1. Introduction and Who Guideline applies to

Rib fractures have long been an underrecognised cause of avoidable morbidity and mortality – particularly if multiple, occurring in older people with frailty, or associated with cardiovascular comorbidities.

In the Emergency Department (ED), recognition of those injuries (using either chest radiography or CT-chest, as indicated), optimal initial analgesia and appropriate disposition as guided by the severity of clinical features and frailty are key.

There is growing evidence that regional nerve blocks such as the serratus anterior plane (SAP) block [1] and intravenous ketamine in adjuvant analgesic doses [2] are useful in patients who remain in significant pain despite an initial dose of intravenous opiates. There is interest within anaesthesia and emergency medicine to develop expertise in the use of those techniques.

Good care for admitted patients includes a bundle of measures including regular physiotherapy, effective pain control (using neuroaxial techniques or patient-controlled analgesia – PCA - where appropriate), critical care outreach review, nutritional support and prompt recognition and management of complications. [3]

This guideline applies to all UHL staff involved in the management of adult patients with rib fractures in any clinical setting.

2. Guideline Standards and Procedures

2.1 ED management should be undertaken using the proforma shown in Appendix A.

2.2 Patients with flail chest and those with significant rib fractures who also require specialist care for additional significant extrathoracic injuries should be transferred to the regional Major Trauma Centre (MTC) unless severe frailty as identified by a clinical frailty score of 7 or greater [4] makes local more limited care more appropriate.

2.2 Patients admitted to the Emergency Decisions Unit (EDU) should be managed as per the EDU rib fracture pathway shown in Appendix B.
The pathway is available for on-demand printing in ED.

2.3 Patients admitted to the Clinical Decisions Unit (CDU) at the Glenfield Hospital (GH) should be distributed between the Respiratory and Thoracic Surgical Team and managed as per the treatment bundle shown in Appendix C.
The dedicated GH clerking proforma for rib fracture patients should be used.

2.4 Patients admitted to LRI wards should be managed as per the rib fracture care plan shown in Appendix D. The document is available for on-demand printing in ED and copies can also be ordered from the print room.

3. Education and Training

A Standard Operating Procedure (SOP) for ED clinicians undertaking ultrasound-guided serratus anterior plane blocks is currently under development. An SAP block teaching package (slideshow), training video and dedicated face-to-face teaching sessions will be provided.

Anaesthetic trainees are expected to acquire the relevant compentencies regarding regional nerve blocks as part of their routine training, as outlined in the Royal College of Anaesthetists (RCoA) 2021 curriculum. [5]

4. Monitoring Compliance

What will be measured to monitor compliance	How will compliance be monitored	Monitoring Lead	Frequency	Reporting arrangements
Proportion of rib fracture patients leaving the ED with pain score >5	ED audit	ED audit lead	Annually	To MTGG
Proportion of rib fracture patients receiving a regional block in the ED	ED audit	ED audit lead	Annually	To MTGG
Proportion of patients assessed by therapists on Day 1 post- admission	Departmental audits in EDU / geriatric medicine and thoracic surgery	Departmental audit leads	Annually	To MTGG

5. Supporting References

1. Nair A, Diwan S. Efficacy of Ultrasound-Guided Serratus Anterior Plane Block for Managing Pain Due to Multiple Rib Fractures: A Scoping Review. Cureus. 2022;14:e21322.
2. NICE (2016) Major trauma: assessment and initial management. NG39. London: National Institute for Health and Care Excellence.
3. UnsworthA, CurtisK and AshaSE. Treatments for blunt chest trauma and their impact on patient outcomes and health service delivery. ScandJTraumaResuscEmergMed 2015;23:17
4. RockwoodK et al. A global clinical measure of fitness and frailty in elderly people. CMAJ 2005;173:489-495.
5. 2021 Curriculum learning syllabus: stage 2. Regional anaesthesia. (2021) The Royal College of Anaesthetists. Available at: https://rcoa.ac.uk/documents/2021-curriculum-learning-syllabus-stage-2/regional-anaesthesia (Accessed: 15 April 2024).

