



Pain management in major trauma

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Prevalence

- 91%
- 86% (2/3rd)
- 74%
- **62%**

- Analgesics (15%: 60-90minutes)



Challenges

- Multiple site injury
- Other things take precedence over analgesia (splinting fractures, draining pneumothoraces, CT scan)
- Multiple surgeries
- Complex pain-neuropathic component

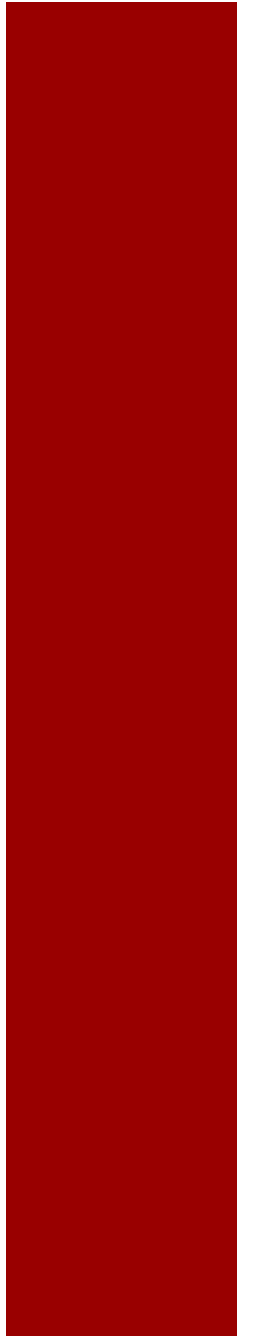


General principles in trauma pain management

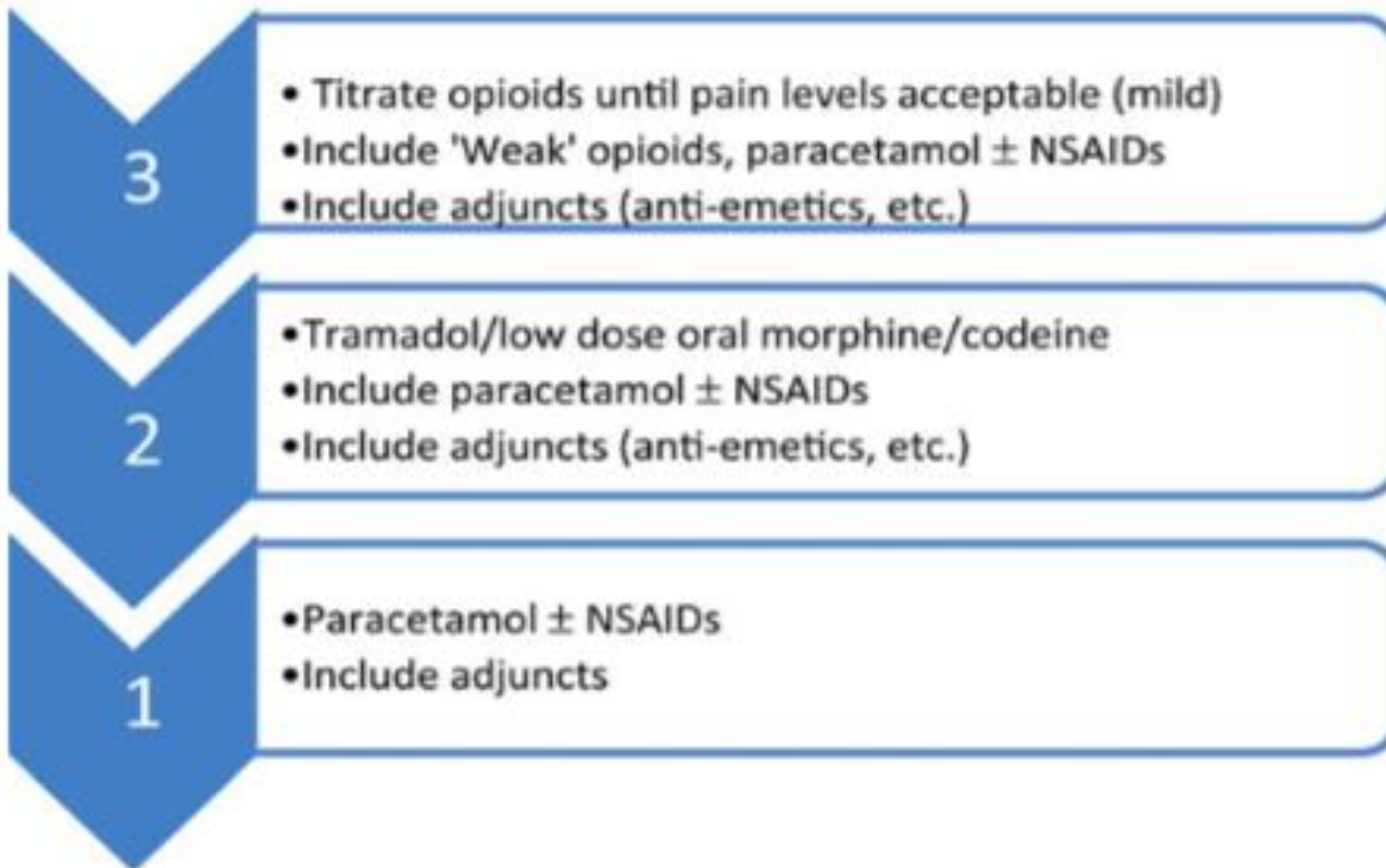


- Trauma pain: maximum at the start and then declines with intermittent increases during periods of surgery
- Multimodal therapy, multidisciplinary approach
- Poorly managed acute trauma pain leads to high incidence of chronic pain

So what's new?



Reverse pain ladder



Ketamine



- Wonder drug!
- LA/opioid/NMDA rec blocking effect
- 0.2-0.5 mgs/kg analgesic dose
- Analgesia>sedation> anaesthesia
- Dose dependent effects



Inhaled agents

Pentrox® inhaler



3 mls lasts 30 minutes
Max 6mls/day
Max 15mls/week

Innovative use of nerve blocks



A polytrauma patient coming to theatre for a femoral nail and an ORIF of forearm bones

- Femoral nerve block
- Axillary BPB



A patient for a free flap on the lower leg and tibial plating-surgical duration 6 hours

- A popliteal nerve block before and after surgery
- Continuous catheter peripheral nerve blocks



Nerve block-worries

Compartment syndrome

- High index of suspicion
- Regular compartment pressure monitoring
- Prophylactic fasciotomy



