Why look into this?
Rib fractures are associated with significant morbidity and mortality. Often they are under-recognized and undertreated, leading to subsequent complications such as pneumonia.

Given that the chest radiograph has been proven to be an insensitive method, low dose, unenhanced CT Thorax may help with early diagnosis and potentially change outcomes.

We trialled early CT for rib fractures at our institution over the last year and sought to answer some questions:
(1) How many scans are we doing?
(2) Who are we scanning?
(3) What are we doing about these fractures, if anything? e.g. open reduction and internal fixation, nerve blocks
(4) How long are these patients staying in hospital for?

Methods
Retrospective analysis of all emergency department (ED) CT Thorax referrals over 12 months (Aug 2017 – Aug 2018) for suspected traumatic rib fractures after minor trauma. Patients presenting with major trauma were excluded. Referral criteria as below. CT reports and electronic discharge summaries were reviewed. Binary logistic modelling was used to determine predictors of rib fracture, admission or operative fixation.

Referral protocol
Age <60
- Low impact. 1-2 ribs tender, good A/E and good inspiration – No imaging
- Low impact and unilateral reduced A/E – CXR for ?pneumothorax
Age ≥60
- Severe bruising - CT
- Tenderness over 3 more more ribs - CT
- Pain limiting inspiration - CT
- 2 or fewer rib fractures: Clinically assess if fit for discharge
- 3 more more rib fracture: Refer cardiothoracics

Results
- 373 CTs were identified: 45% were normal.
- 91% of those with fractures received conservative management.
  - Average age was 74.3 and age was a significant predictor of rib fracture (p<0.01).
  - Significant radiological predictors of admission and operative fixation were: (i) number of fractures and (ii) degree of fracture displacement (p<0.01)
  - Surgically managed patients had more fractures, displacement, flail segments, haemopneumothoraces, and longer length of stay*

Discussion
- We demonstrate a high incidence of rib fractures in mainly elderly patients presenting to ED with minor trauma. Around three-quarters required admission, likely also relating to other complex medical and social problems related to falling.
- The vast majority of rib fractures were managed conservatively, although when present, the total number and severity of displacement were the most significant radiological features associated with admission and surgical fixation.
- This study does not challenge, but instead reinforces current dogma that suspected rib fractures after minor trauma do not necessarily require urgent imaging in, or out of hours. If the purpose of CT is to image patients into the correct admission pathway or to facilitate early discharge, it would not seem wise to treat such patients empirically and aggressively with analgesia and oxygen support, the correct management over 90% of the time.
- It is patients with refractory pain, respiratory distress or those who are poor historians that should be considered for early CT. This may prove the optimum strategy in balancing clinical need and radiological service capacity.

CT THORAX FOR SUSPECTED TRAUMATIC RIB FRACTURES
1 year retrospective study of 373 scans at a major trauma centre
JP Jen1, R Geevarghese1, M Christie-Large2

Management
- Conservative 187 (91%)
- ORIF 9 (4%)
- Nerve block 11 (5%)

Pathway
- Admitted 157 (75%)
- Discharged 51 (25%)

Subgroup analysis
Conservative  Nerve Block  ORIF
Patients (n) 187  11  9
Age (average) 75.7  78.5  69.7
Rib fractures (average) 2.5  5.6  5.6
Degree of displacement (mode) Mild Moderate Moderate
Pulmonary complications 15.6%  45%  22%
Flail segment 9.6%  45%  55%
Other traumatic injuries 14.5%  45%  66%
Length of stay (days) 5.4  10.1  10.8

Pathway
- Cardiothoracics
- Medics
- ED
- Others

Pathway
- N = 373
- No fracture 166 (45%)
- Positive 207 (55%)

Pathway
- [1] University Hospitals Birmingham, Mindelsohn Way, Birmingham, B15 2TH
- [2] University Hospital Coventry and Warwickshire, Clifford Bridge Road, Coventry, CV2 2DX
- All correspondence to jianping.jen@nhs.net

*Subgroup analysis
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