TRAUMA SERVICES MANUAL
2013

UNIVERSITY OF TEXAS MEDICAL BRANCH
GALVESTON, TEXAS
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1. To always be aware that suddenly and unexpectedly we may find ourselves in a role where our performance has ultimate consequences.

2. To instill within ourselves these qualities essential to professional excellence.

   **Discipline**…There being no substitute for total preparation and complete dedication, for there is no margin to be careless or indifferent.

   **Confidence**…Believing in ourselves as well as others, knowing that we must master fear and hesitation before we can succeed.

   **Responsibility**…Realizing that it cannot be shifted to others, for it belongs to each of us; we must answer for what we do, or fail to do.

   **Toughness**…Taking a stand when we must; to try again, and again, if it means following a more difficult path.

   **Teamwork**…Respecting and utilizing the abilities of others, realizing that we work toward a common goal, for success depends upon the efforts of all.

3. To recognize that the greatest error is not to have tried and failed, but that in the trying we do not give it our best effort.

* Adapted from the Foundation of Mission Operations NASA.
INTRODUCTION

The management of patients who are injured is best accomplished by a dedicated multidisciplinary team of personnel. To ensure a coordinated approach, the Trauma Team Leader must be clearly identified, and the members of the Trauma Team must have predetermined tasks and roles to avoid confusion and loss of time.

Because particular elements of the initial assessment and resuscitation should be undertaken for all seriously injured patients, a limited number of guidelines and standing orders are necessary to ensure that essential aspects are not overlooked or delayed. This standardization of routine serves to enhance education, performance proficiency, and Quality assurance, and to reduce iatrogenic complications.

This manual is intended as a guideline for those involved in providing care for trauma patients treated at The University of Texas Medical Branch at Galveston. The manual describes the structure of the Trauma Team and guidelines for the management of trauma patients.
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SERVICE ORGANIZATION GUIDELINES

Composition and Function of the Trauma Service
The Trauma Service will be responsible for coordinating the care of all injured patients treated at UTMB. From 07:00 to 17:30 hours Monday through Friday, the Trauma Service will be the team responding to all Trauma Team Activations, and will also respond to Emergency Department General Surgical emergencies. The night float team will assume these duties during the evening hours Sunday through Thursday. Weekend coverage is shared with the General Surgical Services on a rotating basis. To ensure continuity, daily care and disposition will be coordinated by the residents, midlevel practitioners and nurses on the Trauma Service. The faculty surgeon on call when a patient is admitted may remain involved in any case at their discretion, or transfer the responsibility to the faculty on the Trauma Service.

A coordinated and rapid response, along with a high index of suspicion, are essential to provide optimum care for the injured patient. To facilitate these things, the Trauma Team members and their respective roles are clearly described below, and the guidelines for Trauma Team Activation are set forth.

The Trauma Team will consist of the following individuals:
1. Trauma Team Attending Surgeon
2. Emergency Medicine Attending Physician
3. Trauma Service PGY-5/4
4. Trauma Service PGY-3/2
5. Trauma Service PGY-1
6. Trauma Midlevel Practitioner
7. Emergency Department Nurse
8. Trauma Service Medical Student (when available)
9. Rotating Residents from Other Services

The resuscitation should be organized by the Trauma Team prior to the patient arrival, if possible. Each participant should review his/her duties so that the team functions efficiently after patient arrival. The resuscitation is organized by the most senior Trauma Team physician present which will usually be the PGY-5/4, or Attending Surgeon. The Trauma Team Attending Surgeon will have the ultimate responsibility for the care of the multiply-injured patient.
Universal Precautions

All Trauma Team personnel are expected to abide by the Exposure Control Plan which states that “barrier precautions be used when contact with any potentially infectious body fluid, tissue or organ is anticipated”. Universal Precautions does not rely on a diagnosis of infection to be made before precautions are instituted. Assume all blood, body fluids and tissues are potentially infectious, and take appropriate measures to safely handle these body substances. You should be prepared to don protective gear on short notice. This gear includes gloves, gowns, masks, goggles, surgical caps and/or shoe covers. Please refer to policy 01.32 entitled Exposure Control Plan under the Healthcare Epidemiology Policies and Procedures section located on the UTMB website. Follow the link below to view the policy.

