

Acute Pain Management



433

ANAESTHESIA





Objectives:


Not given

Pain management goals:

- Facilitate recovery & return to full function
- Ensure quality of care & Patient satisfaction.
- Reduce morbidity & mortality.
- Allow early discharge from hospital .
- Cost effectiveness

Definition of pain:

- Pain is whatever the experiencing person says it is, existing whenever he/she says it does. *Margo McCaffery (1968)*
- An unpleasant **sensory & emotional experience** associated with actual or potential tissue damage or described in terms of such damage
- *International association of study of pain IASP) 1979 , & American Pain society (APS)*

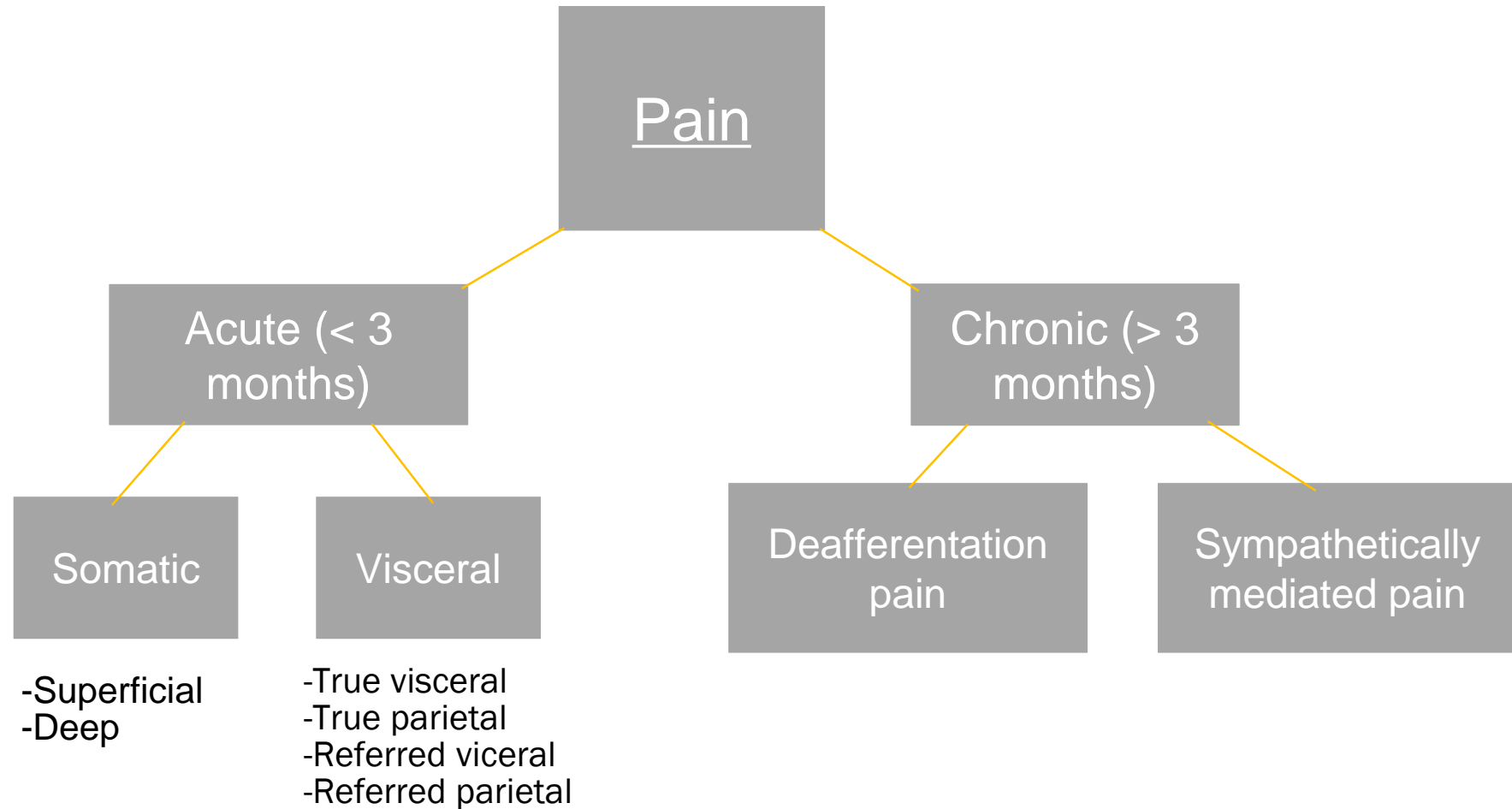


The management of pain is a multidisciplinary team effort involving physicians, psychologists, nurses, and physical therapists.

Pain is subjective.

Pain is a multidimensional experience.

Classification of pain:



Classification of pain:

- According to pathophysiology:

- **Nociceptive;**

Due to activation, sensitization of **peripheral nociceptors**.

- **Neuropathic;**

Due to injury or acquired **abnormalities of peripheral OR central nervous system**.

- According to etiology:

- Post operative
- Cancer pain

- According to type of organ affected:

- Toothache
- Earache
- Headache
- Low backache

Acute pain:

- Caused by noxious stimulation due to injury, a disease process or abnormal function of muscle or viscera.
- It is nearly always **nociceptive**.
- Nociceptive pain serves to detect, localize and limit the tissue damage.

