Trauma Update Guidelines

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Objectives:

• Discuss the advantages of practice guidelines in caring for injured patients
• Describe the foundation for the development of clinical guidelines and the relative strength of recommendations
• Identify location of nationally recognized trauma practice guidelines
• Review recent guideline updates that will improve patient care
TRAUMA UPDATE : 2014
CLINICAL GUIDELINES

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OBJECTIVES

- Discuss advantages of clinical guidelines
- Examine process by which guidelines are developed
- Identify locations of important trauma clinical guidelines
- Review recent and important guideline updates
- Change the way you utilize trauma guidelines!

- Personal Disclosures: none
CLINICAL GUIDELINES

Also: medical guideline, clinical practice guideline, clinical protocol
Not: clinical “pathway”

- A document guiding decisions regarding diagnosis and treatment for specific healthcare problems
- Based on thorough examination of current studies (evidence-based medicine) - not tradition or authority
- Healthcare provider is obligated to be familiar with clinical guidelines in his/her professional field
- Provider then decides whether to follow guideline when managing a specific patient
PURPOSES OF GUIDELINES

- Guide decisions of healthcare professionals
- Provide rapid access to best care models - per evidence available
- Standardize medical care nationally, regionally - and even within same institution
NATIONAL GUIDELINE CLEARINGHOUSE

- A public resource to catalogue healthcare guidelines
- Maintained by Agency for Healthcare Research and Quality (AHRQ)
- Updated weekly - current
- Guideline comparison capability
GUIDELINE DEVELOPMENT

Step 1. Select topic
Step 2. Select panel - multidisciplinary
Step 3. Goals and questions
Step 4. Grade quality of scientific evidence
Step 5. Establish recommendations -- and their strength
GRADING OF EVIDENCE

Class I: prospective, randomized studies (gold standard)

Class II: prospective collection of data, with retrospective analyses (observational, case-controlled, cohort studies)

Class III: retrospective reviews, case reports, expert opinion
ESTABLISH RECOMMENDATIONS

Level 1. “convincingly justified” - based on Class I data

Level 2. “reasonably justified” - Class II, III data

Level 3. “supported by available data” - scientific evidence is lacking; Class III data, expert opinion
GRADE Methodology

Grading
Recommendations
Assessment
Development
Evaluation

1. Frame the question
2. Define the outcomes
3. Grade the evidence (A,B,C,D)
4. Make the recommendation (two strengths)
   “strong” vs. “weak”
Where Do I Find Trauma Guidelines?

- Your local institution
- Other individual trauma centers

- Eastern Association for the Surgery of Trauma (EAST)
- Western Trauma Association (WTA)

- CDC: guideline for field triage of the injured patient
- WHO: “Essential Trauma Care”
- National Guideline Clearing House
- Brain Trauma Foundation
- Am. College of Chest Physicians: VTE Rx and Prevention
TRAUMA GUIDELINES: WHERE TO FIND QUICKLY

- EAST.org: 25 Practice Management Guidelines
- Western Trauma - 12 algorithms
- Google: “trauma guideline ???”

T spine
EAST PRACTICE MANAGEMENT GUIDELINES
THORACOLUMBAR SPINAL INJURIES

- All guidelines
- Trauma

- Blunt Abdominal Trauma, Evaluation of 2002
- Blunt Aortic Injury 2000
- Blunt Cardiac Injury, Screening for 2012
- Blunt Cerebrovascular Injury 2010
- Blunt Hepatic Injury, Selective Nonoperative Management of 2012
- Blunt Splenic Injury, Selective Nonoperative Management of 2012
- Emergency Tracheal Intubation Immediately Following Traumatic Injury 2012
- Genitourinary Trauma, Diagnostic Evaluation of 2003
- Genitourinary Trauma, Management of 2004
- Geriatric Trauma, Evaluation and Management of 2012
- Geriatric Trauma, Triage of 2001
- Hemothorax and Occult Pneumothorax, Management of 2011
- Pancreatic Trauma, Diagnosis and Management of 2009
- Pelvic Fracture Hemorrhage—Update and Systematic Review 2011
- Penetrating Abdominal Trauma, Prophylactic Antibiotic Use in 2012
- Penetrating Abdominal Trauma, Selective Non-Operative Management of 2010
- Penetrating Colon Injuries, Management of 1998
- Penetrating Combined Arterial and Skeletal Extremity Trauma, Management of 2002
- Penetrating Lower Extremity Arterial Trauma, Evaluation and Management of 2012
- Penetrating Venous Extremity Trauma, Management of 2002
- Penetrating Zone II Neck Trauma 2008
- Pregnant Patient, Diagnosis and Management of Injury 2010
- *** Thoracolumbar Spinal Injuries in Blunt Trauma, Screening for 2012 ***
- Triage of the Trauma Patient 2010
Recommendations

Level 1
When imaging is deemed necessary, MDCT scans with axial collimation should be used to screen for and diagnose, as MDCT scans are superior to plain films in identifying TLS fractures.

