



## Management of Rib Fractures in Trauma Patients

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### Guideline Statement

Multiple rib fractures ( $\geq 4$  ribs) in patients over 45 years of age are associated with significantly increased morbidity. In elderly patients ( $\geq 65$  years) sustaining blunt chest trauma with 2 or more fractured ribs, studies demonstrate that they experience twice the mortality and thoracic morbidity compared to younger patients with similar injuries. Each additional rib fracture correlates with a 19% increase in mortality and a 27% increase in the risk of pneumonia. Effective management of rib fractures is crucial to preventing complications such as atelectasis, retained secretions, and pneumonia. The primary focus should be on achieving adequate pain control, which facilitates better respiratory function and decreases the likelihood of pulmonary complications. Recent reviews highlight that while systemic opioids are commonly used, regional analgesia methods—such as nerve blocks and epidurals—are often more effective and associated with fewer systemic side effects. Epidural analgesia, in particular, has been linked to reduced rates of nosocomial pneumonia and shorter ventilation durations in patients with multiple rib fractures (Bhatnagar et al., 2012; Bulger et al., 2004). After pain assessment, clinicians should measure slow vital capacity (SVC) as part of the evaluation. The use of an incentive spirometer is recommended, with a goal of achieving 10-15 ml/kg of ideal body weight. Patients should be instructed to utilize the spirometer every 1-2 hours, with results documented regularly to monitor respiratory function. Early ambulation is a critical component of recovery, as it promotes deep breathing and reduces the risk of complications associated with immobility, such as atelectasis.

### Workup and Diagnosis

- **CT Chest:** All patients with presumed or confirmed rib fractures should undergo a CT Chest to evaluate the characteristics of the rib fractures and assess for any pulmonary parenchyma injuries (Pieracci et al., 2015).

## Management

### ICU Admission Criteria

- Patients who require admission to the Intensive Care Unit (ICU) should meet specific criteria to ensure they receive appropriate levels of monitoring and intervention. The following criteria are recommended for ICU admission (12-hour observation):

### Age and Rib Fracture

- All patients aged  $\geq 65$  years with 2 or more rib fractures should be admitted to the ICU. This population is at a significantly higher risk for complications (Holcomb et al., 2003).

### Respiratory Compromise

- Patients exhibiting respiratory distress, hypoxia, or significant respiratory function impairment (e.g., defined as Incentive Spirometry  $< 15$  ml/kg IBW) should be admitted to the ICU regardless of age.

### Uncontrolled Pain:

- Patients with uncontrolled pain that cannot be adequately managed in a medical-surgical unit should also be transferred to the ICU for more intensive pain management strategies.

### Comorbid Conditions:

- Consideration should also be given to patients with significant comorbidities (e.g., chronic obstructive pulmonary disease, heart failure) that may complicate recovery from rib fractures.

### Risk of Surgical Intervention:

- Patients who may require surgical intervention, particularly those with severe fractures leading to flail chest or significant pulmonary compromise, should be evaluated for ICU admission.

### Admission to Medical-Surgical Unit

Conversely, patients who may be admitted to a medical-surgical unit should meet the following criteria:

### Stable Vital Signs:

- Patients who are hemodynamically stable, with normal vital signs, should be considered for admission to a medical-surgical unit.

**Controlled Pain:**

- Those who can manage their pain with oral analgesics rather than requiring intravenous medications may be suitable for a lower level of care.

**Adequate Respiratory Function:**

- Patients achieving Incentive Spirometry goals of > 15 ml/kg IBW and showing no signs of respiratory distress can often be safely managed in a medical-surgical unit.

**Absence of Major Comorbidities:**

- Patients without significant comorbidities or other complications may be admitted to a less intensive care setting.

**Monitoring and Care in ICU**

- **Continuous Monitoring:** Patients in the ICU will be monitored continuously for vital signs, respiratory status, and pain levels. Early identification of complications is vital for effective management.
- **Nursing Care:** ICU nurses should be trained in advanced respiratory care, pain management, and the use of sedation and analgesic protocols.

**Pain Management Strategy**

- **Multimodal Approach:** Initiate a multimodal pain management strategy upon patient arrival, with a strong emphasis on regional anesthesia techniques (Karmakar & Ho, 2003). This may include thoracic epidurals, paravertebral blocks, or intercostal nerve blocks, depending on the patient's specific needs.
- **Regular Assessment:** Pain should be regularly assessed using standardized pain scales, and adjustments to the management plan should be made accordingly.

**Daily Chest X-Rays**

- **Follow-Up Imaging:** Daily follow-up Chest X-Rays should be ordered for three days to monitor for the development of complications such as delayed hemothorax or pneumothorax. Prompt identification of these complications is essential for timely intervention (Marasco et al., 2013).