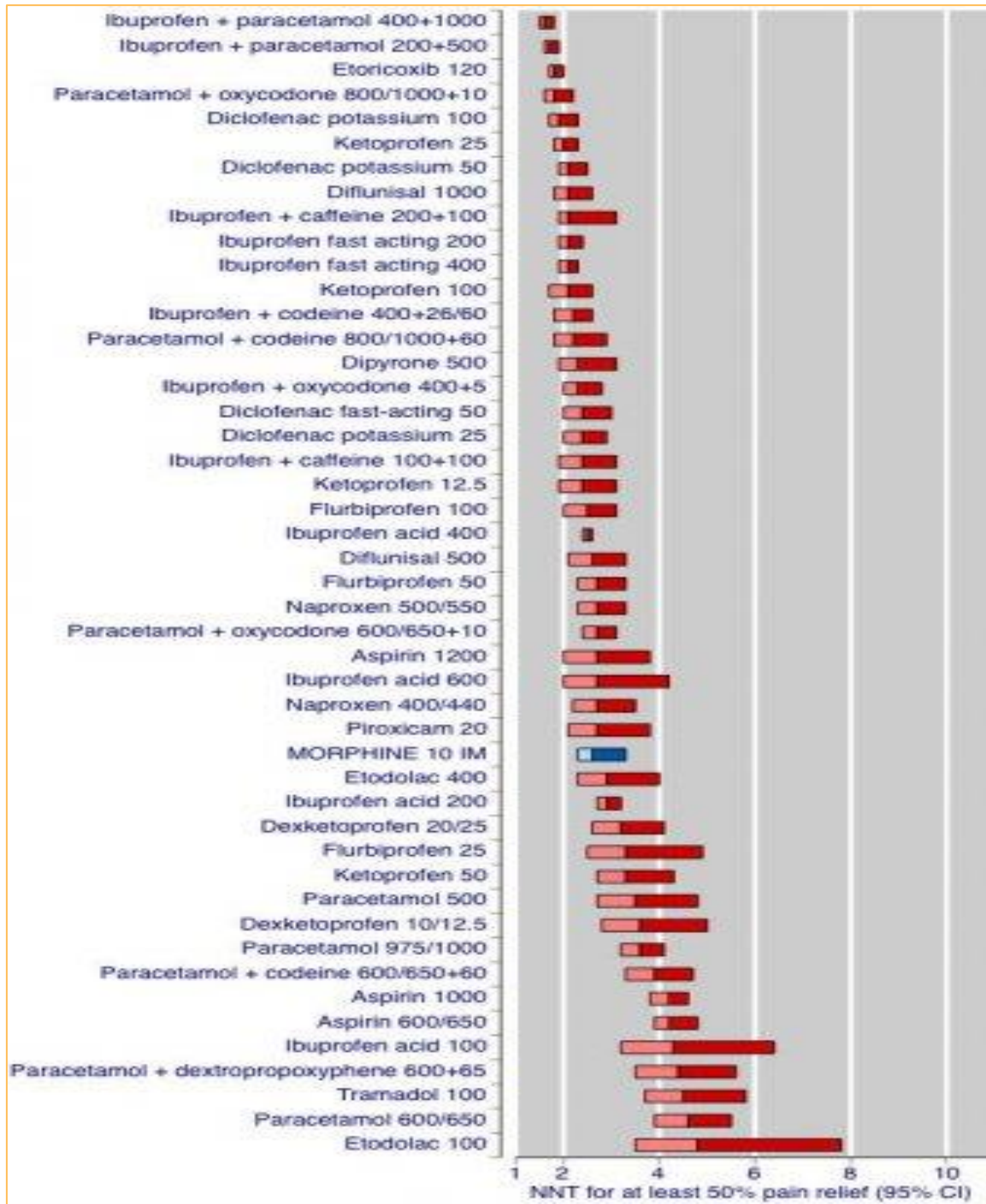
Clasper JC, Aldington DJ. Regional anaesthesia, ballistic limb trauma and acute compartment syndrome. *J R Army Med Corps* 2010; 156: 77–8

Mar GJ, Barrington MJ, McGuirk BR. Acute compartment syndrome of the lower limb and the effect of postoperative analgesia on diagnosis. *Br J Anaesth.* 2009 Jan;102(1):3-11.

Continuous LA infusions

- Catheters inserted by surgeons.
- Mostly for amputations
- An initial bolus of 0.25% bupivacaine, followed by an infusion rate of not more than 0.5mgs/kg/hour of bupivacaine.
- Will not control bone pain





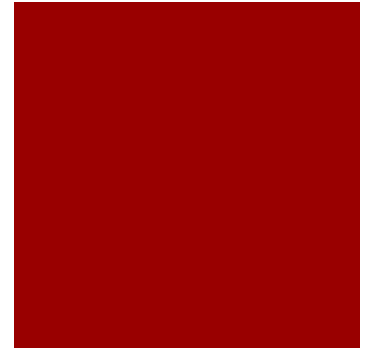
**Table 4**

Studies analyzing the effect of NSAIDs on bone healing in humans.

