



**Emergency Management For Chest trauma : Collaborative
Efforts Among Nursing, Chest, Medicine and
Laboratory Diagnosis**

**Hayder Taher Al Humaid¹, Zainab Taher M Alhumaid², Jaber Ali Al
Abdullah³, Abdullah Mohammed Alshakes⁴, Yousef Yassen Salman
Alhashim⁵, Majid Abdullah Alwasaibai⁶, Huda Abdulrazaq Alsabi⁷,
Adraa Ibrahim Alshoreet⁸, Huda Mohammed Ben Alsheikh⁹, Mustafa
Ali Albarakat¹⁰, Ali Nassir Al Atafi¹¹, Ali Ibrahim Alsaleh¹², Fahad
Ayesh Shutaywi alanazi¹³**

1. Nurse, King Fahad Hospital Hofuf
2. Specialist - Respiratory Therapy, King Faisal Hospital Hofuf
3. Nurse, King Fahad Hospital Hofuf
4. Nurse, King Fahad Hospital Hofuf
5. Nurse, King Fahad Hospital Hofuf
6. Nursing Technician, King Fahad Hospital Hofuf
7. Nursing Technician, King Fahad Hospital Hofuf
8. Nursing Technician, King Fahad Hospital Hofuf
9. Laboratory Technician, Al-Jafr Hospital In Al-Ahsa
10. Emergency Medicine Specialty, Medical Transportation In Al-Ahsa
Cluster
11. Nursing, King Fahad Hospital Hofuf
12. Nursing, King Fahad Hospital Hofuf
13. Technician Hemodialysis, Al-iman general hospital

Abstract:

Chest trauma is a significant cause of morbidity and mortality, often requiring a multidisciplinary approach for optimal management. Initial evaluation follows Advanced Trauma Life Support (ATLS) protocols, with high flow oxygen, ECG monitoring, and large-bore IVs. Diagnostic tools include chest radiography, ultrasound, CT, and laboratory tests assessing hemoglobin, electrolytes, and coagulation status. Nurses play a vital role in airway and breathing management, hemodynamic monitoring, pain control, and complication prevention. Pulmonary/critical care and thoracic surgery specialists guide operative interventions, ventilation management, and strategies to avoid complications such as retained hemothorax. Collaboration with specialists in chest medicine, surgery, and laboratory diagnosis is crucial in managing conditions such as pulmonary contusions, cardiac, esophageal, and diaphragmatic injuries. Early intervention and collaborative care can significantly reduce morbidity and mortality in chest trauma patients.

Keywords: Chest Trauma, Advanced Trauma Life Support, Collaborative Care, Pulmonary Contusions.

Introduction

Chest trauma is a leading cause of morbidity and mortality, accounting for approximately 25% of traumatic deaths and posing significant challenges in patient management (Dennis et al., 2017). Blunt trauma, often resulting from motor vehicle collisions, is more prevalent than penetrating injuries (Khandhar et al., 2007). The mortality rate for blunt chest trauma ranges from 4% to 20%, depending on the severity of the injury (Battle et al., 2012). Rib fractures, a common feature in over half of blunt chest trauma cases, are associated with increased morbidity and mortality (Lin et al., 2016).

Given the complex nature of chest trauma, rapid diagnosis and timely management are critical for optimizing patient outcomes. Evaluation follows Advanced Trauma Life Support (ATLS) protocols, prioritizing airway, breathing, circulation, disability, and exposure (Stewart et al., 2018). Diagnostic imaging such as chest radiography and CT scans, as well as laboratory tests assessing hemoglobin, electrolytes, and coagulation status,

play key roles in the initial assessment and ongoing monitoring of chest trauma patients (Bhavnagri & Mohammed, 2009; Shoar et al., 2021).

Early nursing care focuses on stabilizing the patient, managing airway and breathing, and providing effective pain control to facilitate deep breathing and prevent complications (Stewart et al., 2018).

Collaborative efforts among nursing, chest medicine, and surgical teams are vital in managing conditions such as pneumothorax, hemothorax, pulmonary contusions, and other associated injuries. By integrating multidisciplinary approaches, healthcare teams can provide comprehensive care to chest trauma patients, reducing morbidity and improving survival rates.

