Optimal pain management in thoracic trauma

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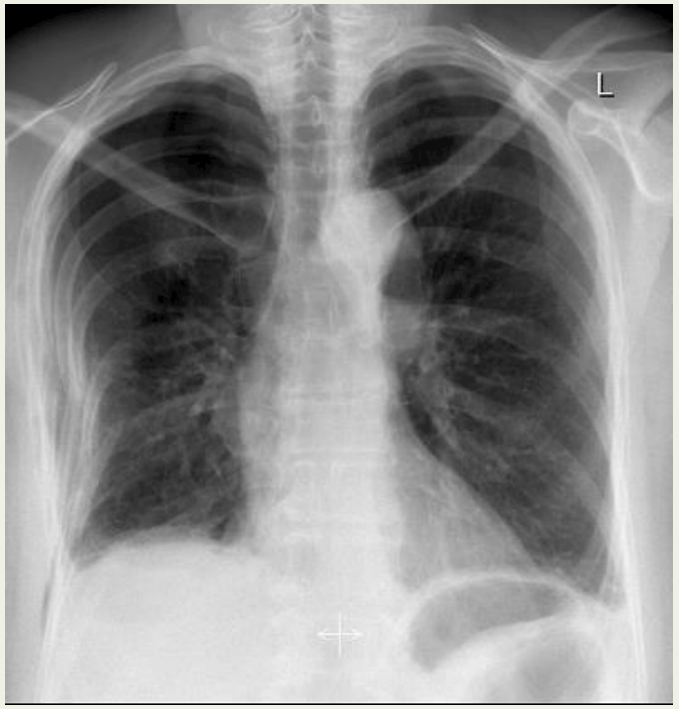
Rib fractures

- What might we do?
- What do we actually do?
- What should we do?
- Why are we doing it?



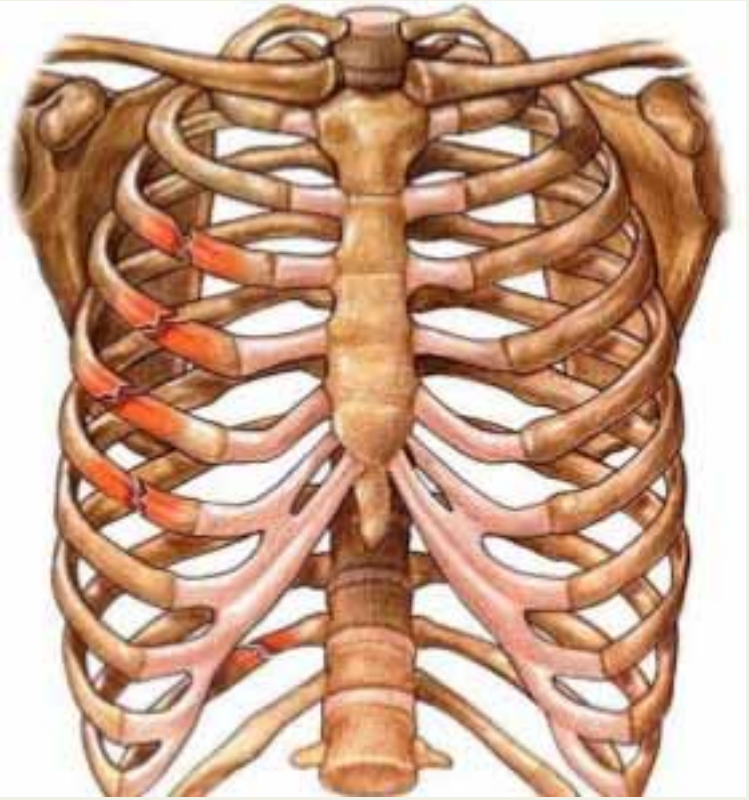
Principles

Inadequate pain control => ↓TV + cough

- Splinting of chest wall
- Atelectasis
- Sputum retention
- Pneumonia
- Reduction in FRC
- V/Q mismatch
- Hypoxaemia
- Respiratory failure

Mortality/morbidity

- US NTDB 10yrs
  - Overall mortality 10%, morbidity 13%
  - Increases with # number & age
- Flail chest – 5-13%
  - Greater pulmonary morbidity
  - 60% require ventilation
- Haemothorax
  - 81% where >2#
- Pneumonia
  - 11% in < 65yrs
  - 31% in > 65 yrs
  - Overall 6% mortality



Is good pain relief essential?