http://www.utmb.edu/policies_and_procedures/Non-IHOP/Healthcare_Epidemiology/01.32-%20Exposure%20Control%20Plan.pdf

Hand hygiene must be practiced before and after each patient contact to prevent the transmission of microorganisms from patient to patient and from inanimate surfaces to patients. Review the policy 01.14 on Hand Hygiene for all Healthcare Workers. Follow the link below to become familiar with the policy.

http://www.utmb.edu/policies_and_procedures/Non-IHOP/Healthcare_Epidemiology/01.14-%20Hand%20Hygiene%20for%20all%20HCWs.pdf

Patient Registration

As trauma patients arrive to the Emergency Department, it is imperative that they be registered in a timely manner. Registration of a trauma patient must be done within the first five minutes of the patient’s arrival to the ER. If you are unable to identify the patient, assign an alias name according to the alias book located at the ambulance desk. The minimum requirement to identify a patient includes name and date of birth. Once the patient has been registered, provide 12 sheets of labels for each trauma patient. In the event EPIC is down, downtime packets are available through ER Registration and contain all paper documents required during the initial trauma work-up.

In the event of a disaster, disaster packets have been created and are available for immediate use. Each packet contains all paper documentation forms pre-stamped with a HAR number. Use of the disaster packets should be limited to actual disasters and not everyday use.
The evaluation of a trauma patient is a dynamic process. Changes in the patients’ condition should be released to the entire team. Below are identified roles of each team member.

**The Trauma Team Leader is the Attending Surgeon or Trauma Team PGY 5/4.** Their responsibilities include:

1. Setting priorities
2. Running the resuscitation and coordinating all team activities
3. Notification to dispatch to upgrade a patient status to a “**Trauma STAT**”
4. Controlling people in the room
5. Consulting other services
6. Decision to go to the Operating Room
7. Notification of the Operating Room Nursing Staff (ext. 75010) and Anesthesia at 747-5003 if necessary
8. Supervising and coordinating invasive procedures
9. Performing ED-thoracotomy, when necessary
10. Ordering blood products

The **Emergency Medicine Attending Physician** will have the following responsibilities:

1. Supervising the resuscitation prior to arrival of the Trauma Team Attending Surgeon
2. Coordinating with the Trauma Team Leader and the Charge Nurse, the management of multiple resuscitations and determining the need for additional resources
3. Coordinating communications and mobilization of hospital resources

The **Trauma Team PGY 3/2** will have the following responsibilities:

1. Performing primary survey including assessment of airway and breathing and communicating the findings to the Trauma Team and Trauma Nurse Recorder
2. Coordinating fluid management
3. Ordering ACLS drugs
4. Completing secondary survey, ordering radiographs, and laboratory studies
5. Placement of thoracostomy tubes
6. Performing DPL and other procedures with supervision
7. Notify PGY-5/4 of changes in the patients’ status

The **Trauma Team PGY 1/Trauma Midlevel Practitioner** will have the following responsibilities:

1. Completing EPIC documentation of patient evaluation
2. Assisting with venous access, performing cutdowns with supervision
3. Transport and monitoring of the patient
4. Insert urinary catheter and NGT unless contraindicated
5. Obtain femoral blood samples and ABG’s
6. Ordering radiographs

The **Trauma Team Medical Student** may share the following responsibilities:

1. Inserting urinary catheter and NGT unless contraindicated
2. Assisting with transport and monitoring of the patient
3. Assisting with obtaining IV access
4. Assisting with CPR as necessary
The **Trauma Nurse Recorder** will:

1. Document in EPIC in the Trauma Narrator the pre-hospital provider report, the primary and secondary survey from the Trauma Team Physician, all vital signs, orders, procedures, lab results, medications, and patient responses to interventions
2. Record pre-hospital report including PTA VS/GCS
3. Obtain pre-hospital run record and assure it is included with the admission papers
4. Pass medications to the Trauma Resuscitation Nurse
5. Remain with the patient at all times throughout evaluation, transportation, radiologic studies, admission to units or the operating room
6. **Assure the blood tube has been sent to the blood bank**
7. Assure signing of all permits
8. Communicates all necessary information to ancillary personnel (chaplain, Social Services, Registration, etc.)
9. Assist the Trauma Resuscitation Nurse as requested
10. Be responsible at the end of the resuscitation to assure all documentation is complete.
11. Notification to dispatch to upgrade a patient status to a “**Trauma STAT**”