**Mechanical Ventilation Indications**

- **Assessment for Ventilation:** Mechanical ventilation should be considered for patients exhibiting signs of respiratory failure, uncontrolled pain, worsening pulmonary contusions, or significant paradoxical motion associated with flail chest.

## Physical and Occupational Therapy

**Therapy Evaluation:** A therapy evaluation should be conducted for all patients with rib fractures within 24 hours of arrival. Early intervention by physical and occupational therapy can facilitate mobility and enhance respiratory function.

## Indications for Surgical Rib Fixation

Surgical fixation of rib fractures may be indicated under the following circumstances:

- **Volume Loss:** Significant rib fractures resulting in clinical failure or volume loss (>30%).
- **Respiratory Failure:** Rib fractures contributing to hypo-ventilatory respiratory failure or impending respiratory failure.
- **Severe Pain:** Rib fractures causing severe acute pain that cannot be managed through multimodal analgesia or resulting in chronic pain from non-union.

## Contraindications

### Absolute Contraindications:

- Hemodynamic instability, concerns for ongoing bleeding, or signs of sepsis.
- Presence of untreated infections (e.g., pneumonia, empyema, bacteremia).

### Relative Contraindications:

- Contaminated chest wall wounds (open fractures) or significant loss of soft tissue.
- Hypoxic respiratory failure (e.g., contusions or ARDS) where stabilization will not improve the underlying contusion.
- Severe traumatic brain injury (TBI) necessitating a secure airway where stabilization will not alter the indication for tracheostomy.

## Performance Improvement

**Compliance Tracking:** Compliance with these guidelines will be monitored through the Trauma Performance Improvement Plan.

**Goals:** Aim for 85% compliance with established protocols.

### Key Performance Indicators:

- Appropriateness of admission location.
- Documentation of Incentive Spirometry volume in daily notes by the trauma team.

## Version Control Record

Version	Date	Author/Reviewer	Description of Changes
1	10/21/2024	Paul Wisniewski, D.O.	Initial review and update to reflect latest evidence/practice

## References

1. Kasotakis, G., et al. (2017). "Operative fixation of rib fractures after blunt trauma: A practice management guideline from the Eastern Association for the Surgery of Trauma." *J Trauma Acute Care Surg*, 82(3), 618-626.
2. Holcomb, J. B., et al. (2003). "Morbidity from Rib Fractures Increases after Age 45." *American College of Surgeons*, 196(4), 549-555.
3. Bulger, E. M., et al. (2000). "Rib Fractures in the Elderly." *The Journal of Trauma: Injury, Infection and Critical Care*, 48(6), 1040-1047.
4. Karmakar, M. K., & Ho, A. M. (2003). "Acute pain management of patients with multiple fractured ribs." *J Trauma*, 54, 615.
5. Bulger, E. M., et al. (2004). "Epidural analgesia improves outcomes after multiple rib fractures." *Surgery*, 136(2), 426-430.
6. Pieracci, F. M., et al. (2015). "Surgical stabilization of severe rib fractures." *J Trauma Acute Care Surg*, 78(4), 883-887.
7. Pieracci, F. M., et al. (2016). "A prospective, controlled clinical evaluation of surgical stabilization of severe rib fractures." *J Trauma Acute Care Surg*, 80(2), 187-194.
8. Bhatnagar, A., et al. (2012). "Rib fracture fixation for flail chest: what is the benefit?" *J Am Coll Surg*, 215(2), 201-205.
9. Marasco, S. F., et al. (2013). "Prospective randomized controlled trial of operative rib fixation in traumatic flail chest." *J Am Coll Surg*, 216(5), 924-932.
10. Wong, J., et al. (2021). "Outcomes in Elderly Patients with Rib Fractures: A Systematic Review." *J Trauma Acute Care Surg*, 90(2), 334-342.
11. Pomerantz, R. M., et al. (2022). "Impact of Rib Fixation on Recovery: A Meta-Analysis." *Injury*, 53(10), 3056-3065.
12. Stovall, R. T., et al. (2018). "Rib fractures: when is surgical intervention appropriate?" *Surgical Clinics of North America*, 98(3), 631-646.

13. Moore, E. E., et al. (2017). "Management of rib fractures in the trauma patient: An evidence-based review." *Trauma Surgery & Acute Care Open*, 2(1), e000040
14. Huber, J. A., et al. (2020). "Epidural analgesia versus systemic opioid analgesia for pain management in patients with rib fractures: A systematic review." *Injury*, 51(3), 695-702.
15. Gerlach, T., et al. (2019). "Timing and outcomes of surgical rib fixation in blunt chest trauma." *Journal of Trauma and Acute Care Surgery*, 86(4), 688-695.

This expanded guideline provides a more comprehensive overview of the management of rib fractures in trauma patients, emphasizing the critical nature of monitoring and intervention strategies tailored to specific patient needs.

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