- Fabricant L. Am J Surg 2013; 205:511.
  - 203 patients with varying injuries – 7% flail, 22% bilateral
  - Epidural 9% (no other regionals)
  - Significant reliance on opioids -89% initially & 66% at 60 d (NSAIDs 25% & 26%)
  - At 60days: 59% chest wall pain, 76% functional disability

- Gordy S et al. Am J Surg 2014; 207: 659
  - Same group of patients
  - At 6 months: 22% chest wall pain, 53% functional disability

- Severe acute pain in first 2 weeks predicted chronic pain

Multimodal analgesia

- Paracetamol
- NSAIDs
- Tramadol
- Opioids
- Ketamine
- Adjuvants
  - Gabapentinoids
  - Clonidine
- Regional analgesia

Contraindications
Effectiveness
Optimal dose

Multimodal analgesia

- Paracetamol
  - 1g QID regularly
- NSAIDs
  - Effective dose
  - Contraindications
  - COX2 inhibitors
- Tramadol
  - Part opioid
  - Titrate
  - Serotonin syndrome

Multimodal analgesia

Opioids

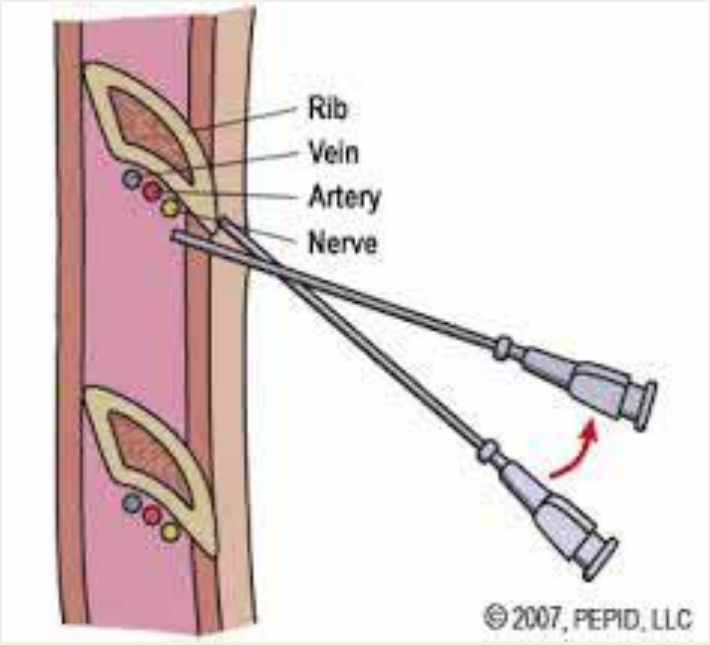
- Route – oral or intravenous
- Preemptive use
- Drug – morphine, oxycodone, fentanyl
  - Same side effect profile
  - Renal impairment – oxycodone or fentanyl
- Formulation
  - Quick release – titrate
  - Slow release – rarely necessary

Multimodal analgesia

- Ketamine
  - Reduce wind up/sensitisation
  - Reduce opioid use
- Adjuvants – rarely relevant in acute phase
  - Gabapentinoids
    - Inconsistent mild analgesia
    - Neuropathic pain
  - Clonidine
    - Epidural
  - Lignocaine patches
    - No effect

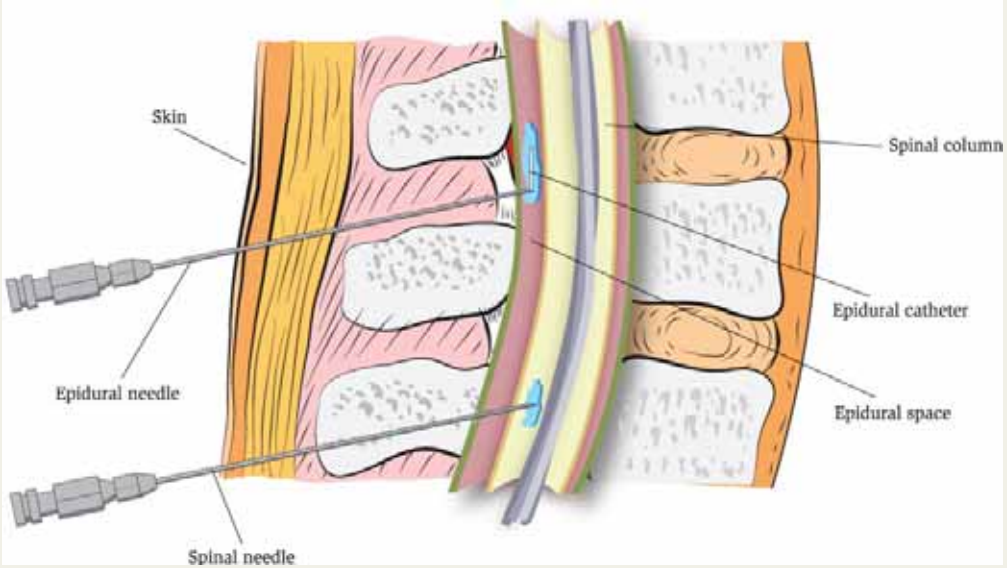
Regional anaesthesia – intercostal block

- Very effective
- At least each # rib
- Short-lasting
- Can tunnel catheter across multiple ribs
- Difficult above T7
- Small risk pneumothorax