Somatic

- **Superficial:**
 - **Nociceptive** input from skin, SC tissue & mucus membranes
 - Well localized
 - Sharp, pricking, burning or throbbing
- **Deep:**
 - Arises from muscles, tendons & bones
 - Less well localized
 - Dull/ aching

Visceral

Due to disease process/abnormal function of internal organs or their coverings (pleura, pericardium, peritoneum)

Subtypes:

- True localized visceral/ parietal pain
- Referred Visceral/ parietal pain

1-Visceral Pain:

Dull; **diffuse/midline**

Frequently with **sympathetic activity**

e.g.
nausea/vomiting
sweating
changes in HR & BP

2-Parietal Pain:

Sharp/stabbing sensation

Either localized to the area around the organ, or referred to a distant site.

Patterns of Referred Pain:

Lungs	T2 – T6
Heart	T1 –T4
Aorta	T1 –L2
Esophagus	T3 – T8
Pancreas & Spleen	T5 –T10
Stomach, liver and gall bladder	T6 –T9
Adrenals	T6 – L1
Small intestine	T6 – T9
Colon	T10 – L1
Ureters	T10 – T12
Uterus	T11 – T12
Bladder and prostate	S2 – S4
Urethra & Rectum	S2 – S4
Kidneys, Ovaries & Testis	T10 – L1

-The landmark of T4:
Nipple

-The landmark of T10:
Umbilicus

-The landmark of T6:
xiphoid process

An example of referred pain: MI
the sensation can occur in the upper chest as a restricted feeling, or as an ache in **the left** shoulder, arm or even hand.

Medical Complications of Untreated Pain:

Efferent pain pathway:

- Sympathetic nervous system
- Endocrine system.

Systemic Responses to Acute Pain:

- Cardiovascular
- Endocrine/ metabolic
- Gastrointestinal
- Musculoskeletal
- Respiratory
- Urinary
- Immune

Cardiovascular system:

- ✦ ↑ **HR** (Tachycardia)
- ✦ ↑ **BP** (Hypertension)
- ✦ ↑ systemic vascular resistance

Respiratory tract:

- ↑ **O2 demand** & consumption
- ↑ minute volume
- Splinting → ↓ **chest excursion**
- ↓ vital capacity
- **Atelectasis** → ↑ shunting, hypoxemia
- Retention of secretions → **chest infection**

- For abdominal and thoracic surgery unresolved pain may cause the patient to breathe at low lung volumes. This, in combination with decreased ability to cough, results in basal airway closure and retention of pulmonary secretions, leading into a spiral of hypoxia, lung collapse and predisposition to bacterial infection (pneumonia).

Medical Complications of Untreated Pain:

G.I.T and urinary tract:

- ↑ **sympathetic tone**
- **Ileus** & urinary retention
- Hypersecretion in the stomach → ↑ chance of **aspiration**
- Abdominal distension → ↓ chest excursion

Endocrine system:

- ↑ secretion of Catecholamine, Cortisol & Glucagon.
- ↓ secretion of **Insulin & testosterone**

Hematological effects:

- ↑ Platelet adhesiveness
- ↓ Fibrinolysis
- **Hyper-coagulability** state

Immune system:

- Leukocytosis
- Lymphopenia
- Depression of RES

Psycho-emotional:

- **Suffering:**
Reaction to the physical or emotional components of pain; Feeling of: *uncontrollability, helplessness, hopelessness, intolerability ...*
- **Pain Behavior:**
Verbal/non-verbal actions that indicate pain & suffering. **e.g.:** *audible complaints, facial expressions, abnormal gait/postures, avoidance of activities & distress.*

Assessment of Pain:

- Location
- Onset
- Description (quality)
- Intensity (quantity)
- Aggravating & relieving factors
- Previous treatment
- Effect on daily activity

Pain is the 5th vital sign

Pain Assessment Tools:

Selection depends upon:

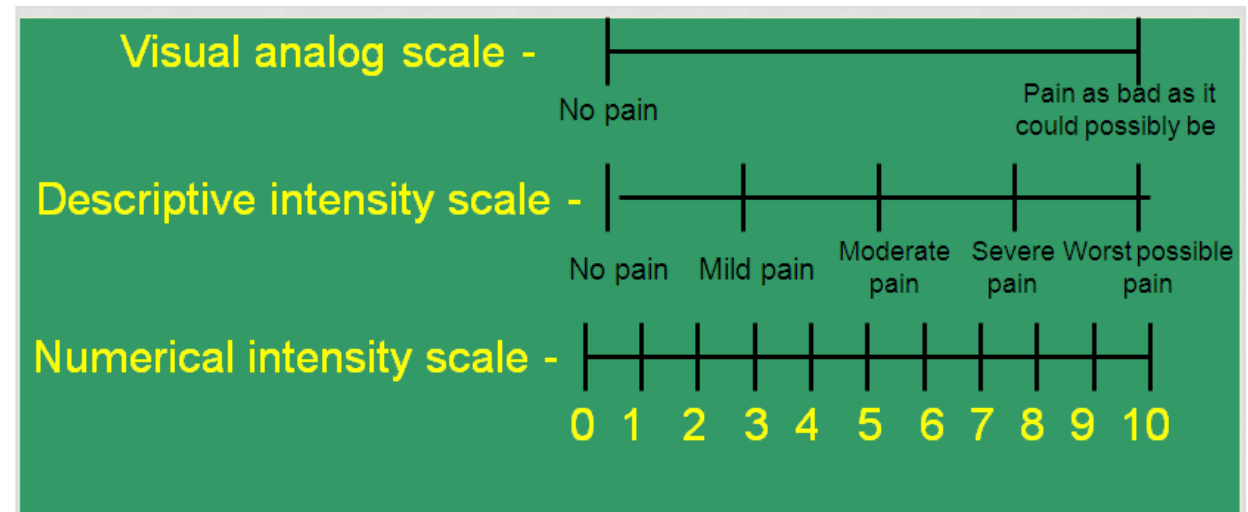
Age & cognitive state/function

✦ Verbalizing Patients.:

Adult & Pediatric

✦ Non-verbalizing Patients.:

- Below 2 yrs
- Sedated/Unconscious



Pain Assessment Tools:

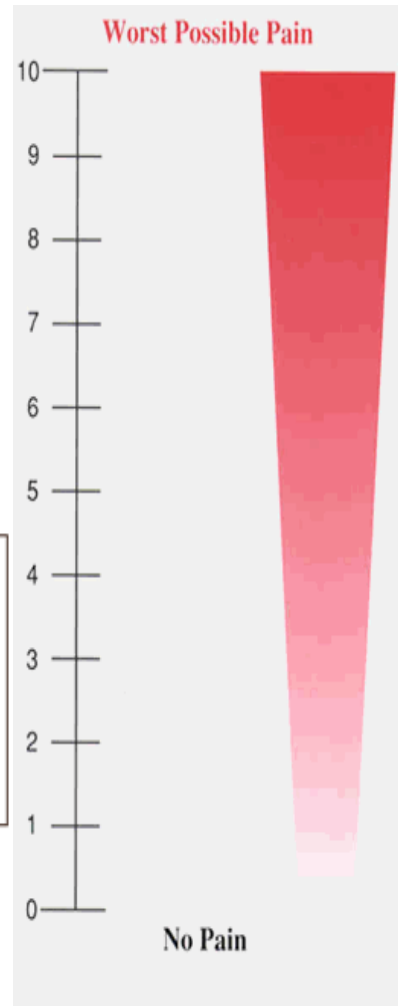
Children Between 3-8 yrs:

- Usually have a word for pain
- Can articulate details about the presence & location of pain
- Less able to comment on
- Quality or intensity

"Faces" Pain Rating Scale



-Wong Baker Faces Pain Rating Scale

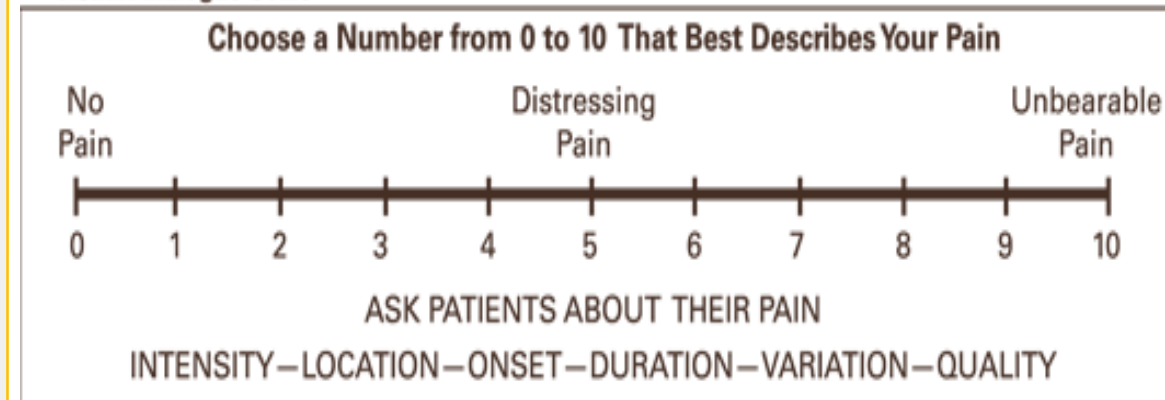


-Color Scale

Patients Older Than 8 yrs:

- Visual analog scale
- Descriptive scales

Visual Analogue Scale



FLACC Scale:

Behavioral Observation Scale; for Children aged 2 months- 7 years

CATEGORIES	0	1	2
FACE	NO particular expression or smile	Occasional grimace/ frown, withdrawn, disinterested	Frequent to constant quivering chin, clenched jaw
LEGS	Normal position or relaxed	Uneasy, restless, tense	Kicking, or legs drawn up
ACTIVITY	Lying quietly, normal position, moves easily	Squirming, shifting back & forth, tense	Arched, rigid, or jerking
CRY	No cry (awake or sleep)	Moans or whimpers, occasional complaints	Cries steadily, screams or sobs, frequent complaints
CONSOLABILITY	Content, relaxed	Reassured by occasional touching, hugging, or being talked to, distractible	Difficulty to console or comfort

Acute pain management:

- Pain management continues to be a challenge to all physician .
- PCA & epidural analgesia are advance in analgesia that may assist physician with this challenge
- Pain management can be evaluated in terms of its ability to meet 2 main goals:
 - To relieve postoperative pain.
 - To relieve patient of inhibition of respiratory movement without sedation.

