

The **Intraspinal Pain Management** training program was developed to familiarize caregivers in the Oncology Program, Palliative Care Program and in the home care setting with guidelines for care management for the patient receiving intraspinal analgesia. The training program includes 2 components including the completion of a:

- ❶ Resource guide for Intraspinal Analgesia
- ❷ 2 Hr Classroom session as outlined below
- ❸ Return of the post quiz

Please note the resource guide should be completed in preparation for session attendance and you will be receiving additional information during the class.

Session Outline

Introductory Lecture: Intraspinal Infusion and Drugs used

Station I: Care of the Patient with an Intraspinal Infusion
Infusion setup, Catheter care, and Troubleshooting

Station II: Assessment of the Patient with an Intraspinal Infusion
Monitoring, Assessment and Documentation



Learner Objectives

1. Describe the **key anatomical structures** and their functions related to Intraspinal analgesia
2. Identify the **mechanism of action** for the following classes of drugs: •Neuraxial opioids, •Local anesthetics and •Naloxone
4. Identify the most common **potential complications** of Intraspinal analgesia and their nursing care management.
5. Describe the **nursing care assessment** & monitoring for patients receiving Intraspinal analgesia
6. Demonstrate, in a simulated setting and then in the clinical setting, the following :
 - Set up of the continuous Intraspinal infusion (pump and tubings)
 - Assessment of the patient with an Intraspinal infusion
7. Describe necessary **documentation** for Intraspinal analgesia
8. Discuss and demonstrate the correct nursing actions for 2 given case scenarios.

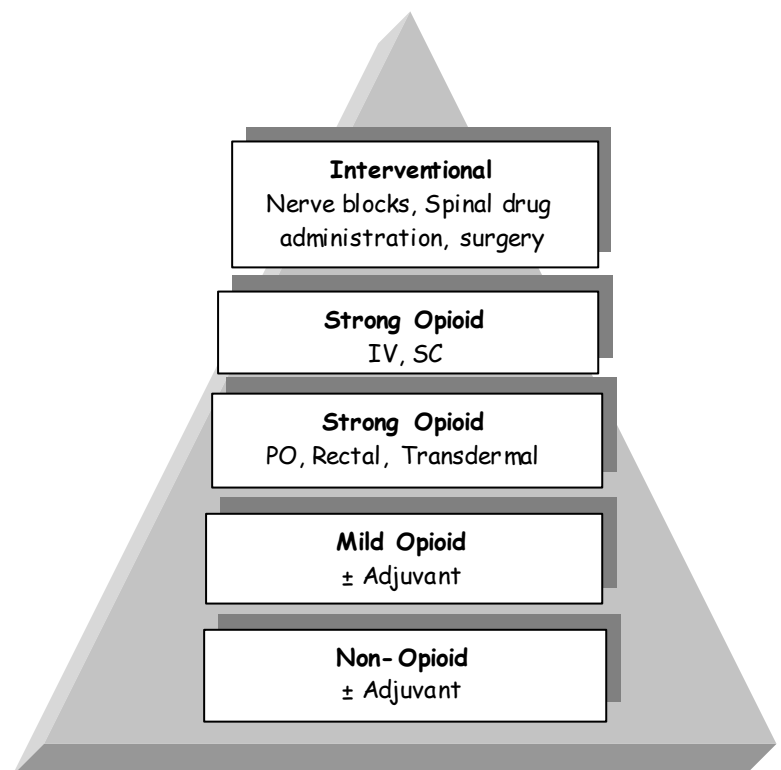
Intraspinal Analgesia for the Treatment of Cancer Related Pain

Pain is a common problem for cancer patients. It is estimated that thirty to forty-five percent of patients with early to intermediate stages of cancer will experience pain, while up to seventy-five percent of patients will have advanced cancer experience pain (Bonica, 1990, Daut & Cleeland, 1982). The causes of cancer pain are multifaceted and often require frequent adjustments in pain strategy methods to achieve optimal results. The majority of cancer patients achieve relief through simple routes of administration (oral, rectal, transdermal) however two to twenty percent of patients require more invasive pain management regimes to control pain.