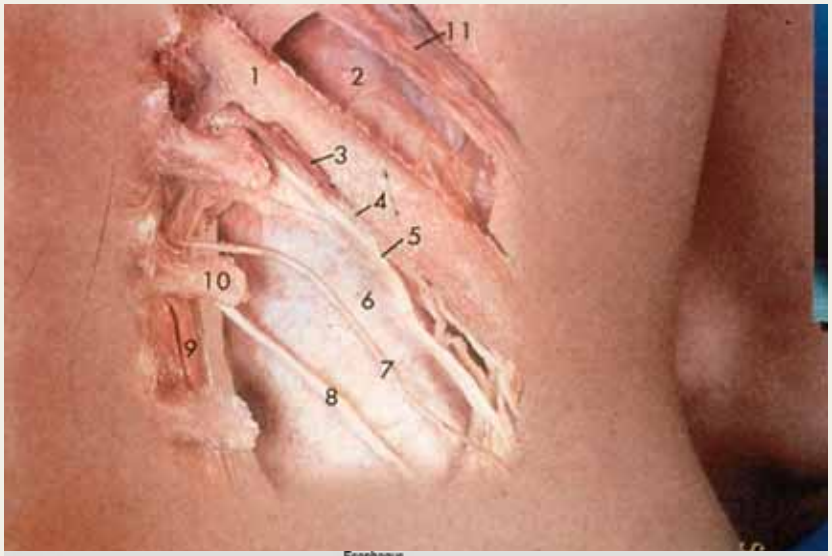
Regional anaesthesia - epidural

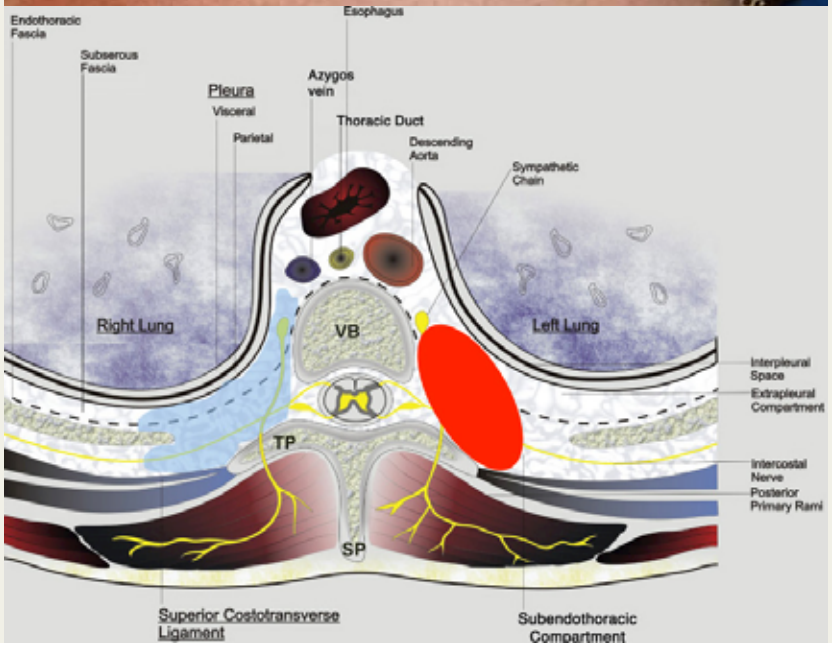
- At level midpoint #s
- Single injection + catheter for prolonged use
- Very effective
- Good for bilateral #s
- Risks:
  - Hypotension
  - Dural puncture
  - SC/nerve injury
  - Urinary retention
  - Sensorimotor block
- Contraindications



Regional anaesthesia - paravertebral

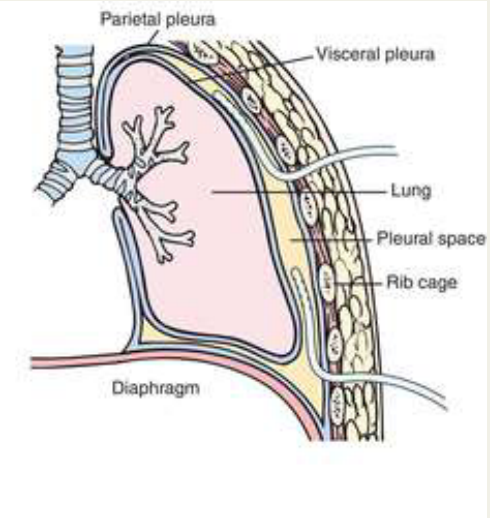
- Single injection + catheter for prolonged use
- Effective for unilateral #
- Few contraindications
- Minimal haemodynamic changes
- No urinary retention
- Small risk pneumothorax
- Small risk epidural spread
- Challenge to thread catheter