6. Key Words

Major trauma, rib, fracture, chest, physiotherapy, epidural, thoracic, PCA, frail, geriatric, flail, pneumothorax, haemothorax, regional anaesthesia, serratus anterior, erector spinae

CONTACT AND REVIEW DETAILS	
Guideline Lead (Name and Title) Martin Wiese, Emergency Physician and UHL Clinical Lead for Major Trauma	**Executive Lead** Andrew Furlong, Medical Director

Details of changes made during latest review:

- Introduction updated to include a paragraph on analgesia options
- Link to GH rib fracture clerking proforma added to Section 2.3
- Education and training section updated to include details of training plan for thoracic regional nerve blocks
- New audit standards added to Section 4
- References added for SAP block and ketamine adjuvant analgesia
- List of key words updated
- ED management proforma updated
    - Analgesia options to be considered added
    - Contact details for thoracic surgical reg added
    - Formatting refreshed
    - Details of referral mechanism to CDU (via thoracic surgical registrar) updated
- EDU pathway refreshed; links to relevant documents added and sign-off footer updated
- Specialist ward/ITU treatment bundle removed (old Appendix C)
- GH patient distribution algorithm & management bundle added (new Appendix C)
- Appendix D renamed ‘Rib fracture care plan for LRI wards’

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Appendix A. ED rib fracture management proforma.

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Developed by MF Wiese

LRI Emergency Department

Rib fracture management in adults

Version 7

For use as soon as diagnosis is clinically suspected

Not required if decision to transfer to the Major Trauma Centre (MTC) has already been made

Disclaimer:
This is a clinical template; clinicians should always use judgment when managing individual patients