Level 2
Patients with back pain, TLS tenderness on examination, neurologic deficits referable to the TLS, altered mental status, intoxication, distracting injuries, or suspected high-energy mechanisms should be screened for TLS injury with MDCT scan.
In blunt trauma patients with a known or suspected injury to the cervical spine, or any other region of the spine, thorough evaluation of the entire spine by MDCT scan should be strongly considered owing to a high incidence of spinal injury at multiple levels within this population.
Patients without complaints of TLS pain that have normal mental status, as well as normal neurological and physical examinations may be excluded from TLS injury by clinical examination alone, without radiographic imaging, provided that there is no suspicion of high-energy mechanism or intoxication with alcohol or drugs.

Level 3
MRI should be considered in consultation with the spine service for MDCT findings suggestive of neurologic involvement and of gross neurologic deficits.
The 2012 updated recommendations regarding the screening for thoracolumbar spinal injuries in blunt trauma patients establish that MDCT scans should be considered the standard imaging modality for the screening of TLS injuries. As stated in the previous guidelines, all blunt trauma patients with clinical symptoms, altered mental status, distracting injuries, neurologic deficits, or significant traumatic mechanisms should receive a MDCT scan to evaluate for TLS injuries. Multiple studies have also documented the phenomenon of multilevel, noncontiguous spinal fractures. This implies that a fracture identified in any region of the spine, in particular the cervical spine, is an indication for radiologic screening of the entire spine. [3][4][8][35][38-42]
Blunt Cerebrovascular Injury (BCVI) 2010

- Blunt Abdominal Trauma, Evaluation of 2002
- Blunt Aortic Injury 2000
- Blunt Cardiac Injury, Screening for 2012
- Blunt Cerebrovascular Injury 2010
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SCOPE OF THE PROBLEM

Blunt injury to the carotid or vertebral vessels (blunt cerebrovascular injury [BCVI]) is diagnosed in approximately 1 of 1,000 (0.1%) patients hospitalized for trauma in the United States unless a screening program has been initiated.[1] However, the majority of these injuries are diagnosed after the development of symptoms secondary to central nervous system ischemia, with a resultant neurologic morbidity of up to 80% and associated mortality of up to 40%. [2] When asymptomatic patients are screened for BCVI, the incidence rises to 1% of all blunt trauma patients and as high as 2.7% in patients with an Injury Severity Score $\geq 16$. [3][4] Key issues that need to be addressed in the diagnosis and management of BCVI include what population (if any) merits screening for asymptomatic injury, what screening modality is best, what is the appropriate treatment for BCVI (both symptomatic and asymptomatic), and what constitutes appropriate follow-up for these injuries.
Recommendations

Question addressed: What patients are of high enough risk, so that diagnostic evaluation should be pursued for the screening and diagnosis of BCVI?

Level I: No level I recommendations can be made.

Level II:
1. Patients presenting with any neurologic abnormality that is unexplained by a diagnosed injury should be evaluated for BCVI.
2. Blunt trauma patients presenting with epistaxis from a suspected arterial source after trauma should be evaluated for BCVI.

Level III:
1. Asymptomatic patients with significant blunt head trauma as defined below are at significantly increased risk for BCVI and screening should be considered. Risk factors are as follows:
   * Glasgow Coma Scale score ≤8;
   * Petrous bone fracture;
   * Diffuse axonal injury;
   * Cervical spine fracture particularly those with (i) fracture of C1 to C3 and (ii) fracture through the foramen transversarium;
   * Cervical spine fracture with subluxation or rotational component; and
   * Lefort II or III facial fractures
2. Pediatric trauma patients should be evaluated using the same criteria as the adult population.
Question addressed: What is the appropriate modality for the screening and diagnosis of BCVI?

Level I: No level I recommendations can be made.