Study/Year	Design	NSAID used	Conclusions and recommendations
Davis and Ackroyd, 1988 [136]	Prospective double-blinded study of 100 patients with Colles' fracture	Fluriprophen (50 mg TDS)	(i) No effect on Colles' fracture.
Adolphson et al., 1993 [137]	Randomized double-blinded study on 42 postmenopausal women with colles fracture	Piroxicam	(i) No decrease of the rate of fracture healing (ii) Patients receiving piroxicam had significantly less pain (iii) No difference in the rate of functional recovery
Butcher and Marsh, 1996 [138]	Retrospective review of 94 patients with tibial fracture	Not specified	(i) Increase in the length of time to union by of 7.6 weeks ($P = 0.0003$) (16.7 weeks versus 24.3 weeks).
Wurnig et al., 1999 [139]	80 prospective patients receiving indomethacin prophylaxis for THR compared with 82 patients without	Indomethacin (Oral 50 mg BD)	(i) No effect on prosthetic loosening after cementless hip arthroplasty
Giannoudis et al., 2000 [140]	Retrospective review of 377 patients treated with IM nail	Ibuprophen and Diclofenac	(i) Increased risk for nonunion in patients receiving NSAIDs
Bhandari et al., 2003 [141]	Retrospective review of 192 tibial shaft fractures	Not specified	(i) Relative risk of 2.02 ($P = 0.035$) for patient who take NSAIDs
Burd et al., 2003 [142]	Retrospective review of 282 with acetabular fractures	Indomethacin	(i) Patients receiving indomethacin had increased risk for developing non-union
Sculean et al., 2003 [143]	Randomized blindied study on 20 patients with deep intrabony defect	Rofecoxib (25 mg/day for 14 days)	(i) No effect on the healing of intrabony periodontal defects
Bhattacharyya et al., 2005 [144]	Retrospective review of 9995 humeral shaft fractures treated nonoperatively	Not specified	(i) Exposure to nonselective NSAIDs in the period 61–90 days after a humeral shaft fracture was associated with nonunion
Meunier et al., 2009 [145]	Randomized study involving 50 patients undergoing total knee replacement	Celecoxib (200 mg BD)	(i) No differences in prosthesis migration, pain scores, range of motion, and subjective outcome were found after 2 years

Bottom line

- Probably best avoided where risk of non-union high
- Young healthy individuals, short term(3-5 days) use has shown no increased risks
- Discuss with surgeon





Opioids

- Useful for acute pain
- Better iv than oral (PCAS best)
- **Have ceiling effect** (120mgs of morphine /24 hours)
- Risk of addiction is **10%** in opioid naïve
- Be cautious and stop/plan to stop in a definite time period



Long acting opioids- cautions



- **Not first line for acute pain**
- Take **48-72 hours** to reach steady state
- Are akin to a background infusion of opioid
- Need a higher level of monitoring
- Should be reduced and stopped ASAP

Epidurals

- No longer as popular for orthopaedic surgery as before
- Limited use in acute trauma
 - Positioning
 - Coagulopathy
 - Rehabilitation
- Competencies



Lignocaine infusions

- Major traumatic injury, rib fractures, opioid dependence, chronic pain, neuropathic pain
- Analgesic, anti-hyperalgesic, anti-inflammatory, decreases central sensitisation, NMDA rec
- Bolus 1-2mg/kg followed by infusion 1 mg/kg/hr for 2-3 days
- Must be started in HDU or theatre with anaesthetist in attendance. Once stable can go to ward.
- Keep plasma conc <5mcs/ml (toxicity >6mcs/ml)
- Less pain scores, less opioid requirement, better satisfaction




Case Study

Case Study

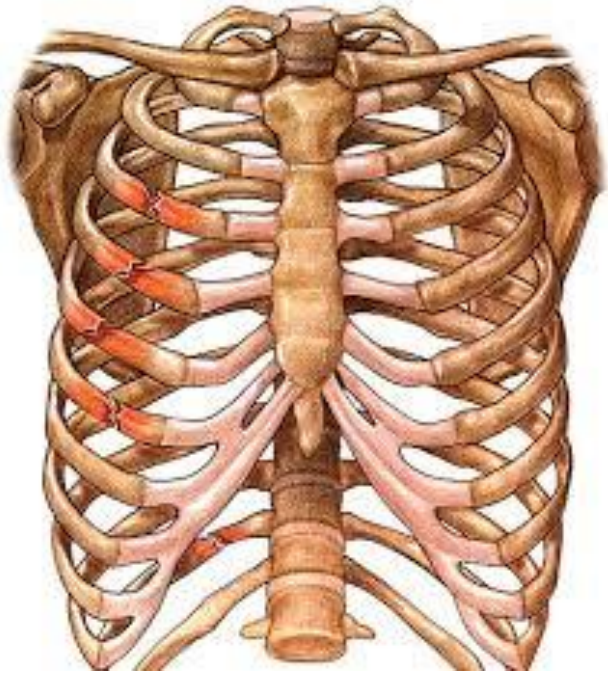


- A 45 year old man, motorcycle RTA, displaced fractured femur, pain score 10/10, haemodynamically stable. Last ate 1 hour ago. Analgesic options?