The **Trauma Resuscitation Nurse** will:

1. Assume direct patient care responsibilities
2. Obtain a full set of vital signs including TEMP, GCS and pain score and communicate to the Trauma Nurse Recorder
3. Help to obtain blood samples and IV access
4. Assure IV is setup and running according to the physician order and hang subsequent IV fluids as needed
5. Remove clothing and give valuables to the Trauma Nurse Recorder for inventory
6. Give meds and administer blood as ordered
7. Assist with insertion of central lines, cut downs, DPL and other procedures
8. Assure pleurevacs are set up
9. Insert urinary catheter or NGT
10. Communicate with Trauma Nurse Recorder ALL procedures performed and the patients’ response to interventions
11. Set up and use of Level I warmer and assign all other duties to a third RN

The **Trauma Emergency Technician** will:

1. Place the patient on the cardiac monitor
2. Assure availability of scissors to remove clothing
3. Perform CPR as necessary
4. **Transport blood sample to the blood bank**
5. Apply direct pressure as needed
6. Assist with restraints as requested by Trauma RN
7. Assist with any other duties as requested by Trauma Resuscitation Nurse or Trauma Nurse Recorder
8. Assure that all lab work is sent
Trauma Roles and Locations

Senior Resident (PGY 4/5)
- Airway control
- Team leader
- Direct interventional procedures

Junior Resident (PGY 2/3)
- Primary survey
- Advanced vascular access
- Care coordination
- Secondary survey
- Performs advanced procedures
- Expedite transport

Respiratory Therapist
- Assists with airway control
- Sets up ventilator
- Ensures adequate airway monitoring

Intern (PGY 1)
- Order films as directed
- Document as directed
- Assist with procedures as directed
- Organize transport

Resuscitation Nurse
- Report initial vital signs and temperature
- Venous access
- Draw blood
- Give medications
- Assist with procedures
- Communicate assessment to Recording Nurse

Medical Student (1, 2, 3, etc)
- Remove patient’s clothing
- Obtain warm blankets and cover patient as appropriate
- Place Foley/NGT as directed by chief resident
- Assist with obtaining supplies
- Assist with all procedures
- Inform CT of presence and clear for logistics of transfer
- Assist with transport

Recording Nurse
- Prepare trauma bay
- Expedite and record vitals and assessment
- Document all procedures
- Travel with patient to radiology
- Notify dispatch of trauma upgrade
- Assist resuscitation nurse

Chief Resident (PGY 4/5)
- Ensure quality of team leadership and adherence to direction
- Expedite interventional procedures

Trauma Emergency Technician
- Place patient on cardiac monitor
- Deliver samples to lab
- Deliver blood from blood bank
- Assist resuscitation nurse

Radiology Technician
- Films as needed

Trauma Faculty
- Ensure quality of care
- Expedite care
- Activate massive transfusion protocol as appropriate
MECHANISM OF INJURY – All of the following injuries that occurred within the last 24 hours

- Motorcycle crash > 20 mph
- Auto-Pedestrian > 5 mph
- Fall > 20 feet
- Motor vehicle crash that includes:
  - Ejection from the vehicle
  - Death of occupant in the same passenger compartments
  - Extrication > 20 minutes
  - Vehicle roll over
  - Speed ≥ 40 mph
- Water craft injuries > 5 mph and impact with solid object
- Hanging
- Significant crush injury
- Combination of Trauma and Burns
- Snake Bite
- Animal Bite (excludes insect bites)

Pediatrics (defined as 16 years or under) – all of the above PLUS:

- Pediatric falls > 10 feet
- Pediatric Auto-bicycle injuries

Age >65

- Motor vehicle crash ≥ 20 mph
- Fall > 5 feet or with obvious fractures (excludes syncope, found down and fall from standing)

ANATOMIC INJURY

- Penetrating injury to: head, neck, torso, extremities (above the wrist and ankle).
  Excludes stingray wounds and minor lacerations
- Flail chest
- ≥ 2 long bone fractures (combination leg and arm fractures)
- Paralysis from new injury
- Amputation or Near Amputation (above the wrist or ankle)
- Pelvic fractures
- Open depressed skull fracture