Re-approved by UHL PGC on 17May24 . Trust Ref: B27/2017
Review due Jul27

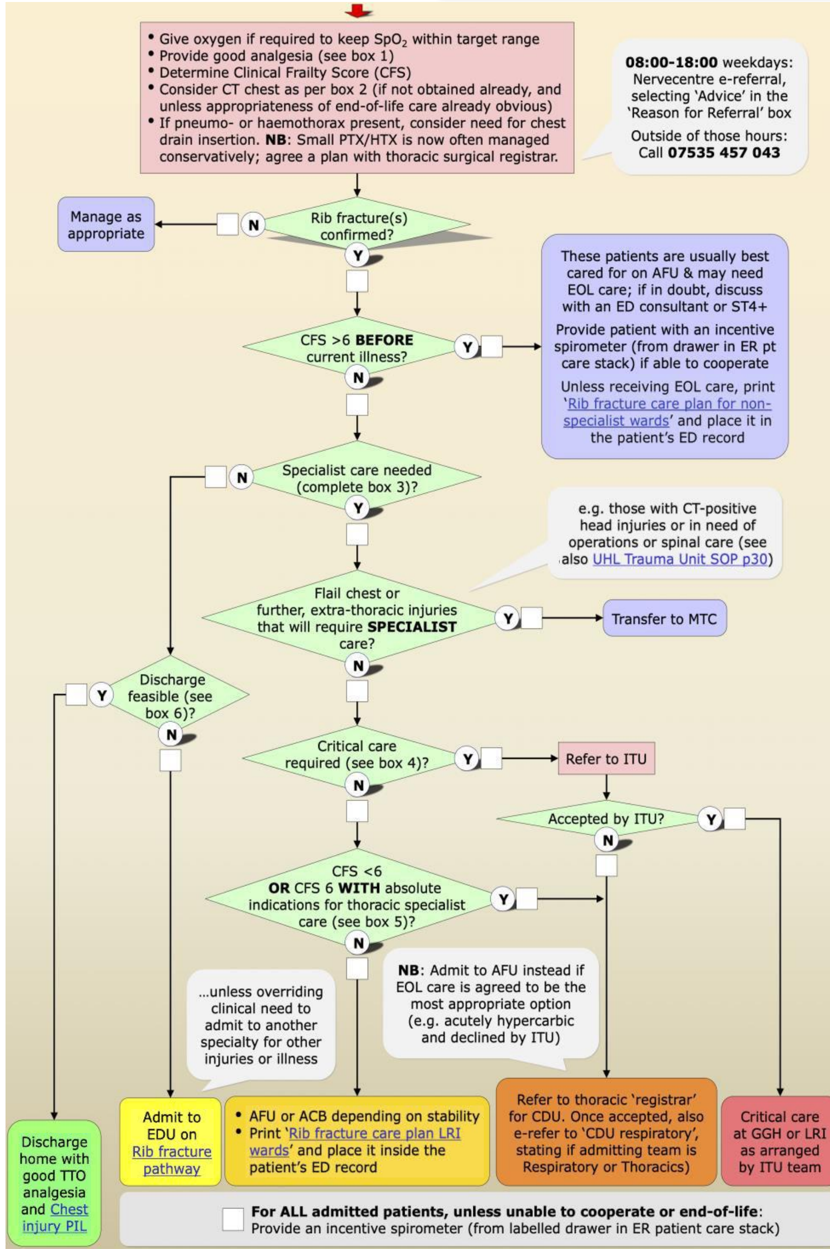
Patient details

Full name

DoB

Unit number

(use sticker if available)



Managed by

Print name | Signature | Role | Date | Time

① Analgesia bundle

- Paracetamol PO (unless taken within last 4h)
- Ibuprofen PO unless NSAID contraindicated
- Dihydrocodeine (elderly: codeine) 30mg PO
- If pain severe: Add morphine IV titrated
- **Consider** regional anaesthesia if suitable and expertise available (ED or anaesthetic team)
- **Consider** ketamine IV in adjuvant analgesic dose (up to 0.25mg/kg titrated) if pain recurs (to be given by ED consultant or registrar only)

② CT thorax indicated?

☐ **Yes**, as at least one of the below

- CT of other body regions required ☐
- Dangerous mechanism ☐
- New hypoxia ☐
- Tachypnoea ☐
- Haemodynamic instability ☐
- Multiple rib fractures on CXR ☐
- Lung contusions on CXR ☐

☐ **No**, as none of the above

③ Specialist care needed?

☐ **Yes**, as at least one of the below

- Flail chest ☐
- Bilateral rib # ☐
- Three or more rib # ☐
- Two or more rib # **AND** aged >65 ☐
- Chest drain required ☐
- Lung contusion ☐
- Persistent tachycardia ☐
- Persistent tachypnoea ☐
- Hypotension at any time ☐
- Fever ☐
- Significantly raised WCC ☐
- New oxygen requirement ☐
- Acute CO_2 retention ☐
- Chronic respiratory disease or heart failure ☐
- BMI 40 or greater ☐

☐ **No**, as none of the above

④ Critical care required?

☐ **Yes**, as at least one of the below

- Desaturating below target SpO_2 despite high-flow O_2 ☐
- Acute CO_2 retention requiring NIV or invasive ventilation ☐

☐ **No**, as none of the above

⑤ Absolute indications for thoracic surgical care?

☐ **Yes**, as at least one of the below

- Chest drain required ☐
- Pain not controlled despite optimal initial analgesia **AND**
  - **EITHER** >2 rib fractures ☐
  - **OR** aged >65 with >1 rib fracture ☐

☐ **No**, as none of the above

⑥ Discharge feasible?

☐ **YES**, as **ALL** of the below

- Age <65 ☐
- CFS <5 ☐
- Pain control adequate ☐
- Able to manage at home ☐
- No other indication for admission ☐

☐ **NO**, as not all of the above

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University Hospitals of Leicester NHS Trust

Emergency Decision Unit Pathway

Rib fracture

Date DD/MM/YY

Patient details

Full name

DoB

Unit number

(use sticker if available)