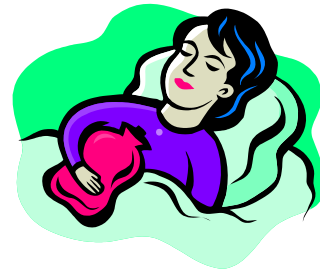


Intraspinal catheters including intrathecal and epidural delivery methods were introduced for the treatment of cancer pain in the late 70's. Intraspinal analgesia is indicated for patients who experience intolerable side effects or intractable pain with other administration routes.

As indicated by the analgesia ladder interventional treatments such as intraspinal infusions should be considered after other measures have been utilized. The prevalence of the use of progressively more invasive therapies such as intraspinal analgesia is estimated to be 2% and 6%

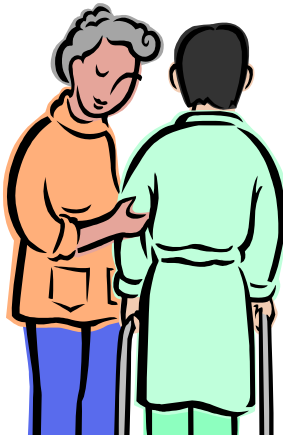


Why use Intraspinal Analgesia ?



- ❖ Can be used to treat somatic, visceral and neuropathic pain with fewer side effects than systemic administered opioids
- ❖ Lower dosages of opioids are required to produce effective pain control with 10 times less medication needed for the epidural space and 100 times less medication needed for the intrathecal space
- ❖ Systemic opioids may be reduced by one half with the introduction of intraspinal administration
- ❖ Because all other administration routes have been found to be ineffective
- ❖ Because patients on epidural or intrathecal therapy may be provided with pain relief in such a way that mobility and awareness are maintained

Contraindications to Intraspinal Analgesia



- ❖ Severe hemorrhage or shock
- ❖ Infection at the site
- ❖ Bleeding tendencies or clotting abnormalities
- ❖ Allergy or sensitivity to local anesthetic agents
- ❖ Certain Neurological disorders: MS, CNS infection and Increased ICP

NOTE: low dose heparin is not a contraindication provided the INR is within normal range. The potential risk of Intraspinal hematoma formation and resultant serious neurological sequela (spinal cord compression, ischemia, and subsequent paralysis) may preclude these patients as candidates.