PHYSIOLOGIC CHANGES

- GCS < 14
- Systolic BP < 90 mmHg (PTA or in the ED)
- Respiratory Rate < 10 or > 29
- Witnessed Loss of consciousness secondary to injury (excluding syncope, found down and fall from standing)

Pediatric – all of the above PLUS:

- SBP < 80 on child 6 – 13
- SBP < 70 on child 1 – 6
- SBP < 60 on child birth to 1 year

CONCURRENT CONDITIONS

- Serious disease (cardiac, respiratory, cirrhosis, renal failure)
- Bleeding disorders or CONFIRMED anticoagulant therapy to include Coumadin, Plavix, Lovenox, Heparin, Pradexa and Xarelto (EXCLUDES Aspirin)
- Pregnancy > 20 weeks with traumatic event (excludes fall from standing)
- All TDC Trauma Transfers regardless of MOI

If in doubt, refer to the algorithm under the trauma tab in the Dispatch Reference Book

Revised: 5/24/13
Trauma Stat Criteria for both Adult and Pedi

Patients who meet the criteria below are to be paged as **Trauma Stat**

- Arm or leg amputations
- Or
- GSW to the head, neck, chest, and/or abdomen (torso)
- Or
- Confirmed Systolic BP <90
- Or
- Trauma Transfer receiving blood products to maintain BP >90
- Or
- Intubated or severe respiratory distress/obstruction
- Or
- GCS<8
- Or
- Neurological symptoms secondary to a possible spinal cord injury
- Or
- Administration of steroids for neurological symptoms
- Or
- Stabbing to the Torso (includes neck/chest/abdomen/back/flank/groin)
Trauma Transfers and Burn Injuries Algorithms

**Trauma Transfers**
- Transfer agreement made between referring facility M.D. and UTMB M.D.
- EMS/transport service notifies dispatch with report
- Appropriate trauma activation based on mechanism of injury, anatomic injury, physiologic changes, or concurrent conditions via paging system
- All transfers direct or ER evaluation who meet criteria for trauma team activation are evaluated in the ED by the Trauma Team regardless of accepting physician.

**Burn Injuries**
- The patient is screened for a patent airway, hemodynamic stability, and concurrent trauma in the ED
- Burn with concurrent injury or mechanism of injury meeting TTA criteria
  - Page the Trauma Team and the Burn Team
  - Take the patient to the ED resuscitation rooms
- Burn without concurrent injury or mechanism of injury
  - Page the Burn Team
  - Take the patient to the Burn unit tub room if stable and to the ED resuscitation rooms if unstable
The Trauma Team is expected to be present when the patient arrives. If a patient arrives unannounced, Trauma Team Activation will be initiated and the Emergency Medicine Faculty will begin the resuscitation.

**Guidelines for Trauma Service Consultation by the Emergency Medicine Faculty**

The Faculty on duty in the Emergency Department should consult the Trauma Service for the assessment of patients initially thought not to meet the criteria above but are subsequently determined to do so, or who exhibit changes in their status. Trauma Team notification should occur within 30 minutes in these situations. Such consultations will be responded to by both the PGY-5/4 and the PGY-3/2 on the Trauma Team.

**Definitions of Trauma Team Activation Tiered Responses**

The Trauma Team response will be activated for all injured patients, including pediatrics in a tiered manner using the following criteria:

1. **Trauma “STAT”**
   a) Arm or leg amputations
   b) Gunshot wounds to the head, neck, chest or abdomen/torso
   c) CONFIRMED systolic BP <90
   d) Trauma Transfer receiving blood products to maintain BP >90
   e) Intubated or severe respiratory distress/obstruction
   f) GCS <8
   g) Neurological symptoms secondary to a possible spinal cord injury
   h) Administration of steroids for neurological symptoms
   i) Stabbing to the torso including neck, chest, abdomen, back, flank, groin
   j) With adequate notification, team response is expected to be prior to patient arrival.

2. **Trauma “EVAL”**
   a) Patient meets criteria by Mechanism of Injury
   b) No physiologic changes reported/observed (TTA criteria)
   c) Team response is expected to be within 20 minutes of patient arrival or 20 minutes after team notification
   d) Any change in patient status meeting the STAT criteria above must be upgraded to a STAT by contacting dispatch to re-page the team.