- 
- Splinting of the femur
 - Ketamine
 - Morphine
 - Entonox
 - Fascia iliaca block
 - Ketamine-morphine-fascia iliaca block-
femur splinted-PCAs-ward- surgery the next
day



	ED	THEATRE	WARD	HDU/ITU
Paracetamol	Green	Green	Green	Green
NSAIDS	Red	Green	Yellow	Yellow
Weak opioids	Yellow	Yellow	Green	Yellow
Strong opioids	Green	Green	Green	Green
Nerve blocks	Green	Green	Yellow	Yellow
LA infusions	Red	Green	Green	Green
Ketamine	Green	Green	Red	Green
Epidurals	Red	Green	Red	Green
Inhaled drugs	Green	Red	Green	Yellow



Rib Fractures



Rib Fractures

- Are painful
- Stop patients from breathing effectively and result in pulmonary atelectasis, collapse, infections, respiratory failure, death
- Prevalence of chronic pain of 22 % and disability of 53% among patients with rib fractures at 6 months



Management principles

- Ventilatory support
- Analgesia
- Surgical fixation
- Supportive treatment



Indications for ventilatory support



Absolute

- Respiratory failure requiring ventilation
- Associated severe injuries needing organ support

Relative

- Impending respiratory failure ($\text{PaO}_2 < 8\text{kpa}$, $\text{PaCO}_2 > 6.5\text{kpa}$, respiratory rate >20)
- Age >65 years with 4 or more rib fractures
- Large flail segment
- Pre-existing severe lung disease (asthma/COPD)
- Significant lung contusions

2

Emergency Department

- Paracetamol
- NSAID (if no contraindication)
- IV Morphine 0.1-0.2mg/Kg titrated

Consider early referral to Acute Pain Team:

- >65 years old
- >3 ribs fractured
- Pre-existing respiratory disease
- Flail chest
- Admitted under General medical/Elderly Care at SJUH

PAIN SCORE 0-1
ADMIT UNDER MTC

PAIN SCORE 2-3
CONSIDER STEP 1

Step 1

- Regular Paracetamol
- Regular Weak opioid eg Codeine/Tramadol
- +/- NSAID (if no contraindication)
- PRN Oral Morphine solution
- Chest physiotherapy

Pain controlled
Dynamic Pain Score 0-1

Continue established analgesia regime

UNCONTROLLED PAIN

PAIN SCORE 2-3

Step 2

- IV Morphine Patient Controlled Analgesia (PCA)
- Antiemetics

Pain controlled
Dynamic Pain Score 0-1

- IV Morphine Patient Controlled Analgesia (PCA)
- Regular Paracetamol
- +/- NSAID

UNCONTROLLED PAIN

PAIN SCORE 2-3

Step 3

- Contact Acute Pain Team
- Consider
 - Regional Anaesthesia e.g. Thoracic epidural, Paravertebral
 - Procedure in Critical Care or Acute/Trauma theatres
 - Contact Anaesthetist
 - LGI Admission to HDU

Follow-up by Acute Pain Team

Follow-up by Acute Pain Team

Acute Pain Team Contact
Mon-Fri 8am-4pm
Ext SJUH 4648, LGI 3341

Out of hours contact:
LGI Bleep 340 Clarendon,
Bleep 454 Jubilee
SJUH Bleep 5011

Dynamic Pain Score refers to pain associated with deep breathing and coughing
Pain Score 0 = None, 1 = Mild, 2 = Moderate, 3 = Severe



Surgical Rib fixation

Insertion of metal rib reinforcements to stabilise a flail chest wall: **NICE interventional procedure guidance [IPG361]**

- Evidence limited in quantity but shows efficacy
- Key benefits
 - Lower incidence of pneumonia
 - Shorter critical care stay
 - Better respiratory mechanics at 6 months
 - Higher percentage return to full time employment after 6 months



Supportive management

- Humidified oxygen
- Chest physiotherapy-early, aggressive
- Incentive spirometry
- Rib belts



Summary



- Pain management in trauma is important not only from a humanitarian point, but also aids recovery and return to full functional ability.
- Analgesia is as important as surgery
- No new wonder drugs but innovative use of available techniques
- Multimodal approach-don't flog the opioids
- Think out of the box

Thank you
Any Questions?