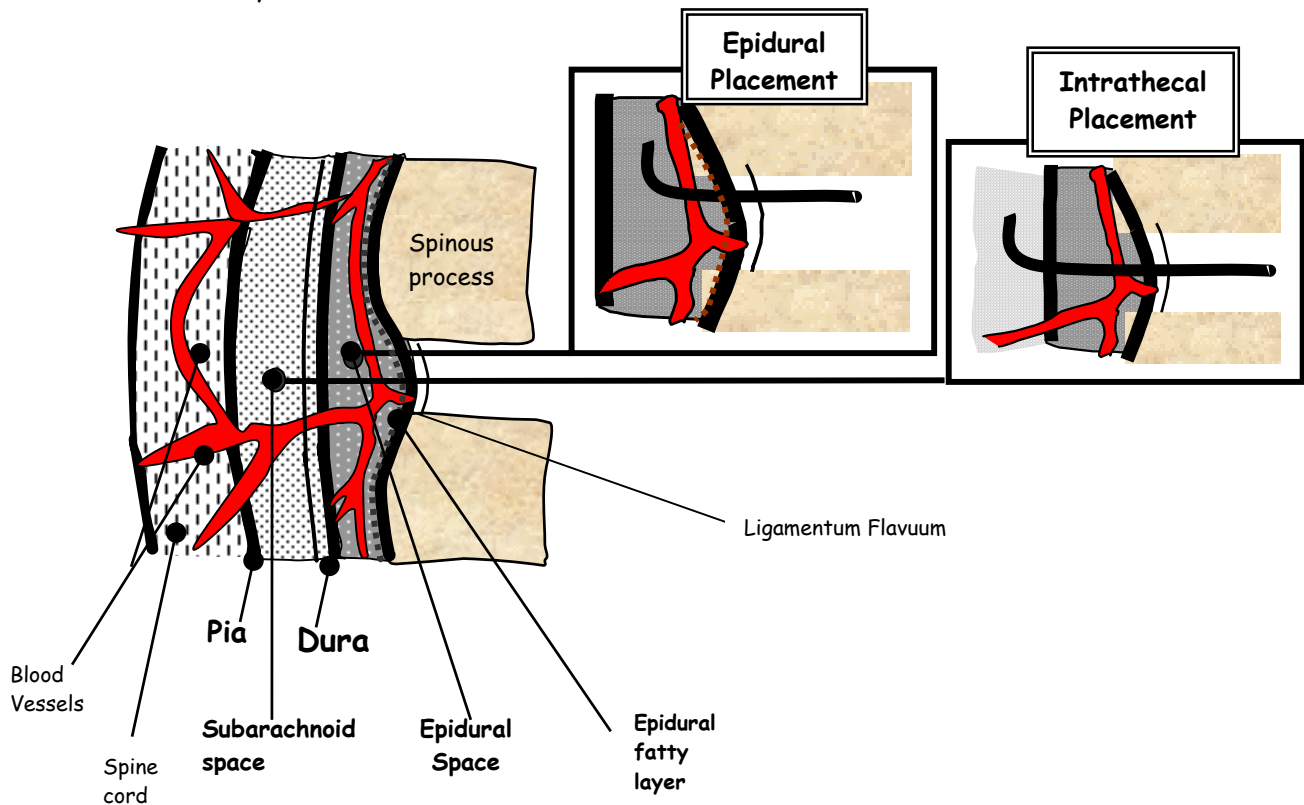
If patient is to be on subclinical anticoagulant therapy check with the prescribing physician regarding administration.

A Brief Review of Anatomy

The spinal cord and the brain are covered by three meningeal membranes as described in the chart below.

Layer	Location	Description
Dura mater	outer layer next to bone	is a fibrous connective tissue containing many blood vessels
Arachnoid mater	Middle layer	is a delicate fibrous membrane
Pia mater	inner layer next to the brain	is a vascular membrane containing a plexus of blood vessels-forms the choroid plexus

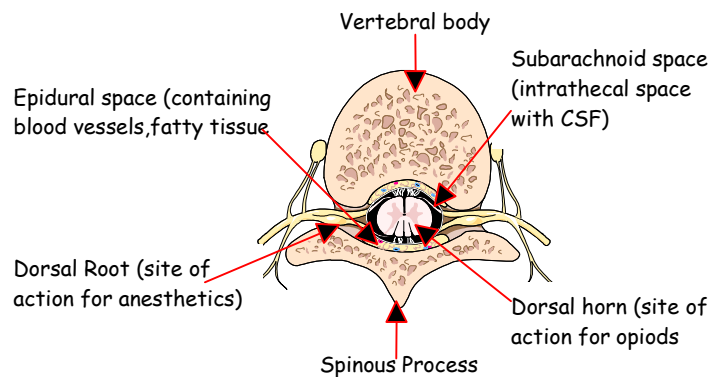
The subarachnoid space - - is between the pia mater and the arachnoid membrane while **the epidural space** is a potential space between the dura mater and the vertebral canal, and extends from the cranium to the sacrum.



Intraspinal analgesia can be given by two delivery routes and is determined by the placement of the catheter. The two routes include: ❶ Epidural and ❷ Intrathecal and the following table and diagram provides further explanation.

