National Trauma Research Action Plan (NTRAP) Investigators Group. Research priorities in chest wall injury: Secondary analysis of the National Trauma Research Action Plan

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Introduction

Chest wall injury (CWI) occurs in 10% to 15% of trauma admissions and is associated with significant short- and long-term morbidity. Despite recent advances in management, critical knowledge gaps remain. This study sought to identify consensus-based research priorities for CWI established by the National Trauma Research Action Plan (NTRAP).

Methods

This study is a secondary analysis of consensus-based research priorities collected using an online Delphi survey methodology by 11 NTRAP panels, each focused on different domains across the entire spectrum of trauma care. The database of research questions or gaps was queried for the key words “Chest Wall/Rib,” “Rib Fracture/Pain Management,” and “Rib Fracture/ Pulmonary Management.”

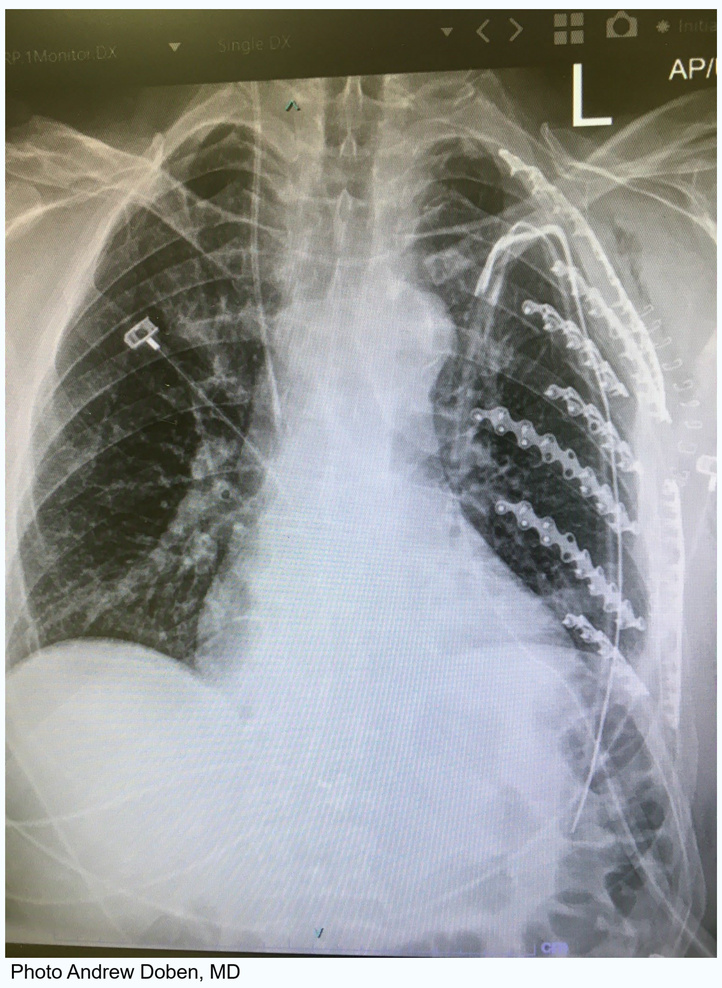


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Results

TABLE 1. The Frequency of CWI-Related Research Gaps/Priorities in NTRAP Panels

Delphi Panel	Research Gaps (n = 57)
Acute resuscitation	29
Geriatric trauma	16
Critical care	5
Trauma systems/informatics	4
Pediatric trauma	1
Orthopedic trauma	1
Long-term outcomes	1



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TABLE 3. Chest Wall Injury–Related Research Gaps by Priority Category (High or Medium) Topic, Originating Panel, and Item Rank