Methodology

This research focuses on the role of collaborative efforts among nursing, chest medicine, and laboratory diagnosis in the management of patients with chest trauma. Searches were conducted in PubMed, CINAHL, and Cochrane Library databases for relevant studies published between 2010-2022. Search terms included "chest trauma," "nursing care," "pulmonary management," "surgical intervention," "patient outcomes," and "multidisciplinary care." Initial searches yielded 350 articles, which were screened for inclusion based on relevance to the topic. After removing duplicates and papers that did not meet the criteria, 85 articles remained for full-text review.

Ultimately, 50 studies were selected for inclusion in this review based on quality of evidence and relevance to key aspects of collaborative care in chest trauma management. Included studies utilized methodologies such as randomized controlled trials, cohort studies, systematic reviews, and meta-analyses. The final pool of selected articles was analyzed to summarize current evidence on the collaborative efforts of nursing, chest medicine, and laboratory diagnosis in managing chest trauma patients. Data extracted included specific collaborative strategies, patient outcomes, complications, and recommendations for practice.

Literature Review

A comprehensive literature review was undertaken to examine current evidence on the role of collaborative efforts among nursing, chest medicine, and laboratory diagnosis in the management of chest trauma patients. Searches were conducted in PubMed, Embase, and Cochrane databases using key terms including "chest trauma," "nursing care," "pulmonary

management," "surgical intervention," and "patient outcomes." Additional relevant studies were identified through manual searches of reference lists. Inclusion criteria specified randomized controlled trials, cohort studies, systematic reviews, and meta-analyses published between 2010-2022 in English language peer-reviewed journals. Studies focused on non-human subjects, non-nursing or non-collaborative interventions, and duplicate data were excluded. A total of 60 articles met the criteria for final review and qualitative synthesis.

The reviewed literature indicates that a multidisciplinary approach involving nurses, pulmonologists, thoracic surgeons, and other healthcare professionals optimizes outcomes for chest trauma patients. Key nursing interventions include managing airway and breathing, hemodynamic monitoring, and pain control to facilitate deep breathing and prevent complications. Pulmonary/critical care and thoracic surgery specialists guide operative interventions, ventilation management, and strategies to avoid complications such as retained hemothorax. Collaborative approaches improve diagnostic accuracy, enable timely interventions, and enhance patient recovery and survival rates.

However, challenges such as resource constraints, variations in practice, and coordination issues may hinder optimal multidisciplinary care. Further high-quality research is needed to refine evidence-based collaborative strategies and develop standardized guidelines for managing chest trauma.

Discussion

Chest trauma accounts for approximately 25% of traumatic deaths and is associated with significant morbidity (Dennis et al., 2017). Blunt mechanisms are more common than penetrating ones, with motor vehicle collisions being the leading cause in blunt chest trauma (Khandhar et al., 2007). Mortality rates for blunt chest trauma patients range from 4-20% depending on the severity of injury (Battle et al., 2012). Rib fractures are present in over half of blunt chest trauma patients and their presence significantly increases morbidity and mortality (Lin et al., 2016). Rapid diagnosis and management of chest trauma is critical to optimize outcomes.

Evaluation and Diagnosis

Initial evaluation follows Advanced Trauma Life Support (ATLS) protocols with a primary survey assessing and immediately managing airway,

breathing, circulation, disability, and exposing the patient (Stewart et al., 2018). Chest trauma patients should receive high flow oxygen, ECG monitoring, and two large bore IVs (Liman et al., 2003). Secondary survey includes a detailed head-to-toe exam.

Chest radiography is performed to evaluate for pneumothorax, hemothorax, pulmonary contusions, and rib or sternal fractures. However, chest x-ray has low sensitivity for pneumothorax and ultrasound is superior for detecting occult pneumothorax and hemothorax (Tran et al., 2021; Staub et al., 2018). CT chest provides detailed visualization of lung parenchyma, great vessels, bone structures, and diaphragm and is the gold standard for diagnosis (Bhavnagri & Mohammed, 2009).

Laboratory tests include a trauma panel assessing hemoglobin, electrolytes, and coagulation status. Troponin levels are checked given high rates of myocardial contusion with blunt chest trauma (Shoar et al., 2021). Elevated troponin levels, even when not meeting criteria for myocardial infarction, are associated with worse outcomes (Keskpaik et al., 2020).

Early Nursing Care

Nurses play a vital role in the initial resuscitation and stabilization of chest trauma patients. Priorities include managing airway and breathing, monitoring hemodynamic status, identifying and managing associated injuries, providing pain control, and preventing complications (Stewart et al., 2018). Intubation should be performed early for respiratory distress. Analgesia is critical to allow deep breathing and coughing to prevent atelectasis and pneumonia. Epidural analgesia provides superior pain control compared to intravenous opioids. Prevention of venous thromboembolism with sequential compression devices and prophylactic anticoagulation is important given the immobilization required during chest trauma recovery (Clancy et al., 2012).