Route	Placement	Description
Epidural	<ul style="list-style-type: none"> involves the placement of the catheter between the dura mater and the vertebral arch in the epidural space 	<ul style="list-style-type: none"> The epidural space contains fat, blood vessels and nerves. It functions as a fatty pad that surrounds the spinal cord and acts as a depot for narcotics. Drugs are administered adjacent to the spinal cord and diffuse across a fat lipid membrane called the dura and into the spinal cord. Some of the analgesia is lost into the epidural vasculature during the diffusion process, thus creating some systemic absorption
Intrathecal	<ul style="list-style-type: none"> refers to the placement of the catheter into the subarachnoid space between the spinal cord and the dura mater. 	<ul style="list-style-type: none"> This space extends from the cranium and sacrum and contains CSF. Eliminates the need for the drug to cross the dura and drug is delivered directly next to the spinal cord. This allows the analgesia to work quicker and in lower doses.

Impulses from a painful stimulus enter the spinal cord through the dorsal or sensory root of a spinal nerve. The nerve terminates in the dorsal horn of the cord. A neurotransmitter known as substance P located in the dorsal horn is thought to allow the impulse of the painful stimuli to travel across and up the ascending fibre of the cord to the brain



Intraspinally administered narcotics such as morphine block the release of substance P thus interrupting the transmission of the painful stimuli. While local anesthetics act a little differently. They block the painful stimuli as it is entering the dorsal horn of the cord. The extent of block depends on the dose given but usually low concentrations are required.

The Intraspinal Catheter

Intraspinal catheters include short term percutaneously inserted catheters and tunneled long term catheters.

Short Term Catheter	This polyethylene catheter is used for short term pain management and is inserted as described below. It exits the spinal column and is run up the back and is looped over the shoulder.
Tunneled Catheter	Is catheter that is tunneled under the skin to exit onto the patient's abdomen or attached to a subcutaneous reservoir/port under the skin. It is often used long term.

The short term catheter will be inserted by an anesthesiologist. Verification of appropriate placement and a test dose of the anesthetic agent must be done by the MD. During the insertion the patient may be positioned on his/her side, lying in fetal position, with both knees drawn upward with head and shoulders flexed toward the chest. This extends the spine, widening the spaces between vertebrae, making insertion of the catheter easier. The patient may also be positioned in the upright position, leaning over an over-bed table.

A special needle (usually a Touhey needle) is inserted through the skin, fat and fascia between the spinous processes, penetrating the ligamentum flavum then advanced into the Epidural or Subarachnoid space. Once the needle has been determined to be in the appropriate position, the catheter is threaded through the needle. The needle is then removed. A connector is then attached to the catheter.

The long tunneled catheter is inserted in the OR by the Anesthesiologist. It is often made of a kink resistant material. The Touhey needle is used to place the catheter and then the catheter is tunneled from the intraspinal space under the skin and exits on the abdomen as illustrated in the accompanying diagram. A connector is attached.

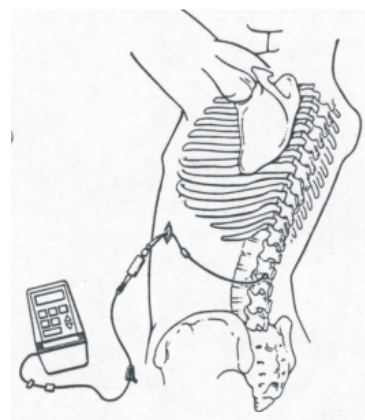


Illustration provided courtesy of SIMS Deltec, Inc., St. Paul, Minnesota.