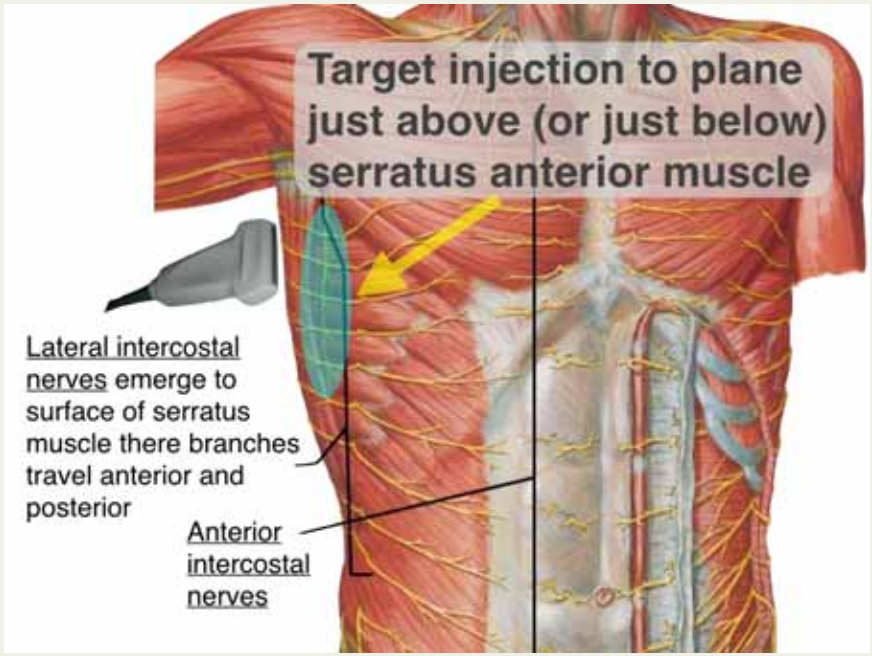
Regional anaesthesia - interpleural

- Unpredictable & unreliable
- Lose LA if chest drain
- Gravity influenced
- Risk of LA toxicity
- Risk of lung damage



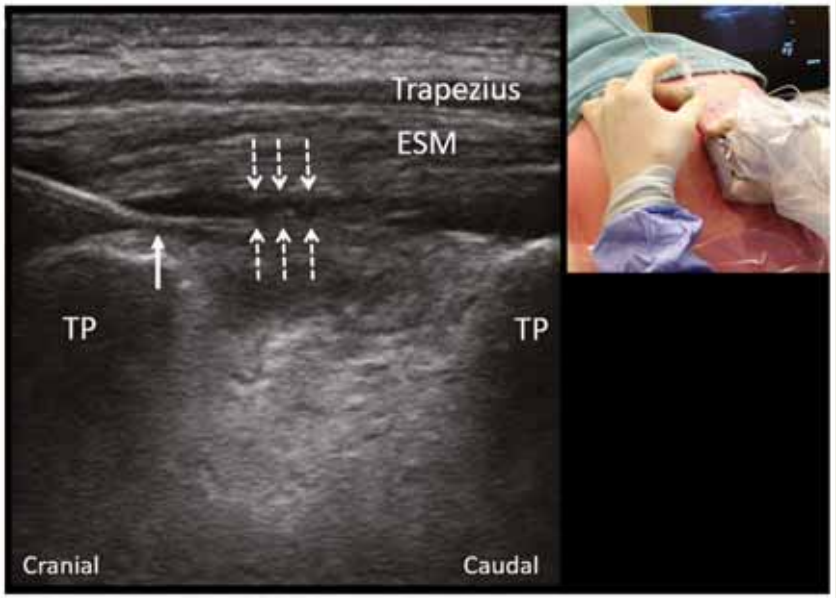
Regional anaesthesia – serratus block

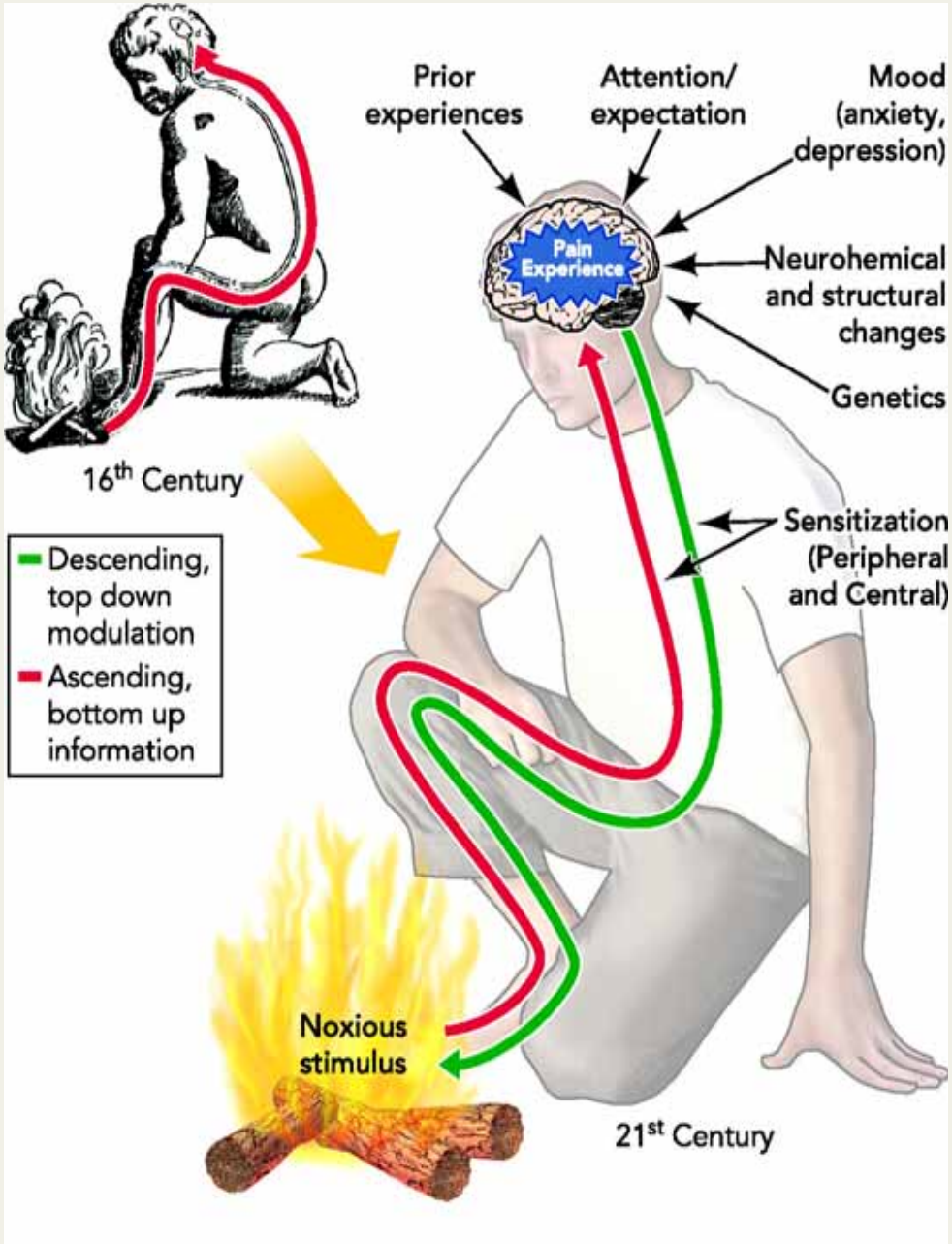
- Suitable when spinal trauma, head injury
- Ultrasound guided
- Reports of catheter use
- Risk of LA toxicity, pneumothorax
- Minimal side effects
- Probably only for anterolateral #



