

Blunt thoracic trauma with rib fractures accounts for a large proportion of trauma patients in the United Kingdom. Rib fractures are commonly associated with underlying pulmonary injury and therefore, patients with rib fractures are at an increased risk of adverse outcomes. Good analgesia is essential in all patients to reduce the risk of chest infections and morbidity.

Patients can have radiographic rib fractures or “clinical” rib fractures (significant pain with no radiologic abnormality). All patients should have an initial assessment of their level of pain and an appropriate analgesia regimen commenced

The management should aim to achieve a patient who is able to cough; move and can take deep breaths. In all patients requiring admission, regular analgesia should be prescribed.

On initial assessment respiratory co-morbidities should be considered - underlying COPD, for example, may influence threshold for regional anaesthesia. Chronic opioid use and cardiovascular disease may also influence choice of analgesic regimen.

Rib fracture pathway

1. Rib fractures confirmed
Document site and number of rib fractures along with any other findings

2. Start multimodal analgesia		
Adult patients	Adults >65 years	Renal impairment (eGFR<30)
Initial STAT IV morphine 1-10mg to achieve pain control (repeated as required)	Initial STAT IV morphine in 1-5mg to achieve pain control (repeated as required)	Initial STAT IV morphine 1-5mg to achieve pain control (repeated as required)
Paracetamol 1g PO/IV QDS (if weight <50kg IV dose at 15mg/Kg)	Paracetamol 1g PO/IV QDS (if weight <50kg IV dose at 15mg/Kg)	Paracetamol 1g PO/IV QDS (if weight <50kg IV dose at 15mg/Kg)
Ibuprofen 400mg PO TDS add PPI	Ibuprofen 400mg PO TDS add PPI if no contra-indications	Avoid NSAIDS
Oxycodone MR 5-10mg PO BD	Oxycodone MR 5-10mg PO BD	Oxycodone MR2.5mg-5mg PO BD
Oxynorm 5mg PO PRN 4 hourly	Oxynorm 2.5mg PO PRN 4 hourly	Oxynorm 2.5mg PO PRN 4 hourly
Laxatives prescribed regularly	Laxatives prescribed regularly	Laxatives prescribed regularly
Antiemetics prescribed PRN	Antiemetics prescribed PRN	Antiemetics prescribed PRN

3. Assess risk	
Rib fracture score:	
BREAKS – total number of breaks (not number of ribs effected) SIDES – unilateral = 1, bilateral = 2 AGE factor <50 = 0 51-60 = 1 61-70 = 2 71 -80 = 3 >80 = 4	$(\text{Breaks} \times \text{sides}) + \text{age factor} = \text{Rib fracture score}$
Risk factors for morbidity:	
<ul style="list-style-type: none"> • Pulmonary contusion • Current smoker • Cardiovascular disease 	<ul style="list-style-type: none"> • Frailty • Obesity • Presence of > distant injuries
Early review for HDU/MTC transfer if:	
<ul style="list-style-type: none"> • Flail chest • > 3 displaced rib fractures • > 65 years old 	<ul style="list-style-type: none"> • Chest wall deformity • CT/CXR with >25% lung volume loss • NIV/ventilator dependent

4. Commence appropriate pathway	
Rib fracture score 0-5 If score 0-5 and no other risk factors present consider if discharge with analgesia and chest injury advise is appropriate. If not follow non invasive pathway	Rib fracture score > 6 or high risk for morbidity If score >6 or other high risk factor present consider escalation to invasive pathway.

Non invasive pathway

1. Admit to appropriate ward

- Monitor oxygen saturations (SpO₂)
- Baseline VBG/ABG, repeat as required
- Assess pain severity using dynamic pain scoring, pain on movement, deep breathing and cough, minimum of 4 hourly.

2. Start respiratory support

- Encourage to sit upright and mobilise early where possible
- Provide supplemental oxygen at the lowest concentrate to achieve appropriate SpO₂
- Oxygen should be humidified where possible
- Prescribe NaCl 0.9% 10ml nebulisers 4 hourly as required to assist expectoration
- Consider prescribing Salbutamol 2.5-5mg nebulised as required



3. Confirm analgesia is prescribed and **titrate** as required

- Commence multimodal analgesia as per page 1.
- **Contact pain team** if pain remains uncontrolled.
- Consider IV PCA Morphine/Fentanyl.
- Consider Gabapentin if features of neuropathic pain present.
- Daily pain review documented

4. Commence physiotherapy on admission

- Supported cough
- Active cycle of breathing technique with huff hourly
- Upper and lower limb exercises
- Sitting in chair daily

5. Regular reassessment and titration of therapy

SpO ₂ / PaO ₂ improving/stable Oxygen needs reducing/stable Pain score improving/stable <div style="text-align: center; margin-top: 10px;">  </div>	SpO ₂ /PaO ₂ reducing Oxygen needs increasing Pain score/analgesia needs increasing <div style="text-align: center; margin-top: 10px;">  </div>
Continue regular reassessment and discharge planning	Invasive pathway

Invasive pathway

1. Admit to appropriate ward (consider HDU)

- Monitor oxygen saturations (SpO₂)
- Baseline VBG/ABG, repeat as required
- Assess pain severity using dynamic pain scoring, pain on movement, deep breathing and cough, minimum of 4 hourly.