Intraspinal Dressing

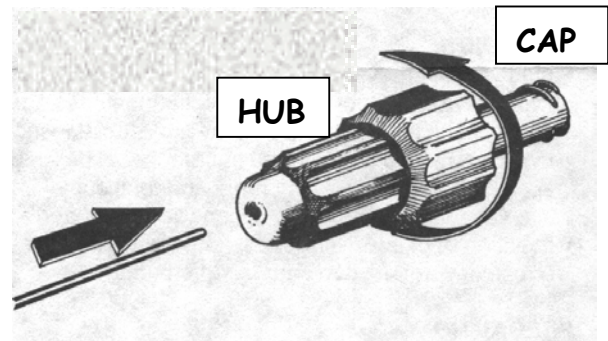
	II. Dressing Changes	Filter/ Tubing Changes	Cleansing	Other
Short-term Non-Tunneled Intraspinal Catheter	<ul style="list-style-type: none"> Q weekly and if dressing becomes wet or loose.If a gauze dressing is under the transparent dressing it must be changed q 72 hours. Occlusive transparent dressing at site on lower back Cloth/Mefix tape to be used up distal length of catheter along back The catheter adapter end is looped over the shoulder Strict aseptic technique similar to central line procedure. Glove and mask are used. 	Q weekly under strict aseptic technique- optimally is best to coordinate tubing change with the cassette/bag change. Limit opening the system as much as possible	Cleanse with providone-iodine in circular fashion. Cover a diameter of 2-3 inches and allow 2-3 minutes for area to dry completely.	This catheter may or may not be sutured; extreme caution must be taken not to dislodge catheter. Peeling the dressing toward the insertion site is recommended. Steri- strips or sutures may be used to stabilize the catheter under the transparent dressing. Steri strips must be replaced with each dressing change.
Tunneled Intraspinal Catheter	<ul style="list-style-type: none"> Q weekly and if dressing becomes wet or loose. If a gauze dressing is under the transparent dressing it must be changed q 72 hours Occlusive transparent dressing at site on patient side or abdomen Strict aseptic technique similar to central line procedure. Glove and mask are used. 	Q weekly under strict aseptic technique. optimally is best to coordinate tubing change with the cassette/bag change. Limit opening the system as much as possible	Cleanse with providone iodine in circular fashion. Cover a diameter of 2-3 inches and allow 2-3 minutes for area to dry completely.	Dislodgment and infection are less common with this type of catheters.

- ☑ The tubing and site should be labelled " Intraspinal Catheter- Do not Inject.
- ☑ The site should be visible and covered with a transparent dressing for assessment purposes. The edges of the dressing should be window-paned to prevent rolling of the dressing.



Connector Problems

The catheter must be placed into a connector. The design of the connector depends on the manufacture but generally has two pieces: The cap and the hub. The hub itself has a freely turning ring. The catheter is inserted into the connector lumen as far it can until its in the STOP position. Then the ring is turned until fully tightened. The hub to catheter connection must be assessed routinely to ensure an intact and secure connection.



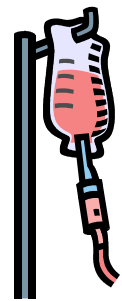
- ☑ If a disconnect is discovered . The infusion is stopped and the catheter should be wrapped in a sterile 4x4 and anesthesia should be notified

Never use alcohol on the catheter or connectors as alcohol is neuro toxic

Modes of Drug Administration

Continuous Infusion	Delivery of medication at a constant rate using an infusion device - is a dilute solution of opioids and/or an anesthetic agent
Top Up <i>via Syringe</i>	Injection of medication bolus at timed intervals or on prn basis for break through pain - is more concentrated drug solution administered - BYMD ONLY
Intermittent /PCA Bolus via Infusion Device	Injection of infusion solution as a bolus but administered via the infusion device for break through pain (local anesthetic and/or opioids).

Continuous Infusion and PCA



All cancer patients requiring intraspinal analgesic will be provided with medications using of a continuous infusion. The use of a continuous infusion for intraspinal medication administration to cancer patients provides long-lasting, uniform levels of analgesia. Programming the pump that allows a set rate to be infused each hour provides this.