Level II:
1. Diagnostic four-vessel cerebral angiography (FVCA) remains the gold standard for the diagnosis of BCVI.
2. Duplex ultrasound is not adequate for screening for BCVI.
3. Computed tomographic angiography (CTA) with a four (or less)-slice multidetector array is neither sensitive nor specific enough for screening for BCVI.

Level III:
1. Multislice (eight or greater) multidetector CTA has a similar rate of detection for BCVI when compared with historic control rates of diagnosis with FVCA and may be considered as a screening modality in place of FVCA.
Question: How should BCVI be treated? This refers to a grading scheme proposed by Biffl et al.[6]

Grading scale:
- Grade I—intimal irregularity with <25% narrowing;
- Grade II—dissection or intramural hematoma with >25% narrowing;
- Grade III—pseudoaneurysm;
- Grade IV—occlusion
- Grade V—transection with extravasation.

Level I: No level I recommendations can be made.
Level II:
1. Barring contraindications, grades I and II injuries should be treated with antithrombotic agents such as aspirin or heparin.
Level III:
1. Either heparin or antiplatelet therapy can be used with seemingly equivalent results.
2. In patients in whom anticoagulant therapy is chosen conversion to warfarin titrated to an INR = 2.0 - 3.0 for 3 months to 6 months is recommended.
3. Grade III injuries (pseudoaneurysm) rarely resolve with observation or heparinization, and invasive therapy (surgery or angiointerventional) should be considered. N.B. carotid stents placed without subsequent antiplatelet therapy have been noted to have a high rate of thrombosis in this population.[7]
4. In patients with an early neurologic deficit and an accessible carotid lesion operative or interventional repair should be considered to restore flow.
Question: For how long should antithrombotic therapy be administered?
No recommendations can be made.

Question: How should one monitor the response to therapy?
Level I: No level I recommendation can be made.
Level II:
1. Follow-up angiography is recommended in grades I to III injuries. To reduce the incidence of angiography-related complications, this should be performed 7 days postinjury.
Level III: There are no level III guidelines for this question.
Western Trauma Association Critical Decisions in Trauma: Resuscitative Thoracotomy

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WTA : Resuscitative Thoracotomy

This is a recommended management algorithm from the Western Trauma Association (WTA) addressing the performance of resuscitative thoracotomy (RT). There are no published PRCT and it is not likely that there will be; the recommendations herein are not based on Level I evidence but on the best available published prospective observational and retrospective studies, as well as expert opinion of WTA members. The algorithm (Fig. 1) and accompanying comments represent a rational approach that could be followed at trauma centers with the appropriate resources; it may not be applicable at all hospitals caring for the injured. We recognize that there will be patient, personnel, institutional, and situational factors that may warrant deviation from the recommended guideline. The annotated algorithm is intended to serve as a quick bedside reference for clinicians.
WESTERN TRAUMA ASSOCIATION

ALGORITHM - 2012

A. Patient undergoing CPR with no signs of life?**
   Yes
   No
   **CPR with signs of life or SBP < 80

B. Blunt trauma with CPR < 10 minutes or penetrating trauma with CPR < 15 minutes?***
   Yes
   No
   ***Penetrating neck or extremity trauma with CPR < 6 minutes heralds non-salvageability
   Dead

C. Profound refractory shock?**
   Yes
   No
   Standard ATLS protocol

D. Cardiac activity?
   Yes
   No

E. Tamponade?
   Yes
   No

F. Cardiac injury?
   Yes
   Repair heart
   No

G. Thoracic hemorrhage?
   Yes
   Control
   No

H. Air embolism?
   Yes
   Hilar cross-clamp
   No

I. Extrathoracic hemorrhage?
   Yes

J. SBP < 70?
   Yes

K. Viable?
   Yes
   OR
   No
   No

L. Apply aortic cross-clamp
A. At the scene, severely injured patients without electrical cardiac activity are declared dead. Patients in extremis but with electrical cardiac activity are intubated, supported with cardiac compressions, and transported rapidly to the hospital.

B. On arrival to the hospital, the time from initiation of CPR is determined directly fromprehospital personnel. Blunt trauma patients with more than 10 minutes* of CPR and penetrating trauma patients with more than 15 minutes of CPR are pronounced dead.

Patients within the time guidelines listed or those with signs of life trigger ongoing resuscitation and RT.