2. Start respiratory support

- Encourage to sit upright and mobilise early where possible
- Provide supplemental oxygen at the lowest concentrate to achieve appropriate SpO₂
- Oxygen should be humidified where possible
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3. Confirm analgesia is prescribed and **titrate** as required

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5. Referral for regional anaesthesia

If contraindicated or out of hours – Consider commencing Morphine/ Fentanyl PCA if pain uncontrolled.

Absolute contraindications	Relative contraindications
Patient refusal Local or general sepsis Open wound at site of insertion	Unable to position patient Coagulopathy: INR >1.4 or platelets <80 x 10/L* Active anticoagulant therapy*

*Discuss with practitioner performing block

Document daily review of regional anaesthesia as per local protocol

6. Regular reassessment and titration of therapy

SpO2/ PaO2 improving/stable
Oxygen needs reducing/stable
Pain score improving/stable



Continue regular reassessment
Consider step down to non-invasive pathway
when appropriate
Commence discharge planning

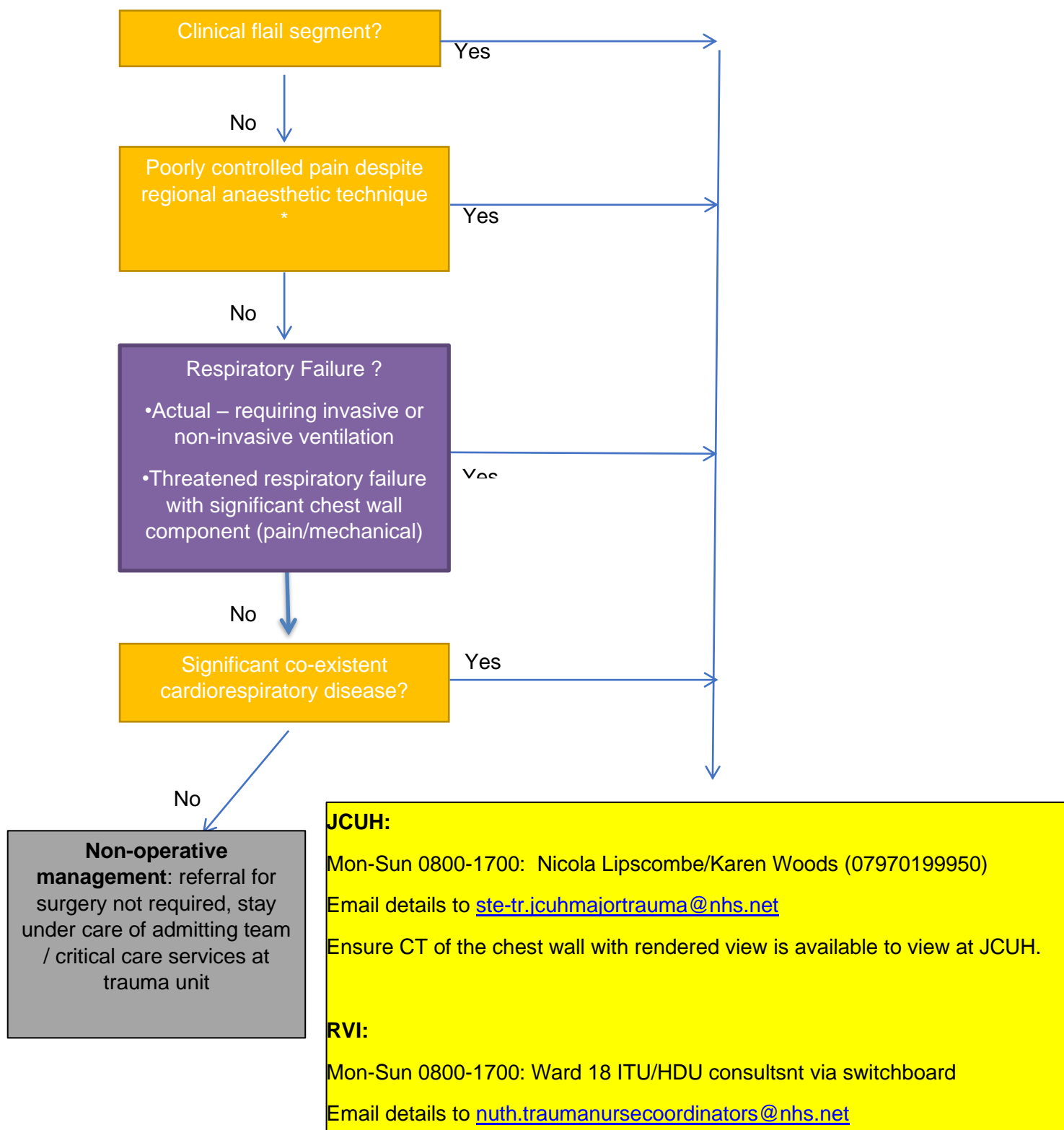
SpO2/PaO2 reducing
Oxygen needs increasing
Pain score/analgesia needs increasing



Contact Critical Care Outreach
Consider CXR/
Consider NIV/nasal high flow O2
Call for Anaesthetics review

- Consider if patient a candidate for
- Mechanical Ventilation
 - Surgical Rib Fixation (see rib fixation pathway)
 - Transfer to MTC (if at TU)

Referral algorithm for consideration of surgery in trauma patients with four or more contiguous rib fractures



* Pain

Pain control is the mainstay of management. All patients should receive early multimodal analgesia, regular pain scoring and local pain service review with a view to early regional analgesia.

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Related Information	
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