Breakthrough dosing allows the patient/family/nurse to self administer small doses of analgesic medication intraspinally. When the patient has pain or anticipates pain will be associated with an upcoming activity, the patient/family member can manually trigger the pump to inject a prescribed amount of the pain medication. The amount of medication delivered each time and the minimum interval between doses is programmed into the pump according to the physician's orders.

At the Metropolitan Campus the CADD Pump is designed to administered medications into the epidural and intrathecal space. At Western Campus and in the Community, the Microject PCA pump will be used for intrathecal administration while the Microject PECA pump will be used for epidural administration of medications.

*****It should be noted that infusion rates will be significantly different between intrathecal and epidural route**

Top up injections may performed by the MD for the following reasons:

- following insertion of a catheter to test catheter position.
- during the administration of infusion because of inadequate analgesia.

Intraspinal Medications



Preservative free narcotics and local anesthetics are the only type of medication that can be given intraspinally. Medications used to treat cancer pain include Morphine, Hydromorphone, Fentanyl and Sufentanil and local anesthetics Bupivacaine (Marcaine) and Lidocaine (Xylocaine). Infusions can include an opioid or an opioid and local anesthetic combination. The addition of a local anesthetic helps to potentate analgesia and improves overall pain control and decrease opioid need.

Neuroaxial Opioids : relieve pain by binding with opium receptors at specific sites in the brain and spine - provide effective and longer duration analgesia - have a tendency to spread due to uptake in vasculature

Local Anesthetics: Given Intraspinally diffuse into the spinal nerve fibres, interrupting the passage of sensory and motor impulses at the level of the injection. The number of pain impulses blocked will be determined by the concentration of the anesthetic. The aim with the lower concentrations used is to reduce pain without motor loss

Intraspinal medications vary in drug solubility. This variability effects the onset of action - Lipophilic drugs (ie. Fentanyl and Bupivacaine (Marcaine) cross the dura or fat layer readily and provide a more rapid onset. While hydrophilic drugs such as morphine and hydromorphone cross slower thus have a slower onset. The poor lipid solubility may result in retention of the drug in the CNS and thus prolonged analgesia.

CLASS : NARCOTIC ANALGESICS			
DRUG	EPIMORPHINE	HYDROMORPHONE	FENTANYL
SOLUBILITY	Water soluble- slower onset	Lipid soluble- fast onset	Lipid soluble- fast onset
ONSET	15-60 minutes -Peaks in 60 mins	5-15 min	5-10 minutes- Peaks in 20 min
DURATION	Long- 4-24 hours	Intermediate 7-19 hours	Short -3-4 hour
OTHER	More spread to brain Delayed Respiratory depression can occur up 8-10 hrs and up to 24 hr but can occur as early as 30 mins after dosing.	May cause more sedation then fentanyl because increased spread to the brain	Less spread to brain Less delayed respiratory depression (3-4 hrs. post injection). Is most likely to be used in infusions.
ADVERSE REACTIONS	Increased sedation, Respiratory depression, hypotension, hallucinations, vomiting, constipation, urinary retention urticaria, rash, pruritis, allergic reaction		

- ☑ The infusion rates will have variable ranges depending on: patient condition, infusion concentrations and if epidural or intrathecal route.- however the side effects are minimized with the use of infusion - Side effects will be more gradual on onset
- ☑ Whenever a patient is receiving Intraspinal analgesia with a narcotic agent Narcan or **naloxone** should be readily available on the unit- need with decreased RR and PaO₂

CLASS: LOCAL ANESTHETICS		
	BUPIVACAINE (Marcaine)	LIDOCAINE(Xylocaine)
ONSET	5-25 minutes	5-10 minutes
DURATION	Long-acting	Short-acting
USE	Used with opioid in continuous	Used for test dose or to test catheter
OTHER	Lower doses are used in an infusion to obtain analgesic effect, sensory blockade is not the goal of trt but may occur in some individuals. It is appropriate as long as pain is controlled. Tends to block pain first, then sensation and then motor blockade.	
ADVERSE REACTIONS	Urinary retention, allergic reaction, decreased bp, muscle weakness, vasodilation local anesthetic toxicity / vascular absorption (s&s: Metallic taste in mouth, Numbness of fingers, Ringing in ears	

- ☑ The infusion rates will have variable ranges depending on: patient condition, infusion concentrations and if epidural or intrathecal route.
- ☑ Whenever a patient is receiving, Intraspinal analgesia **with a local anaesthetic Ephedrine** should be readily available on the unit for the treatment of hypotension. It may also be treated with fluids too.