* For blunt trauma, however, many centers withhold RT for patients who lose VS prior to or in the ED.
WTA: Resuscitative Thoracotomy

C. On patient arrival and determination for the need of RT, the patient’s left arm should be placed above the head to provide unimpeded access to the left chest. Left anterolateral thoracotomy should be performed. A clamshell thoracotomy should be the initial incision in a hypotensive patient with a penetrating wound to the right chest. The pericardium should be opened from the apex toward the aortic root, anterior to the phrenic nerve.

Although occlusion of the thoracic aorta is typically performed after pericardotomy, this may be the first maneuver on entry into the chest for patients sustaining extrathoracic injury and associated major blood loss.
D. After performing the thoracotomy and pericardotomy, the patient’s intrinsic cardiac activity is evaluated. Patients in asystole without cardiac tamponade are declared dead. Patients with a cardiac wound or tamponade - even with associated asystole are aggressively treated.

Intracardiac injection of epinephrine may be administered into the left ventricle, using a specialized syringe, which resembles a spinal needle.

The heart is vigorously massaged to enhance coronary perfusion. After allowing time for vasopressors to circulate, the heart is defibrillated (30 J) using internal paddles.

Following several minutes of such treatment, as well as generalized resuscitation, salvageability is reassessed - which we define as the patient’s ability to generate a systolic blood pressure of greater than 70 mm Hg.

Patient is either taken to operating room or pronounced dead.
Summary: Trauma Clinical Guidelines

- Guide decisions based on evidence - “best practice”
- Standardize and improve processes and outcomes!
- Are quick and easy to access
- Trauma provider is obligated to be familiar with
- Recently-updated guidelines empower clinicians when caring for injured patients with challenging problems
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EXCELLENCE IN TRAUMA CARE
SEPTEMBER 18, 2014
THORACOLUMBAR SPINE INJURIES
EAST PMG - Continued

- **Scientific Foundation**

- **Mdct Scan: The Criterion Standard for Screening of TLS Injuries**

  In summation, the sensitivity of plain films for diagnosing all TLS fractures ranged from 22% to the best published value of 75% in comparison with 95% to 100% in MDCT scans (Table 1). Most fractures missed by plain film imaging were transverse process fractures (TPFs) and SPFs. TPFs have been associated with scoliosis in rare cases, but they do not lead to vertebral column instability and rarely impact therapeutic interventions. [25-27] Providers should recognize that it requires a high energy mechanism to fracture a transverse process. These injuries have a concomitant association with injury to the abdominal viscera, the retroperitoneum, the vertebral column, long bones, the cranium, pelvic fractures, and the genitourinary system. [24][28-30] SPFs can result in vertebral column instability in some circumstances, but most are not clinically relevant. [31][32] TPFs and SPFs can both increase morbidity secondary to pain, muscle spasm, and decreased mobility. However, the most concerning issue regarding the decreased sensitivity of plain films is the number of missed unstable fractures. The publications reviewed classified unstable fractures as those involving the vertebral bodies, namely, compression fractures, Chance fractures, and burst fractures that required either surgical intervention or some type of orthotic with follow-up from a spine service. The sensitivity of plain films in diagnosing unstable fractures ranged from 33.3% to 76.9%, and the number of missed fractures that were unstable ranged from 0% in the 2003 study of Hauser et al. to 3%, 9%, 15.7%, 16.7%, and up to 25% in the study of Ballock et al. [14-24]
• WTA: Resuscitative Thoracotomy
Scientific Foundation

- **Mdct Scan: The Criterion Standard for Screening of TIs Injuries**
- **Indications for the Screening for TIs Fractures in Blunt Trauma Patients**
- **The Role of MRI in Screening for TIs Injuries**