3. **Trauma Consult**
   a) Any trauma patient who does not meet Trauma STAT/Trauma EVAL criteria but who has sustained a traumatic injury will be evaluated by the Emergency Department physician
   b) If the Emergency Department physician believes a Trauma Consult is necessary, the ED physician will contact the trauma faculty on their cell phone or personal pager.
   c) Team response is expected to be within 30 minutes of team notification.
4. **Trauma Transfer**
   a) All trauma patients accepted for transfer will be paged as a Trauma EVAL unless they meet Trauma STAT criteria
   b) **Trauma transfers must stop in the ER for Trauma EVAL.** The Trauma team must see patient.
   c) **All TDC Trauma Transfers regardless of the mechanism of injury will be paged as an EVAL unless the STAT criteria is met at which time the trauma team was be activated for a STAT.

5. **Trauma Transfer Calls**
   a) The Patient Placement Center (PPC) initiates Trauma Transfer and will contact the trauma faculty on call via their cell phone or the faculty personal pager.
   b) The Trauma Faculty will notify the Trauma Chief Resident and other consulting services as appropriate of impending transfer
**GENERAL POLICIES**

**Guidelines for Trauma Team Faculty**

Each Trauma Team has a designated faculty member. The attending surgeon is responsible for the overall management of patient care. The trauma faculty must be involved with all major patient care decisions. Ideally, the initial management decisions are made by the senior resident and then presented to the faculty. Senior residents are required to notify the faculty immediately for those patients meeting the major resuscitation criteria. **The attending surgeon is expected to be present in the ED upon patient arrival in all patients meeting the guidelines for major resuscitation when given sufficient advanced notification from the field OR within fifteen minutes.**

1. Faculty on call for trauma should be physically present and actively participate in all patient evaluations and operative procedures.

2. The direct involvement of faculty in major resuscitations is important to avoid delays in patient management. Major resuscitations include:
   
   a) Arm or leg amputations  
   b) Gunshot wounds to the head, neck, chest or abdomen/torso  
   c) CONFIRMED systolic BP <90  
   d) Trauma Transfer receiving blood products to maintain BP >90  
   e) Intubated or severe respiratory distress/obstruction  
   f) GCS <8  
   g) Neurological symptoms secondary to a possible spinal cord injury  
   h) Administration of steroids for neurological symptoms  
   i) Stabbing to the torso including neck, chest, abdomen, back, flank, groin

3. Faculty on call for Trauma should be aware of all major therapeutic decisions. Examples might include, but are not limited to:
   
   a) Admission and 23 hours of observation  
   b) DPL, CT, abnormal CT scans

4. Trauma Transfer Patients
   
   a) As a Level 1 Trauma Center, UTMB accepts all appropriate trauma transfers provided there is available capacity  
   b) The Trauma Faculty will notify the Trauma Chief Resident of impending transfer  
   c) The Trauma Faculty will notify specialty consultants as needed  
   d) All TDC Trauma Transfer calls will be referred to the Trauma Faculty on call for acceptance in transfer to the TDCJ Hospital.
Qualifications
A surgeon who serves as a Trauma Attending Surgeon on the Trauma Team at UTMB must meet the following qualifications:

1. The attending surgeon must be board certified in General Surgery. Board eligible surgeons may serve on the Trauma Team for a period not exceeding 5 years after completing a general surgery residency approved by the Accreditation Council for Graduate Medical Education.

2. The Trauma Attending Surgeon must be regularly involved in the care of injured patients.

3. The Trauma Attending Surgeon must demonstrate an interest in and commitment to trauma care by the maintenance of current ATLS provider or instructor certification. This requirement can be waived by the Director of Trauma Services if the surgeon has demonstrated extensive experience and recognized competence in trauma care.

4. Based on the American College of Surgeons Requirements, the Trauma Attending Surgeon is required to complete an average of 16 hours of Trauma-related Continuing Medical Education (CME) credits annually. Half of the hours earned must be obtained outside UTMB sponsored courses/lectures. A list of pertinent CME lectures is maintained in the Trauma Service Office. The Trauma Director must complete an average of 16 hours of Trauma-related CME annually outside the UTMB system.

5. The Trauma Attending Surgeon will demonstrate active participation in continuous trauma quality improvement by participating in the daily trauma morning report while he/she is post trauma call.