Positive rule of pain:

- Acute pain plays a useful positive physiological role by providing a warning of tissue damage.

<u>Acute Pain</u>	<u>Chronic Pain</u>
<ul style="list-style-type: none">• Intensity correlates with the triggering stimulus• Can be <u>easily located</u>• Has a distinct warning & protective function• e.g. surgical, trauma, dental, burn pain medical: SCC	<ul style="list-style-type: none">• Intensity is no longer correlated to stimulus• Often, <u>NO neuroendocrine stress response</u>• Sleep & affective (mood) disturbances• Requires <u>multidisciplinary approach to management</u>• e.g. cancer, neuropathic, and neurospinal pain

Pain management:

- There are many different techniques, non-pharmacological & pharmacological ,both regional and non-regional to provide post-op analgesia.

Non-pharmacologic Pain Relief Technique:

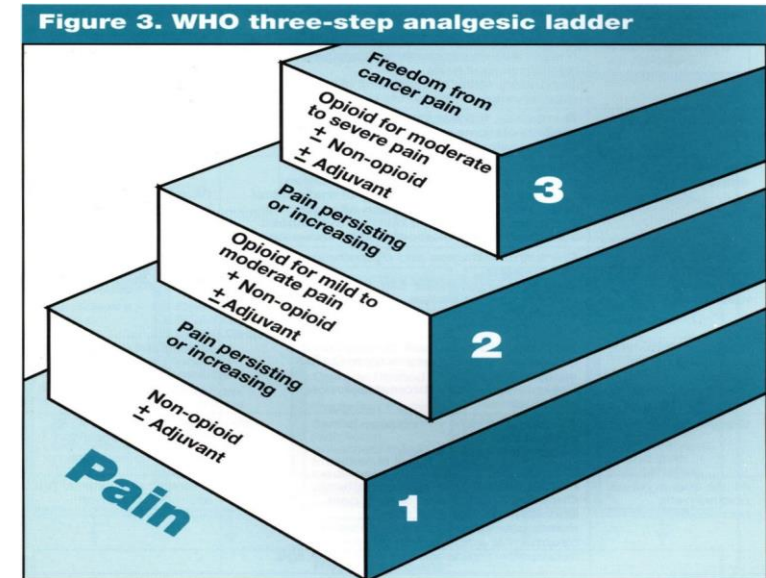
- Heat & Cold
- Hydrotherapy
- Touch & massage
- Movement & Positioning
- Transcutaneous electric nerve stimulation (TENS)
- Acupuncture
- Hypnosis
- Aromatherapy
- Audio-analgesia.

Pain management:

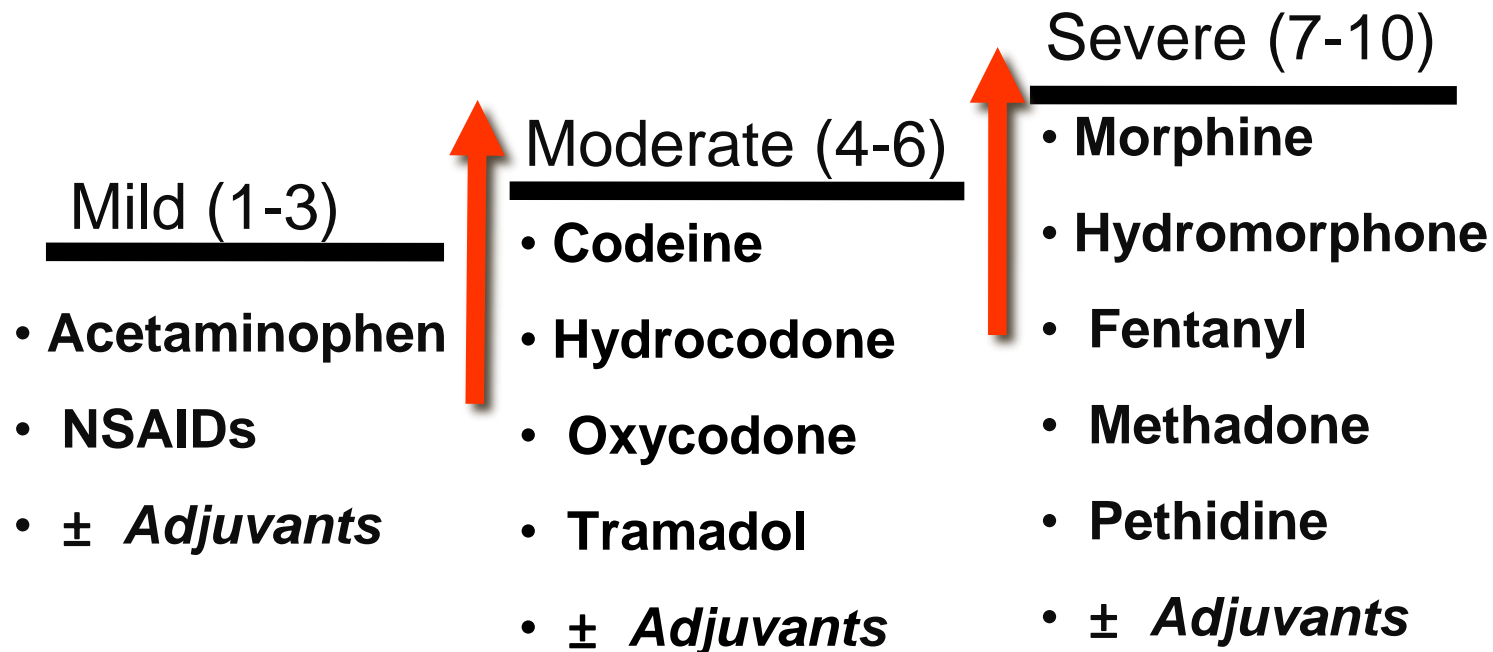
Pharmacologic Pain Relief: 'WHO' recommendations

'WHO Analgesic Ladder' Principle:

- Pain management using analgesia should be based on the intensity of pain reported by the patient rather than it's specific etiology'.