MRI does not currently offer any advantage over CT scans, and it is actually less sensitive with respect to identifying spinal osseous injuries. Although MRI is useful for evaluating marrow edema as in compression fractures, MDCT scan should be obtained first to evaluate for fractures. MRI is more useful to evaluate spinal cord injury, ligamentous injury, hematomas, disk involvement, and facet joint involvement.\[55\][56\] Ligamentous injury of the TLS without fracture is extremely rare, but the phenomenon does exist.\[1\][2][5][57–59\] The indication for MRI of the TLS after blunt trauma includes the evaluation of gross neurologic deficits, MDCT findings suggestive of neurologic involvement, and neurologic examination findings despite the absence of radiographic abnormalities.\[6\][8][60][61\] The thoracolumbar “burst” fracture occurs approximately 14% to 48% of the time, and a neurologic deficit is present in 65% of patients. The soft tissue components of the injury, including ligamentous disruption, are not reliably visualized with CT scans and therefore typically warrant an early MRI.\[62–65\] Several studies have demonstrated the deleterious effects of delayed intervention on neurologic outcomes and recovery.\[2–9\] Therefore, it is the recommendation of the PMG Committee that either the orthopedic or the neurosurgical spine service be consulted on patients with the previously mentioned findings before obtaining an MRI as to not delay potential emergent therapeutic interventions which could be based on physical examination findings alone or MDCT imaging.
The rationale for temporary thoracic aortic occlusion for the patient with massive hemorrhage is multifactorial.

1. Distributes blood volume to heart and brain
2. For pts. With blood loss below diaphragm, this reduces blood loss

Reassessment of the patient following intervention and aggressive resuscitation efforts is performed. Vasopressors such as epinephrine and vasopressin may be given IV or intracardiac. If the patient develops ventricular fibrillation, internal defibrillation at 30 J is performed. Salvageability is assessed; in our experience, this is defined as the patient’s ability to generate a systolic blood pressure of greater than 70 mm Hg after a period of aggressive intervention
One of the remarkable offerings of the Western Trauma Association (WTA) is the critical annotated algorithm for the management of difficult clinical problems in trauma. In this issue, the authors discuss the role of resuscitative thoracotomy (RT) in the emergency department (ED) for the trauma patient undergoing cardiopulmonary resuscitation (CPR). Carefully defining the scope of RT, they suggest the following indications: blunt trauma patients with less than 10 minutes of prehospital CPR, penetrating torso trauma patients with less than 15 minutes of CPR. Most of these recommendations are widely acknowledged.

For blunt trauma, however, many centers withhold RT for patients who lose VS prior to or in the ED. In fact, these “restrictive” guidelines are enunciated by the National Association of EMS Physicians Standards and Clinical Practice Committee as well as the American College of Surgeons’ Committee on Trauma.
THORACOLUMBAR SPINE INJURIES
EAST PMG - Continued

- Scientific Foundation

- MdCT Scan: The Standard for Screening of TL spine Injuries

- Indications for the Screening for TLs Fractures in Blunt Trauma Patients

- The Role of MRI in Screening for TLs Injuries

- Summary
SCIENTIFIC FOUNDATION

Screening and Diagnosis
Criteria for Screening/Risk factors
Screening Modality
Treatment of BCVI

FUTURE DIRECTIONS

Screening
Treatment
- WTA: Resuscitative Thoracotomy
WTA: Resuscitative Thoracotomy
- WTA: Resuscitative Thoracotomy
TLS injuries are common in blunt trauma patients. Screening for these injuries is imperative owing to the devastating impact that unrecognized fractures and resultant spinal cord injuries can have on patient outcomes. The indications to scan patients with back pain, point tenderness, neurologic deficit, altered mental status, multiple or distracting injuries, or the presence of other spinal fractures are evident and well documented. Multiple studies have also documented the phenomenon of multilevel, noncontiguous spinal fractures. This implies that a fracture identified in any region of the spine, in particular the cervical spine, is an indication for radiologic screening of the entire spine. The referenced publications do not delineate whether patients were symptomatic with regard to their TLS examination. Therefore, the true incidence of associated TLS fractures in an asymptomatic patient with perhaps an isolated cervical spine fracture is unknown. As with any scenario, clinical judgment, mechanism, and the possibility of a distracting injury must be considered.

Most blunt trauma patients at major trauma centers receive screening body scans that also evaluate for TLS fractures with MDCT technology. However, there are certainly a significant number of patients who can be excluded for injury by clinical examination. It remains the recommendation of the PMG Guideline Committee based on the reviewed literature that patients with a reliable mental status and negative clinical examination result can be excluded by physical examination without the need for MDCT imaging. However, if a high-energy mechanism is confirmed or suspected, the patient should be screened for TLS injuries via MDCT scan or transferred to a trauma center with MDCT scan capabilities.
BCVI - EAST PMG: SUMMARY

SCIENTIFIC FOUNDATION

Screening and Diagnosis
Criteria for Screening/Risk factors
Screening Modality
Treatment of BCVI

FUTURE DIRECTIONS

Screening
Treatment