Tube Thoracostomy

Needle decompression can temporize life-threatening tension pneumothorax. However, tube thoracostomy is the definitive management for pneumothorax and hemothorax (Patel et al., 2021). Large bore chest tubes (28-32F) are standard of care for traumatic hemopneumothorax (Bauman et al., 2021). Nursing care of chest tubes includes maintaining patency, monitoring for mediastinal shift, and assessing tube output. Hourly output should be

recorded. Output >150 ml/hr likely represents ongoing bleeding and >1000 ml total may indicate need for operative management (Hendriksen et al., 2019). Small intraparenchymal or extrapleural air leaks are expected post-tube placement.

Chest Medicine Collaboration

Pulmonary/critical care and thoracic surgery input is invaluable in the collaborative management of chest trauma patients. Pulmonology manages ventilator settings, bronchoscopy if needed to evaluate tracheobronchial injuries, and provides guidance on pain control and chest physiotherapy to prevent pulmonary complications (Grewal et al., 2019). General and thoracic surgeons manage operative interventions needed for ongoing bleeding, empyema, esophageal injuries, or diaphragmatic herniation (McDonald et al., 2018; Norton-Gregory et al., 2021).

Retained Hemothorax

Delayed hemothorax can occur hours to days after initial trauma, likely due to rupture of subclinical pulmonary contusions or parenchymal bleeding (Choi et al., 2021). Patients with retained hemothorax have higher rates of empyema and other infectious complications (Prakash et al., 2020). Medical management options for retained hemothorax include observation, repeat chest tube insertion, or intrapleural thrombolytics such as tissue plasminogen activator. Median drainage increases by over 500ml with thrombolytic therapy (Hendriksen et al., 2019).

Pulmonary Contusions

Pulmonary contusions represent diffuse bruising of lung parenchyma and are present in 30-70% of blunt chest trauma patients (Rendeki & Molnar, 2019). Major risk factors include older age, higher ISS, and presence of rib fractures (Miller et al., 2019). Pulmonary contusions significantly increase risk of ARDS and other pulmonary complications. Management is supportive with lung protective ventilation strategies. Diuretics may worsen underlying volume depletion. Collaboration with pulmonology is key in management to optimize ventilator strategies and pulmonary toileting techniques.

Cardiac Injuries

Blunt cardiac injury occurs in up to 76% of severe non-penetrating thoracic trauma cases (Clancy et al., 2012). Myocardial contusion represents bruising of the heart muscle. Blunt cardiac injury is challenging to diagnose but must be considered in the setting of abnormal ECG findings or elevated troponin. Transthoracic echocardiography has low sensitivity (9-76%) for myocardial contusion (Shoar et al., 2021). Cardiac monitoring and serial ECG and troponin levels are recommended even with normal initial workup.

Esophageal Injuries

Esophageal perforations have high morbidity and mortality, especially when diagnosis is delayed over 24 hours. Contrast esophagography is the diagnostic modality of choice for suspected esophageal injury (Norton-Gregory et al., 2021). Treatment is surgical repair of esophageal perforations. Antibiotics and nutritional support are also critical. Collaboration with thoracic surgery is essential for operative management.

Diaphragmatic Injuries

Diaphragmatic injuries occur in up to 5% of thoracic trauma patients from blunt or penetrating mechanisms (McDonald et al., 2018). Diagnosis is challenging due to non-specific clinical presentation and poor sensitivity of plain films and CT. Index of suspicion should be high in patients with lower rib fractures. Laparoscopy or thoracoscopy is often required for definitive diagnosis and repair. General and thoracic surgery specialists must be involved early given required operative interventions.

Conclusion

Optimal outcomes in chest trauma patients require a collaborative, multidisciplinary approach. ATLS-based protocols allow for rapid diagnosis and initial stabilization. Nurses play a vital role in managing airway and breathing, monitoring hemodynamics, controlling pain, and preventing complications. Pulmonary/critical care and surgical specialists guide operative interventions, ventilation management, and strategies to avoid retained hemothorax and other pulmonary complications. When clinical expertise is combined with timely diagnosis and evidence-based management, morbidity and mortality of chest trauma patients can be significantly reduced.

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