Inclusion criteria	Adults with a confirmed rib fracture who are unsuitable for immediate discharge from ED due to • Age 65 or above • Clinical frailty score (CFS) 5 or above • Pain insufficiently controlled • Unable to manage at home
Exclusion criteria	• Need for admission to a bed-holding specialty due to significant illness or additional injuries • Persistently abnormal vital signs or test results (e.g. high WCC, newly abnormal U&Es or acid-base disturbance on blood gas) • Hypotension at any time • Fever at any time • Rib fractures requiring a more high level of care (see main 'UHL rib fracture in adults guideline') • Flail chest • Three or more rib fractures (NB: if aged 65 or above: two or more rib fractures) • Chest drain in situ • Lung contusion • New oxygen requirement • Chronic respiratory disease or heart failure • BMI 40 or more

Notes to doctor completing this pathway (ED senior to ensure compliance)

- This pathway must only be used in conjunction with the ED proforma 'Rib fracture management in adults'
- If required, use it in conjunction with additional EDU pathways
- Prescribe appropriate medicines from the ED formulary; go to NC Meds > Emergency Medicine (ED)

EDU plan

- Regular analgesia (if persistent severe pain, consider oxycodone)
- RADS (OT/PT rapid assessment and discharge service) review (daily 08–18:00; call **07950 883 651**)
- Provide with Chest injury PIL on discharge

NB:

- If severe pain remains an issue, refer to thoracic surgical team – will need regional anaesthesia or PCA
- Notify COTW (out of hours: EPIC) if NEWS increasing / clinical deterioration / OT or Physio concerned
- Admit to appropriate speciality if not ready for discharge within 48h (revisit ED proforma 'Rib fracture management in adults' for guidance)

Planned & agreed by

Referring Clinician

Print name

Signature

NB: Pathway must be filled in and signed by the referring clinician and then discussed with, and 'EDU admission approved' written by, a consultant or the EPIC on Nervecentre'

Patients will NOT be accepted until this has been done

Martin Wiese . Version 10 . Part of UHL guidelines B27/2017 . Re-approved by Policy and Guideline Committee on 17May24 . Review due Jul27

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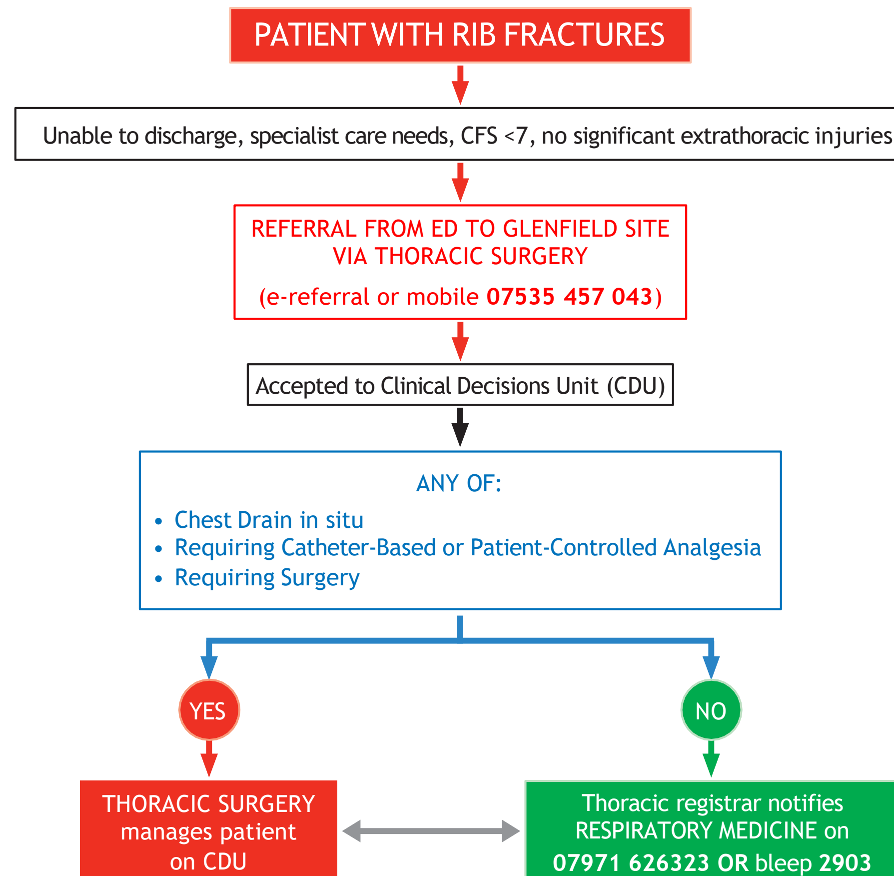
Glenfield Hospital