Source: World Health Organization, 1990. Used with permission.



-Examples of adjuvants:

- Anticonvulsants
- Antidepressants
- NMDA antagonists
- Local anesthesia
- Clonidine
- corticosteroids

Causes of Post-operative Pain:

- Surgical Trauma:

Incisional: skin & subcutaneous tissue.

Deeper: cutting, coagulation, nerve compression/traction.

- Position & Activities:

Coughing, deep breathing, urinary retention.

Ambulation, physiotherapy .

- Others:

IV site: needle trauma, extravasation, venous irritation.

Tubes drains, NGT (Nasogastric tube), ETT (Endotracheal tube).

Cast, dressing (too tight).

Patient Controlled Analgesia (PCA):

- A technique whereby patient is allowed to self administer small doses of an analgesic (**usually morphine**) when pain is present, using a programmable infusion pump that aids titration of analgesia according to the intensity of pain.

-Why PCA?

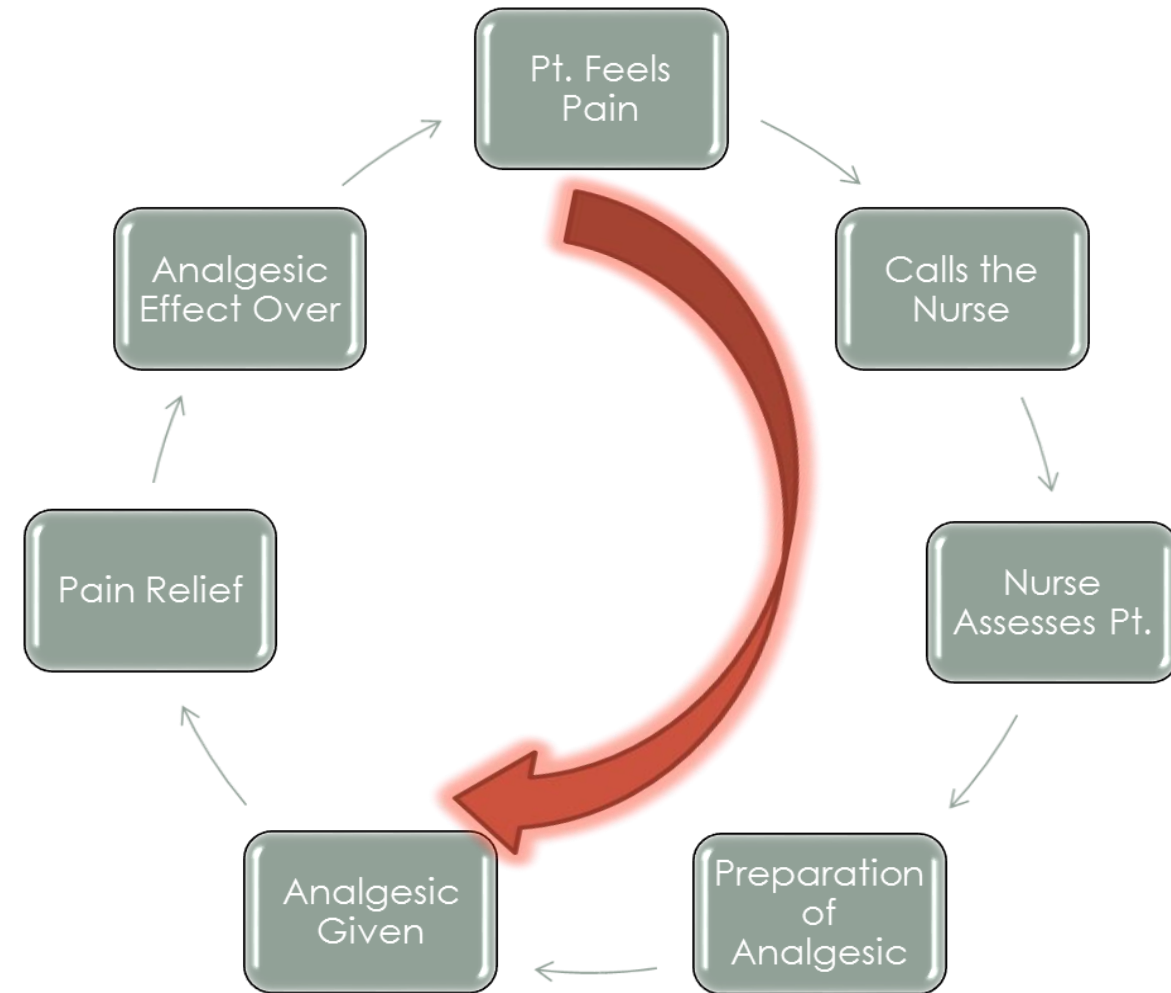
- Pain is subjective;
 - Patient is the best judge of his/her pain.
 - Patient should be allowed an active role in controlling their pain.