COMPARISON OF LOCAL ANESTHETICS & NEURAXIAL OPIOIDS

SIDE EFFECT	NEURAXIAL OPIOID	LOCAL ANESTHETIC
Postural Hypotension	No	Yes (below T10)
Respiratory depression	Yes, dose dependent	No, if block is too high may experience it
Urinary retention	Yes, parasympathetic Interferes sphincter tone	Yes, relatively short
Pruritis	Yes	No
Nausea, vomiting	Yes	No but may occur with hypotension, or may be a sign of toxicity
Sedation	Yes, less frequent than with IV	No

Use of Intraspinal Infusion and Systemic Opioids

The nurse will have a role in monitoring pain level as the ideal analgesia levels are achieved for the patient on intraspinal infusion. IV opioids will need to be reduced when initiating an intraspinal infusion. The patient can receive other sedatives and opioids while on the infusion however must be titrated carefully. During the initiation of this therapy it is important to evaluate all sedatives and analgesia that the patient is receiving.

The following is a conversion table for Morphine

PO Morphine	IV/SC Morphine	Epidural Morphine	Intrathecal Morphine
200 mg	100 mg	10 mg	1 mg
		Volume 3- 7 mls With max of 15- 20 mls	Volume .3-.7 ml With usual max of 1 ml

Summary: Care of the Patient receiving Epidural Medications

Assess site of catheter placement

- ☑ Check for signs of infection
- ☑ Keep occlusive, transparent dressing intact- Reinforce prn
- ☑ Ensure catheter is secure
- ☑ Label site
- ☑ Observe the connector that it is secure



Assess pain status

- ☑ Use the Pain scale to evaluate patient pain
- ☑ Document pain status on Intraspinal flow sheet
- ☑ Check system for mechanical errors or check site for leakage if pain relief ineffective
- ☑ Notify MD if pain relief ineffective

Assess sensory and motor function

- ☑ Ask patient if legs are numb
- ☑ Assess if motor function affected
- ☑ Assess level of sensory blockade using Dermatomes- see next page
- ☑ Prior to ambulation -assess for postural hypotension
- ☑ Patient should be accompanied to ambulate and transfer
- ☑ Assess bladder and sphincter function- record I&O, BMs, bladder distention

Assess for side effects

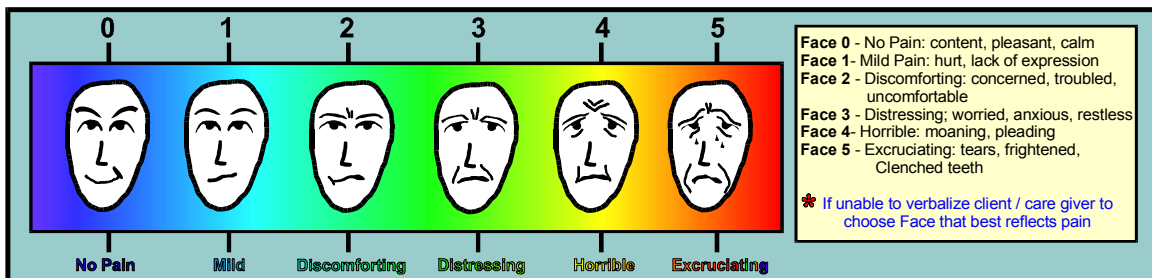
- ☑ See previous pages- CONTACT & INFORM PHYSICIAN OF ANY SIGNS OF COMPLICATIONS
- ☑ Have appropriate reversal agents available