GH patient distribution pathway and treatment bundle



GH INPATIENT MANAGEMENT BUNDLE FOR RIB FRACTURE PATIENTS

1. Provide supplemental oxygen only to patient's target saturations
2. Ensure appropriate analgesia (paracetamol, ibuprofen, oxycodone MR+PRN) *
   - escalate to pain team OR on-call anaesthetist if inadequate pain control
3. Review regular medications, with emphasis on interrupting nephrotoxic and antithrombotic drugs
4. Discuss treatment aims, expected outcomes & ceiling of care early with patient and carers
5. Facilitate mobilisation & physiotherapy

* Review contraindications to NSAIDs when prescribing (review with pharmacist as needed):
AKI and renal impairment, peptic ulcers, severe hypertension and severe heart failure, taking anti-coagulants or anti-platelets, or concurrent corticosteroid use

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Rib Fracture Care Plan

For LRI wards

Date DD/MM/YY | Time HH:MM use 24h clock

Patient details

Full name

DoB

Unit number

(use sticker if available)

Patient's team to ensure that each section on this form is completed by the relevant clinician

	Section	Time completed	Ward doctor print name and signature	Reason not done
1	**Deliver humidified oxygen** • Maintain SpO_2 at 94-98% (88-92% if raised CO_2 on BG) • Use a controlled O_2 device if raised CO_2 on BG • Oxygen at flow rates ≥4L/min should be humidified			☐ SpO_2 in room air within range

	Section	Time drug chart completed	Ward doctor print name and signature	Reason not done
2	**Prescribe effective analgesia** • Regular paracetamol • Regular NSAID unless contraindicated • Regular Dihydrocodeine (in the elderly: codeine) • If pain severe, consider regular oxycodone • PRN IV / PO morphine for break-through pain **NB**: In patients with an eGRF <30 there is a risk of opiate toxicity due to accumulation; use tramadol instead of codeine / dihydrocodeine and oxycodone instead of morphine			

	Section	Time of first review	Pain team print name and signature	Reason not done
3	**Pain team review** Daily review by the Adult Pain Management Team Mon-Fri to optimise pain control; requires ICE referral			☐ Pain well controlled

	Section	Time of first review	Physiotherapist print name and signature	Reason not done
4	**Physiotherapy** • 1st review within 24h of admission; further input guided by assessment as per Physiotherapy Rib Fracture SOP • Aim is to maintain lung volume, prevent and treat lung collapse and consolidation, aid secretion clearance and facilitate mobilization • Eligible pts will have received incentive spirometer in ED			

	Section	Time of first review	Outreach team print name and signature	Reason not done

5	**DART review**
	• 1st review within 14h of admission
	• Criteria for escalation to ITU care (unless ceiling of care below ITU previously agreed) include
	  • SpO_2 below target despite high flow oxygen therapy
	  • Prolonged need for high flow (≥60%) oxygen therapy
	  • Acute hypercapnia
	  • Inability to speak in sentences			

	Section	Time of first review	Dietician print name and signature	Reason not done
6	**Dietician review** Within the next working day; refer via ICE			

ALL patients in whom severe pain remains an issue after 24h despite optimal systemic analgesia should be discussed with the thoracic surgical team for consideration of catheter-based regional analgesia / PCA.

Where appropriate, patients will be accepted for transfer to a thoracic surgical bed at the GGH. Please involve the LRI Senior Manager On Call (SMOC) if transfers are delayed. **NB**: Any delay in excess of 48h should be datixed.

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