Regional anaesthesia – erector spinae block

- Recently described
- Potentially effective hemithorax block
- For fractures along whole of rib
- Ultrasound guided
- Catheter possible
- Minimal complications



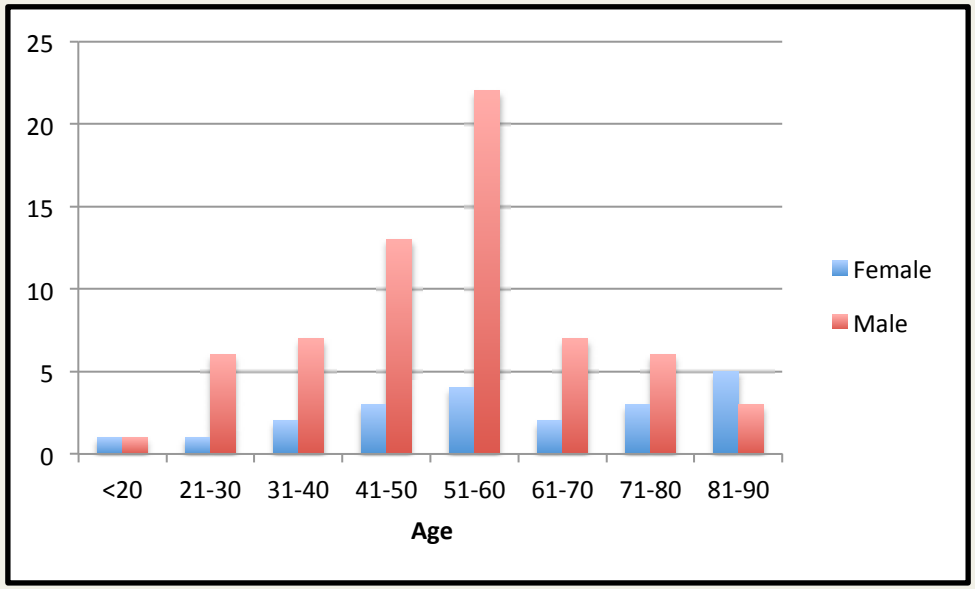

Prior experiences
Attention/ expectation
Mood (anxiety, depression)
Pain Experience
Neurohemical and structural changes
Genetics
Sensitization (Peripheral and Central)
16th Century
Descending, top down modulation
Ascending, bottom up information
Noxious stimulus
21st Century