Drugs and Pump

- ☑ Double check for correct drug and dosing
- ☑ Check pump settings and function
- ☑ Have reversal agents or ephedrine readily available on the unit

Assessment Scales

Pain scale



Level of sedation (LOC)

Degree of alertness or Level of sedation (LOC) is assessed using the following

- 0= Alert, Easy to rouse
- 1= Mild, Occasionally drowsy, easy to arouse
- 2= Moderate, Frequently drowsy, easy to rouse
- 3= Severe, Somnolent, difficult to Arouse
- S= Sleep, Normal, Easy to arouse

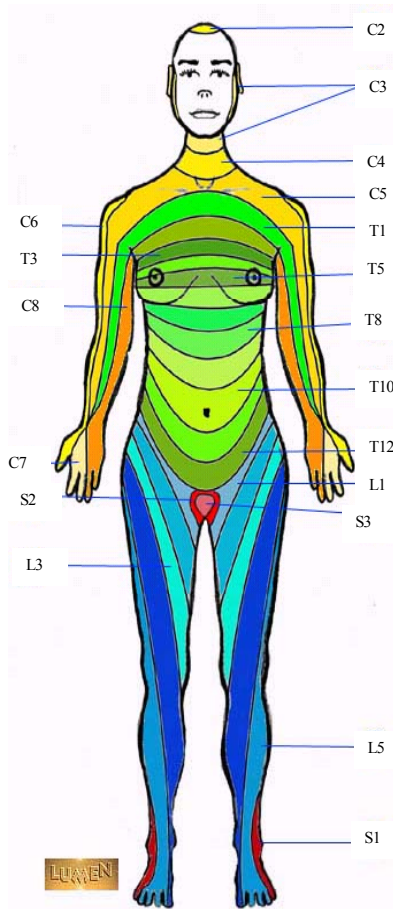
Remember to assess respirations first, if less than 8-10/min attempt to arouse.
If sedation level is **greater than 2** notify Anesthesia

Remember the placement and the amount of agent can influence the level of sedation. The goal is effective analgesia NOT anesthesia.

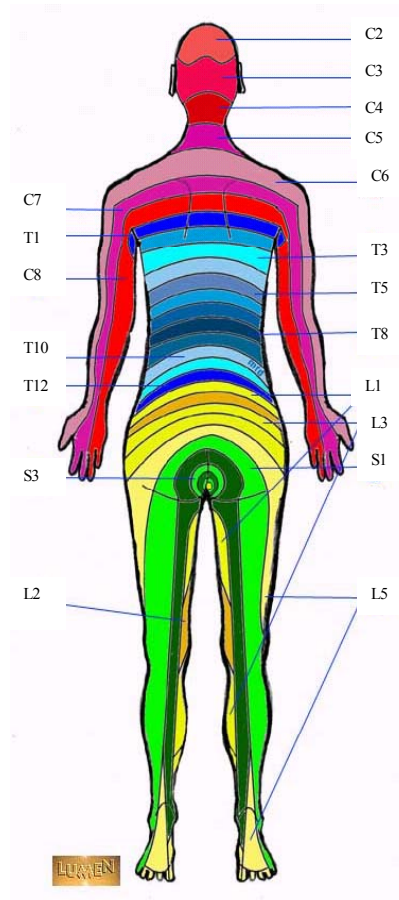
Sensory Assessment

Assess the level of block to see if it is changing - refer dermatome illustration next page

Assess sensation q2h- numbness, tingling or normal sensation using cold sensation with ice. Run the ice up from the toe and note where coldness is detected by the patient



Anterior Dermatomes



Posterior Dermatomes

Note: weakness is an expected finding - this finding should be correlated to the level of sensation. **If sensation or motor block is above the level specified higher notify MD.**

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