Rib Fracture Management Guideline

The main goals of treatment for patients with multiple rib fractures, with or without flail segments, are pain control, support of respiratory function, and chest wall stabilization.

ICU admission recommended for **two** or more of the following, but decision for admission is based on overall clinical appearance:

- Age >65 years
- History of COPD and/or heart failure, home oxygen use, current smoker, or other significant pulmonary condition
- 4 or more rib fractures
- Flail segment (at least 3 consecutive ribs with 2 fractures)
- IS volumes <50% of predicted volume (see chart)
- Inadequate pain control

Pain Management:

- Opioids
    - Consider PCA (morphine preferred) for patients with significant pain from rib fractures (see below)
    - Otherwise, order oxycodone and fentanyl/morphine as needed for pain
- Multimodal Pain Regimen (include all as appropriate):
    - Acetaminophen 1000mg PO/IV q8h (po preferred)
    - Ketoralac 15-30mg IV q6h x 5 days or ibuprofen 600mg po q6 hours PRN (avoid if bleeding or renal dysfunction)
    - Methocarbamol 500-1000mg PO/IV q8h (po preferred; avoid IV if renal dysfunction)
    - Gabapentin 300 mg TID (requires renal dose adjustment)
    - Ketamine infusion for pain uncontrolled by usual multimodal regimen (Must be in ICU, use the PowerPlan for Analgesia & Sedation Ventilator, does not require intubation)
- PCA guidelines
    - PCA should NOT have a continuous rate or be administered with any other opioids
    - Recommended dose for morphine: 1 mg q6 minutes, max dose 10 mg/hour
    - Recommended for hydromorphone: 0.1 mg q15 minutes, max dose 0.4 mg/hr
    - Transition to an oral regimen as soon as possible
        - Determine the amount of opioid given over the previous 24 hours by PCA
        - If ≥ 40 mg morphine equivalents, start long-acting oxycodone (can't be given through a feeding tube) BID with a 50% taper. Then schedule additional oxy IR PRN.
        - Taper the long-acting oxycodone q24-48 hours. Must be stopped prior to discharge
        - If < 40 mg morphine equivalents used start PRN oxycodone using the pain management guidelines and taper as tolerated

- Erector spinae plane block may be performed at bedside or in the OR using Exparel – see dosing guideline. Pain relief lasts about 48-72 hours
- Cryotherapy may be performed in the O.R. with VATS and lasts about 2 months

Support of Respiratory Function:

- Incentive spirometry should be ordered for ALL non-intubated patients with thoracic trauma
- IS volumes < 15ml/kg (IBW) or <50% of predicted are considered poor
- Flutter valve may be added for those with poor volumes
- IS volumes should be monitored and trended to ensure prompt recognition of those with poor and/or decreasing volumes.
- High flow oxygen or BiPAP may be considered early for those requiring ICU care for rib fractures but are not effective as rescue therapies
- Use low tidal volume ventilation (≤ 6ml/kg IBW) for patients requiring intubation

Chest Wall Stabilization

- ORIF of rib fractures is recommended for:
    - Flail chest (3 or more consecutive ribs with 2 fractures)
    - Bicortical displacement of ≥ 3 ribs
- ORIF of rib fractures may also be considered for:
    - ≥ 4 rib fractures with IS <50% of predicted at 24 hours post-injury
    - ≥ 4 rib fractures with inadequate pain control
    - ≥ 4 rib fractures with probable lifestyle limitations