Patient Controlled Analgesia (PCA):

Advantages:

- Therapeutic level reached relatively quickly.
- A steady state plasma level occurs, because plasma drug elimination is balanced by repeated boluses.
- Elimination of the time lag between Patient's pain report & receiving analgesia.
- Used in a variety of acute medical & post-op surgical conditions.
- Flexibility in programming 'dose & frequency' as per patient's need.
- Controlled 'opioid' usage & side effects.
- Better pain control → improved Pt. functioning & compliance, e.g. better breathing & coughing, earlier mobilization, ↑ tolerance of physiotherapy, better sleep & less anxiety..etc
- Pt. control over pain → better satisfaction.



Patient Controlled Analgesia (PCA):

-Adverse Effects and Management:

- Sedation & Resp. depression → IV Narcan
- Nausea & Vomiting → Primperan (metoclopramide)
(*opioids stimulate the chemoreceptor trigger zone*)
- Pruritus → Diphenhydramin
Narcan (low dose)
- Urinary retention → Catheterization/
Narcan low dose
- Hypotension → IV fluids
- Slowing of GI motility

Neuraxial Analgesia (NA):

- **Epidural Analgesia (EA):**

Administration of medication into epidural space.

- **Intrathecal Analgesia:**

Administration of medication into subarachnoid space

-EA: Advantages :

- Convenient pain control in Pts. with medical comorbidities
- Improved pulmonary functions
- Early ambulation
- ↓ incidence of DVT
- Faster return of bowel function

-EA: Indications:

EA in pain management:

- Major surgery: abdominal, pelvic, lower limbs..etc.
- Trauma: e.g. fractured ribs.
- Palliative care : relief of intractable pain
- Labor pain analgesia/anesthesia

-EA: Contraindications:

- **ABSOLUTE:**

- Patient Refusal
- Sepsis or Infection at injection site
- Coagulopathy
- Elevated ICP or Cerebral Edema
- Local Infection near injection site

- **RELATIVE:**

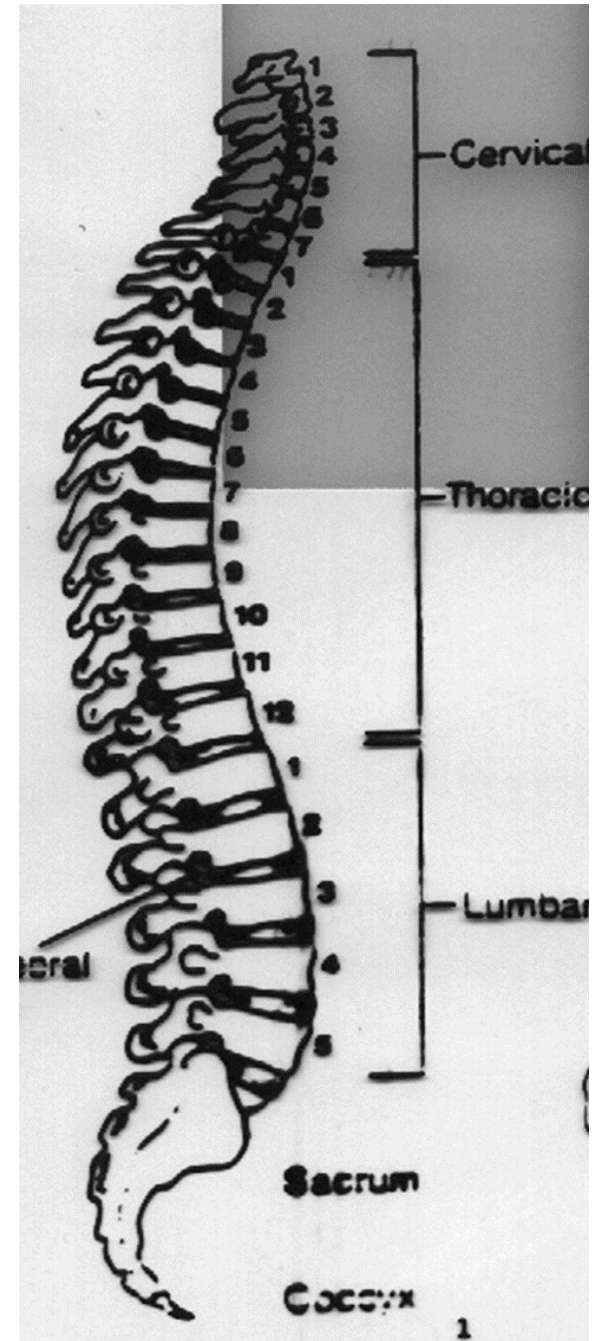
- Hypovolemia
- CNS Disease
- Chronic Back Pain
- Anticoagulation

Spinal Cord Anatomy:

- Extends from the foramen magnum to lower border of L1 in adults/ S2 in children.
- Protected & surrounded by meningeal membranes: 'dura, arachnoid & pia mater'

Epidural Space:

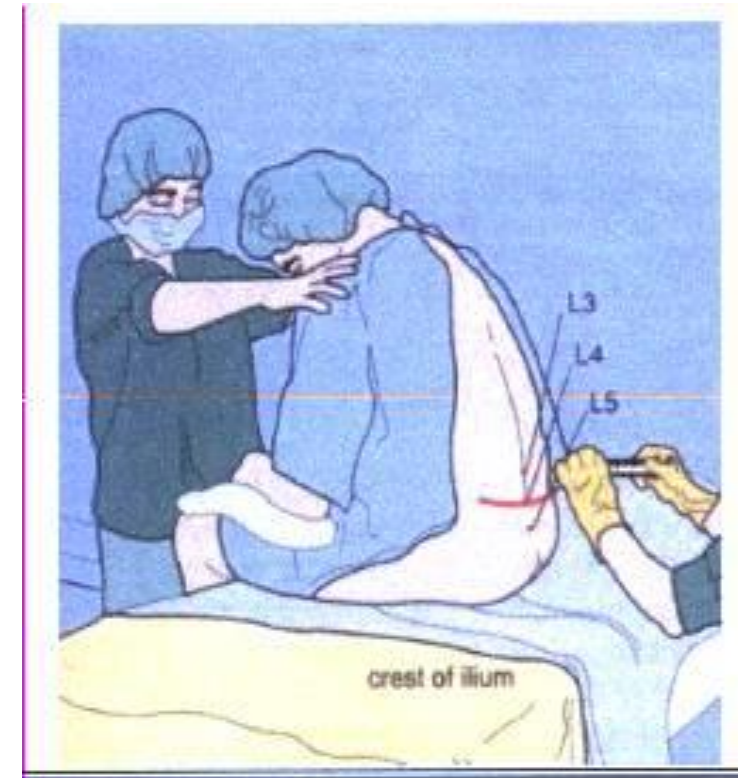
- Potential space, between the dura-mater & ligamentum flavum.
- Made up of fatty tissue, blood vessels, lymphatics & nerves.
- Extends from foramen magnum to the sacro-coccygeal ligament.



Insertion of Epidural Catheter:

- Positioning of patient:

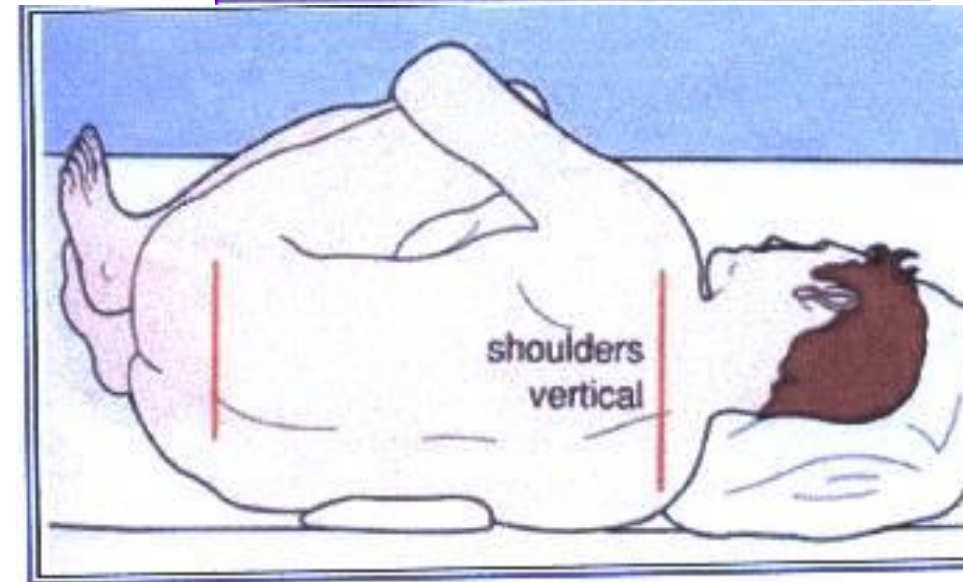
Patient assumes a sitting or side-lying position with the back arched toward the physician (to help spread the vertebrae apart).



- Site is dependent upon the area to be relieved of pain:

<u>Incision Level</u>	<u>Epidural Block Level</u>
-----------------------	-----------------------------

Thoracic	T4-T6
Upper abdomen	T6-T8
Lower abdomen	T8-T10
Pelvis	T8-T10
Lower extremity	L1-L4



Insertion of Epidural Catheter:

ECs have 'length markings':

- Dark mark at the tip
- 1st single mark = 5 cm
- Double mark = 10 cm
- Triple mark = 15 cm
- Fourth mark = 20 cm

- **Ideal placement (adult)= 10-12 cm at the skin**
- A change in depth of EC indicates migration either into/out of the epidural space.

Potential Problems:

- EC migration into a blood vessel in the epidural space or subarachnoid space;
 - Rapid onset 'loss of consciousness'
 - Variable loss of sensory/motor functions
 - Toxicity
 - Profound hypotension
- EC migration out of the epidural space:
 - Ineffective analgesia
 - Absent analgesia
 - Drugs deposited into soft tissue.



Epidural Drugs \ Analgesics:

- Opioids:
 - Fentanyl, Morphine
 - Affect pain transmission at the opioid receptors.
- Local Anesthetic (LA):
 - Bupivacaine (marcaine);
0.0625%, 0.125%, 0.25%
 - Inhibits pain impulse transmission at the nerves fibers.
- Methods of Administration:
 - Boluses: Fentanyl/ Duramorph
 - Continuous infusion: Marcaine + Fentanyl
- Epidural drugs must be preservative free.
- Epidural opioids must be diluted with NS
- prior to intermittent bolus administration.