Change the context … … ….. Change the pain

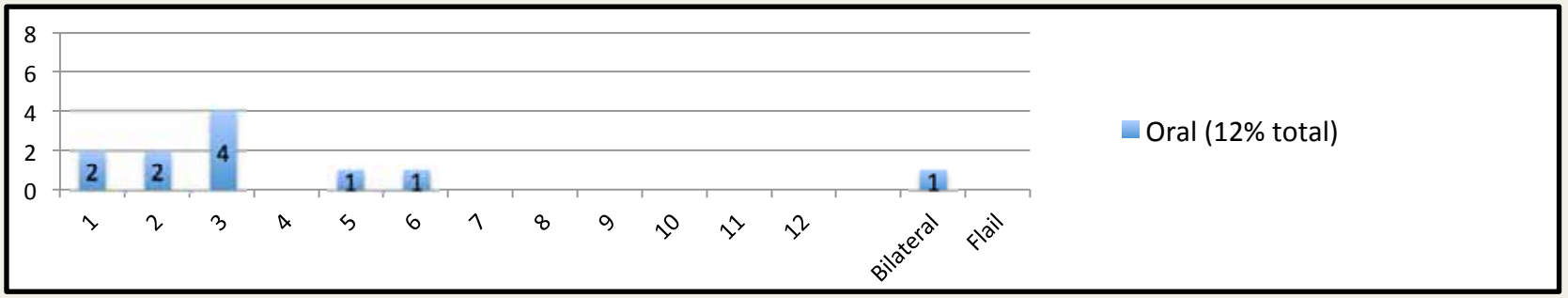
Auckland experience 2016

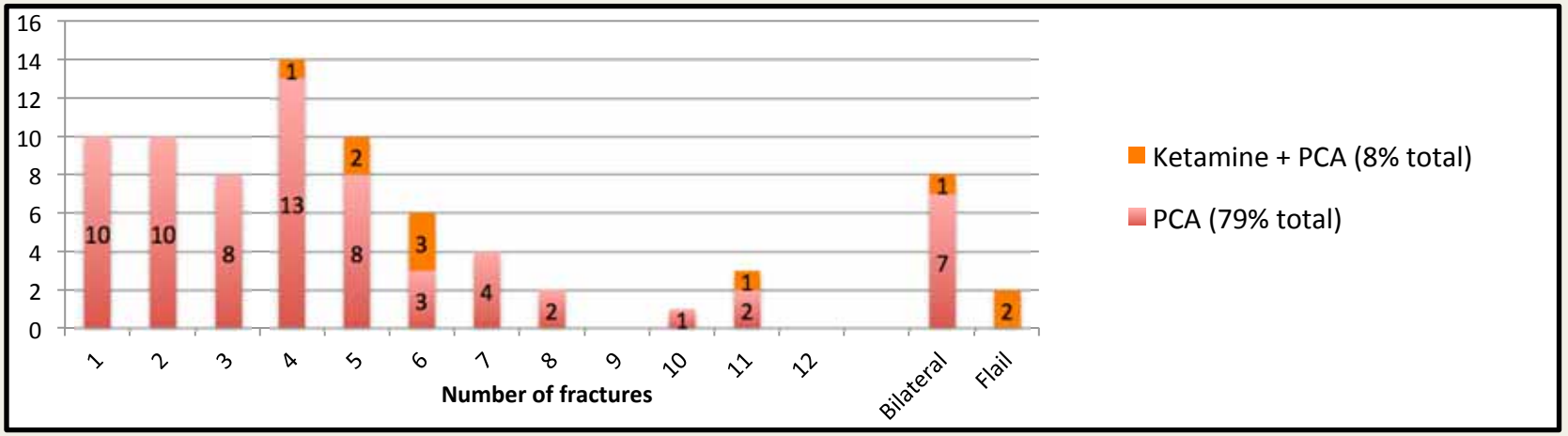
- 227 inpatients with rib fractures seen by trauma service – 172 (76%) “uncomplicated”
- 116 seen by APS – 86 (74%) “uncomplicated”

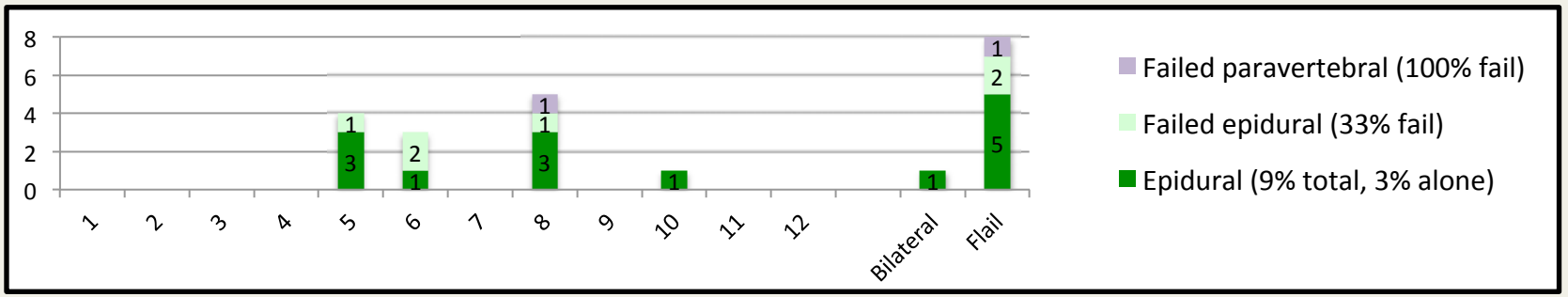
- Male – 65 (76%)
- Female – 21 (24%)