Topic	Delphi Panel	Research Gaps	Mean Priority Score	Question Ranking*
High priorities				
Admission Criteria (general/ICU)	Geriatric	Should patients older than 65 years with 4 or more rib fractures be admitted to the ICU? What is the impact of ICU admission on outcomes in older adult rib fracture patients (>4 ribs) in comparison with admission to the general ward?	6.6	153 of 514
Anesthesia and Rib Fracture	Geriatric	What is the efficacy of peripheral nerve blocks on opioid requirements in geriatric rib fracture patients in comparison with those who receive epidural analgesia?	7.1	44 of 514
Anesthesia and Rib Fracture	Geriatric	In older adults with multiple rib fractures, does a standard protocol for use of regional anesthesia techniques starting on the day of admission compared with use of regional anesthesia after the first day of admission reduce hospital length of stay?	6.9	61 of 514
Anesthesia and Rib Fracture	Geriatric	In older adults with multiple rib fractures, is the use of ultrasound-guided serratus anterior blocks an effective alternative for adequate pain management compared with epidural and paravertebral catheters?	6.9	76 of 514
Chest Wall/Ribs	Acute resuscitation	In adult trauma patients with multiple rib fractures, what are the optimal selection criteria for rib plating versus nonoperative management?	6.7	53 of 1,422
Chest Wall/Ribs	Acute resuscitation	What is the optimal timing for rib plating?	6.5	125 of 1,422
Ketamine	Acute resuscitation	For adults (>18 years), in the setting of multiple fractured ribs, does low-dose ketamine infusion (in combination with multimodal pain management plan) result in improved pain control and fewer pulmonary complications compared with multimodal pain management	6.7	46 of 1,422
Outcomes of Early Mobilization	Geriatric	In geriatric-trauma patients with rib fractures, does early epidural lead to early mobilization?	6.7	142 of 514
Pain Management Adjuncts	Geriatric	Should a protocolized pain regimen using acetaminophen, gabapentin, and lidocaine patches be used to improve pain control and decrease complications (e.g., decreased respiratory failure, decreased pneumonia, decreased atelectasis, decreased effusions) in older adults with rib fractures?	7.1	37 of 514
Pain Management Adjuncts	Geriatric	Does the use of scheduled low-dose ketorolac in older patients with bony fractures lead to lower daily opioid consumption compared with patients who do not receive ketorolac? Does it impact clinical bone healing at 30 days compared with patients who do not receive ketorolac?	6.9	72 of 514
Pain Protocols	Geriatric	Explore the effect of opioid-sparing alternative pain control regiments on pain scores in geriatric rib fracture patients in comparison with those who received opioid-based regimens?	7	47 of 514
Predictor of Optimal Postoperative Outcomes in Rib Fracture	Geriatric	In a geriatric population, does a geriatric-specific pain protocol for patients with two or more rib fractures (e.g., nonopioid), compared with usual approach, impact outcomes (e.g., death, disability, quality of life)?	7.4	11 of 514
Predictor of Optimal Postoperative Outcomes in Rib Fracture	Geriatric	For older patients with rib fractures identified for surgery, does early surgery (within 48 hours) versus later surgery improve survival/functional outcomes?	6.5	169 of 514
Special Populations: Long-term Outcomes after Trauma in the Elderly; Functional Recovery and Mortality	Trauma systems	What is the best pain strategy for elderly rib fractures and hip fractures?	7.0	60 of 570
Special Populations: Long-term Outcomes after Trauma in the Elderly; Functional Recovery and Mortality	Trauma systems	For patients ≥55 years with 2+ displaced rib fractures, does rib fixation vs. no rib fixation result in more discharges to home/acute rehab?	7.0	68 of 570
Medium priorities				
Axial Spine Injury	Ortho trauma	Does prehospital C spine immobilization of adult patients with a stiff neck who also have TBI or chest injuries influence the outcome in comparison with inline immobilization?	4.7	464 of 506
Blocks/Regional Anesthesia: Effects on Pain (acute/chronic, hemodynamics, inflammation)	Acute resuscitation	For patients suffering traumatic rib fractures, who benefits from regional anesthesia and what is the optimal regional anesthesia technique?	6.5	143 of 1,422

Fifty-seven CWI-related research questions were identified across seven NTRAP panels. Of these, 15 (26%) were rated as high priority and 42 (74%) as medium priority. Most CWI-related research questions appeared in the following topics: Chest Wall/Ribs (n = 22), followed by Blocks/Regional Anesthesia: Effects on Pain (acute/chronic, hemodynamics, inflammation) (n = 5)

and Special Populations: Long-term Outcomes after Trauma in Older Adults; Functional Recovery and Mortality (n = 3). Eighteen questions specifically addressed surgical rib fixation.

Conclusion

National Trauma Research Action Plan identified 57 consensus-driven research priorities in CWI. These findings should inform extramural funding efforts, focusing on studies that evaluate short-term clinical metrics, comparative effectiveness research between surgical and nonsurgical management, and the long-term impact of CWI on patient recovery and quality of life.

LEVEL OF EVIDENCE: Expert Opinion/Consensus; Level V.

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