Epidural Drugs: LA:

- LAs act as analgesics at sub-anesthetic doses.
- Sensory fibers are blocked before motor fibers
- Pain fibers are blocked before heat/cold & touch/pressure sensory fibers.
- Onset of action: 10-15 min.
- Duration of action: +4hrs after a bolus or after infusion is stopped
- Extend of spread is influenced by drug volume & position of patient.

Epidural Opioids:

Morphine (Duramorph/Astramorph)

- Hydrophilic (H₂O) soluble)
- Slow diffusion across dura to SC
- Broad spread
- Duration: + 6hrs
- May cause late respiratory depression
- Monitor respiratory status for 12 hrs after the last dose.

Fentanyl

- Lipophilic (fat soluble)
- Crosses the dura rapidly
- Rapid onset of action
- Segmental spread
- Onset 5-20 mints
- Duration 2-4hrs
- lower risk of late respiratory depression
- Excellent for breakthrough pain

Table 13.3 Effects of drugs in the epidural space

Local anaesthetics	<ul style="list-style-type: none"> • <i>Sensory block</i> <ul style="list-style-type: none"> – pain relief, urinary retention • <i>Motor block</i> <ul style="list-style-type: none"> – paralysis, urinary retention • <i>Sympathetic block</i> <ul style="list-style-type: none"> – hypotension
Opioids	<ul style="list-style-type: none"> • <i>Respiratory depression</i> • <i>Urinary retention</i> • <i>Itching</i>

Patient Assessment: Sedation Level:

0	None	Alert
1	Mild	Easily aroused
2	Moderate	Difficult to arouse or RR <10 (notify APS)
3	Severe	Unresponsive or RR <8 (notify APS)

EA: Patient Assessment:

-Assessment for motor block:

'Bromage Scale' →

-Assessment for Sensory Block:

'Dermatome Level':

- Use 'ice in glove'
- Start in upper neck & move down thorax bilaterally assessing all potential dermatomes
- Level of block is where intensity of cold changes or the cold sensation is absent



Bromage 3 (complete)
Unable to move feet or knees



Bromage 2 (almost complete)
Able to move feet only



Bromage 1 (partial)
Just able to move knees



Bromage 0 (none)
Full flexion of knees and feet

EA: Adverse Effects:

- Hypotension:
 - Assess intravascular volume status
 - No trendelenberg positioning
 - Teach Pt. to move slowly from a lying position to sitting to standing position.
 - **IV Fluids.**
- Urinary retention:
 - Urinary catheter
- Headache (PDPH) :
 - Symptomatic trt.: bed rest, fluids, caffeine
 - Autologous blood patch
- Infection:
 - **Take EC out.**
 - Tip for C & S
- Hematoma:
 - Intravenous placement of catheter
 - Subdural placement of catheter

- Temporary LL motor/sensory deficits:
 - ↓ the rate of infusion or concentration
- LA toxicity (neurotoxicity):
 - Stop infusion.
- Respiratory insufficiency:
 - Stop infusion
 - ABC, O2 (100%), & call for help
 - Assess for spread & height of block
 - Alternate analgesia

Table 13.4 Risk and benefits of epidural infusions

Benefits	Risks
<ul style="list-style-type: none"> • Superlative pain relief • Opioid sparing • Quicker return of GI function • Reduction in: <ul style="list-style-type: none"> • Pulmonary thromboembolism • Blood loss and transfusion • Some respiratory complications • Stress response 	<ul style="list-style-type: none"> • Hypotension and its risks (MI, renal failure, CVA and side effects of excess fluid administration) • Poor mobility • Permanent neurological damage

Acute Toxicity:

- Main concern is CNS and cardiac toxicity
- CNS
 - Tinnitus, dizziness, lightheadedness are early signs
 - Anxiety → disorientation → loss of consciousness → seizures → respiratory arrest

- Cardiac
 - Hypotension:
All local anesthetics are negative inotropes
 - PVC → wide QRS → Multiform ventricular tachycardia → ventricular fibrillation, or Pattern with bupivacaine
 - Bradycardia → a-systole:
Pattern with bupivacaine + lidocaine

- With most drugs, CNS toxicity proceeds cardiac toxicity, providing a warning of impending disaster.
- Key response: maintain oxygenation and normal CO₂!
- With bupivacaine, CNS toxicity rapidly progresses to cardiovascular collapse.

Treatment:

- Airway:
 - 100% oxygen
 - Intubate if necessary to ventilate
- CNS:
 - Break seizure with propofol, thiopental, or midazolam
- Cardiovascular
 - Amiodarone has demonstrated efficacy. Use 300 mg
 - Lidocaine would be a particularly poor choice!

- Risk of seizure and/or cardiovascular collapse is increased by:
 - Cold temperature (slows metabolism)
 - Metabolic or respiratory acidosis
 - Hypoxia
 - Pregnancy

Done by:

Sarah Aljabri



Reviewed by

Sarah Aljabri



Leader

Yasmine
Alshehri

Color reference:

Black-slids

Green-Notes

Blue-Book

Red-important

Contact us:

Anesthesia433

@gmail.com