

ACS COT Residents Trauma Papers Competition Title Page

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Title of the Abstract: Prospective Validation of the Rib Injury Management (RIM) Protocol for Traumatic Rib Fractures

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Prospective Validation of the Rib Injury Management (RIM) Protocol for Traumatic Rib Fractures

Introduction

The Rib Injury Management (RIM) protocol was developed at our institution to guide care and pain control of traumatic rib fracture patients. The RIM score is calculated based on variables that pertain to patient demographics, physical examination findings, and imaging results. The aim of our study was to evaluate patient outcomes and healthcare resources utilization following the implementation of the RIM protocol.

Methods

We performed a pre-/post-implementation study of RIM at our Level I Trauma Center from October 2017 to January 2020. We included all adult (age ≥ 18 years) blunt trauma patients with a diagnosis of at least one rib fracture on CT imaging. In the RIM group, patients were divided into three categories based on their RIM score. **(Figure 1)** Our primary outcomes were readmission for RIM-1 patients, unplanned ICU admission for RIM-2 patients, and overall ICU admission. Our secondary outcomes were pain score improvement, hospital length of stay (LOS), and mortality. Multivariate regression analysis was performed in order to account for measurable confounding factors.

Results

A total of 1107 patients were identified: 757 patients in the control group and 350 in the RIM group. Mean age was 56 ± 19 years, 792 (71.5%) were male, and median ISS was 14 [10-22]. The most common mechanism of injury was motor vehicle collision (557; 50.3%), 254 (22.9%) patients had five or more ribs fractured, and 53 (4.8%) patients had a flail chest. Compared to the control group, patients in the RIM group had better pain score improvement (3 [1-5] vs. 1 [0-4]; $p=0.040$) and shorter hospital LOS (3 [1-6] vs. 4 [1-7] days; $p=0.019$). No difference in mortality was noted (6.9% vs. 8.1%; $p=0.485$). In the RIM group, 74 patients (21.1%) were RIM-1, 123 (35.2%) RIM-2, and 153 (43.7%) RIM-3. None of the RIM-1 patients was readmitted following initial discharge, and 2 (1.6%) of the RIM-2 patients had an unplanned ICU admission (both patients had alcohol withdrawal syndrome). On multivariate analysis of outcomes, RIM

implementation was independently associated with decreased ICU admission (aOR 0.536 [0.368-0.781]; $p=0.001$) (AUROC 0.901 [0.884-0.918]).

Conclusion

The implementation of the RIM protocol was effective in guiding management of traumatic rib fracture patients and resulted in overall decreased ICU admissions, shorter hospital LOS, and better pain control.

RIM Score Calculator	
Variable	Points
Age ≥ 60 years	4
Incentive Spirometry < 750 mL	4
Severe pulmonary contusions on CT scan	2
Rib fractures ≥ 5	2
COPD, Asthma, or smoker	2
Hemothorax, Pneumothorax, or chest tube placed	2
Pain score $\geq 6/10$	1
Weak or absent cough	1

RIM Category	RIM Score	Disposition
RIM-1	≤ 2	Discharge if possible
RIM-2	3-9	Floor
RIM-3	≥ 10 or severe extra-thoracic injuries	ICU

Figure 1: RIM Score calculator and categories