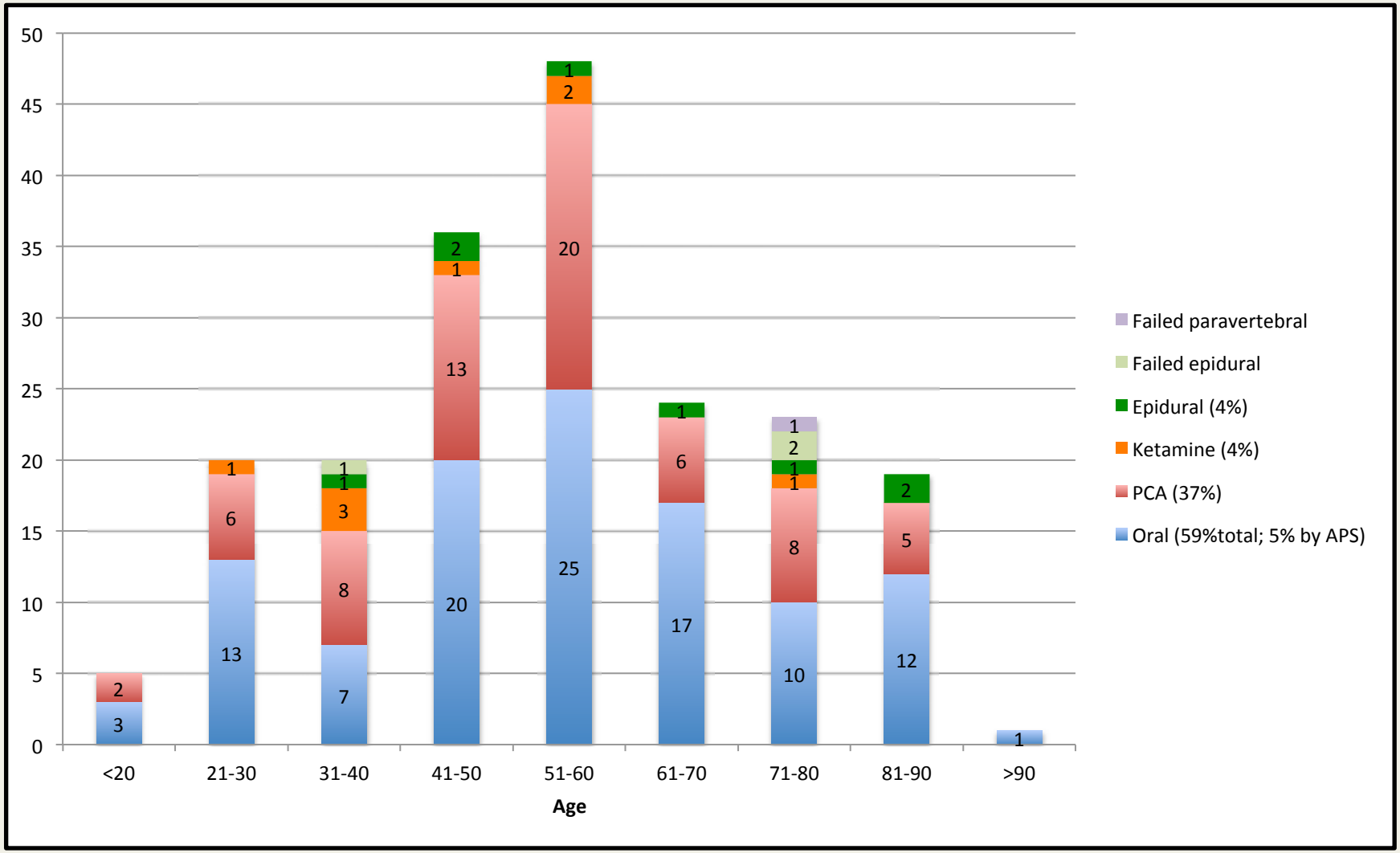
Main mode used by APS vs number of fractures

