sats, absent BS over the upper lobe
- Malpositioned Cather Tip. The S/S of this are arm or shoulder pain, chest pain, cardiac dysrhythmias. Make sure you assess and monitor for this!
• Air embolism occurs when intrathoracic pressure becomes less than atmospheric pressure when the catheter is open to air. The S/S are sudden respiratory distress, tachypnea, cyanosis, chest pain.
• Catheter embolism occurs when the catheter is pulled back and sheared off through inserting needle or from catheter rupture. S/S are chest pain, cardiac dysrthmias...very very rare!

Nursing Considerations of Central Catheters

• Maintenance
  • Organize care to minimize entries into the VAD system (venous access device?)
  • Maintain strict aseptic technique for all procedures
  • Secure all tubing connections with a needle-less access leur-lock device
  • 30/30 rule: cleanse ports for 30 seconds, allow to dry for 30 seconds

• Site care
  • Wash your hands
  • Assess dressing for intactness, secretions/blood
  • Assess catheter site for bleeding or signs of infection
  • Change dressing per agency protocol (dressing should have date, time, initials)
  • Note the length of the external portion of catheter
  • Make sure sutures are intact

• Flushing
  • Never use excessive force
  • Avoid using syringes < 3mL in size to decrease pressure on catheter
  • 10mL syringe is recommended
  • Slide clamps are used when accessing VADs to prevent air embolism or blood backflow
  • NEVER use a hemostat or sharp-edged clamp that could damage catheter
  • If clamping is not possible, have patient perform a Valsalva maneuver when catheter is open to ari.