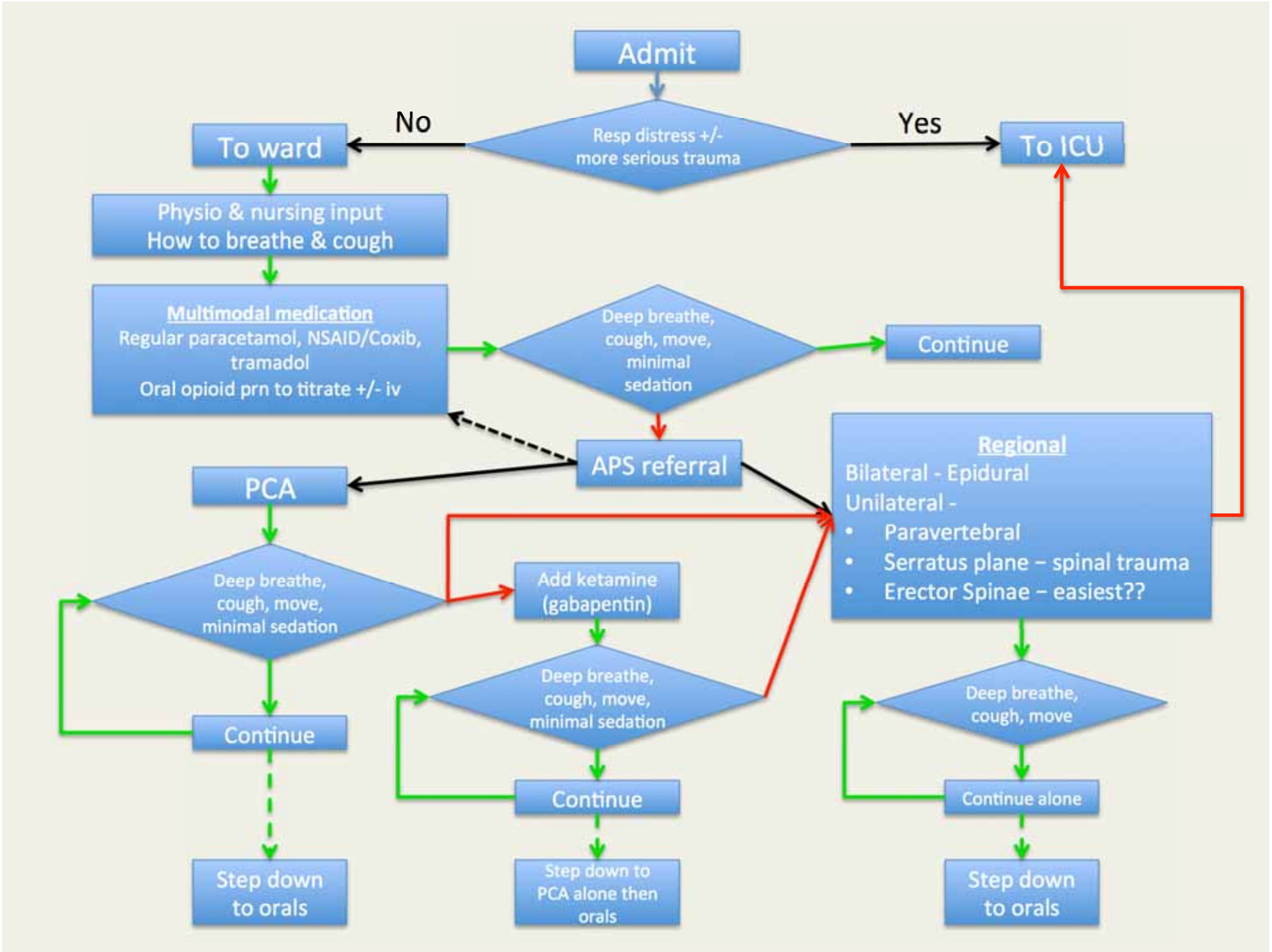


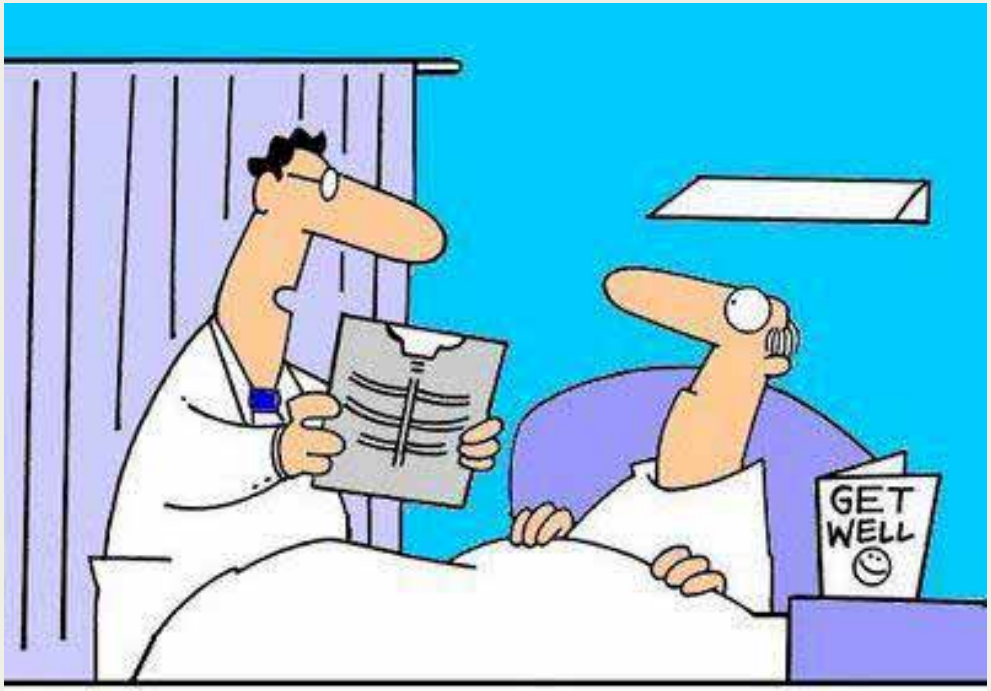




Main analgesic mode vs age




Admit
Resp distress +/- more serious trauma
No
Yes
To ward
To ICU
Physio & nursing input
How to breathe & cough
Multimodal medication
Regular paracetamol, NSAID/Coxib, tramadol
Oral opioid prn to titrate +/- iv
Deep breathe, cough, move, minimal sedation
Continue
APS referral
PCA
Regional
Bilateral - Epidural
Unilateral -
Paravertebral
Serratus plane – spinal trauma
Erector Spinae – easiest??
Deep breathe, cough, move, minimal sedation
Add ketamine (gabapentin)
Deep breathe, cough, move, minimal sedation
Deep breathe, cough, move
Continue
Continue
Continue alone
Step down to orals
Step down to PCA alone then orals
Step down to orals



"Your x-ray showed a broken rib,
but we fixed it with Photoshop."