The Trauma Attending Surgeon must attend the monthly Multidisciplinary Trauma Peer Review Committee and meet 50% attendance requirements.
Guidelines for Faculty Notification

The direct involvement of faculty in major resuscitations is important to avoid delays in patient management. The faculty must be notified of all major resuscitations. The minimum criteria for the definition of a major resuscitation are as follows:

a) Arm or leg amputations
b) Gunshot wounds to the head, neck, chest or abdomen/torso
c) CONFIRMED systolic BP <90
d) Trauma Transfer receiving blood products to maintain BP >90
e) Intubated or severe respiratory distress/obstruction
f) GCS <8
g) Neurological symptoms secondary to a possible spinal cord injury
h) Administration of steroids for neurological symptoms
i) Stabbing to the torso including neck, chest, abdomen, back, flank, groin

The attending surgeon is expected to be present in the ED upon patient arrival in all patients meeting the hospital specific guidelines for defining major resuscitation when given sufficient advance notice from the field OR within fifteen minutes of trauma team activation when the advance notice is short.

Faculty on call for trauma must be notified of all potential operative procedures, admissions, and all major therapeutic decisions such as intubation, DPL, chest tube, abnormal CT scans.

Faculty on call for trauma will be notified immediately of all “STAT” activations for the trauma team.

Standard Orders

Initial laboratory for **ALL** trauma patients should include BMP, hemogram, coagulation studies, Type and Cross Match, and pregnancy test for women of child-bearing age. Additional appropriate tests should be individually ordered as needed. ABG’s should be drawn in the ED on all critical patients to guide fluid resuscitation.

Antibiotic Therapy

The standard antibiotic coverage for penetrating abdominal trauma is a broad spectrum single antibiotic with adequate coverage of Staphylococcus, gram negative aerobes and anaerobes. Choices are ampicillin/sulbactam (3 grams) q6h, or cefoxitin (2 grams) q6h. For patients with a demonstrated allergy to penicillins or cephalosporins, a combination of levofloxacin and clindamycin or a combination of aztreonam and clindamycin have both been proven efficacious. Patients with blunt abdominal trauma requiring exploration are also candidates for perioperative antibiotics. Antibiotic therapy should be continued for 24 hours post surgery. Further continuation of antibiotics may be appropriate if treating an established infection. During operative procedures, the antibiotics should be dosed at half their normal dosing intervals to maintain sufficient tissue levels of antibiotic.

Soft tissue antibiotic coverage is usually accomplished with a first generation cephalosporin (cefa zolin (Ancef®), 1 gram q8h).
Admitting Services
Patients with multiple system injuries or who have 2 or more consulting services will be admitted to the Trauma Service. Exceptions will be determined by the faculty.

Patient Transportation Policies
All patients must be accompanied by a physician and a nurse when transported from one nursing unit to another or when transporting to Radiology. Care should be taken that airways are secure before these procedures are begun. Full cardiac monitoring must be used when transporting to the OR, ICU and from ED to CT scan.

Transfer of Duties/Patient Care
Resident Trauma pagers are to be passed to the oncoming team at 5:30 p.m. Monday-Friday and at 7:00 a.m. each day. Wednesdays are the exception to these times when the residents switch at 8:00 p.m. Hand-off of the pagers is typically accomplished during morning and evening report however hand-off can be done face to face or at the patient’s bedside if a patient is currently in the Emergency Room. Faculty exchange of pagers occurs at 5:00 p.m. Monday-Friday.

Conferences

Daily Report
Residents, medical students, mid-level providers, trauma case manager and faculty on the Trauma Service and the Trauma Team on-call for the preceding evening will meet for a daily report at 0700 to present the previous night’s admissions and consultations to the members of the Trauma Service. This conference should take precedence over everything except emergent patient care. The On-call Trauma Team should be prepared to display radiographs through the PACS System.

Daily Rounds
Full team rounds to include Trauma faculty, residents, medical students, mid-level providers and trauma case managers will begin immediately following the daily hand-off report. Clear communication regarding the patient’s status or change in condition must be communicated to the faculty and documented in the chart.

Multidisciplinary Trauma Patient Care Conference
The purpose of this conference is to discuss the care and needs of all patients admitted to the Trauma Service. All disciplines involved in the care trauma patients are expected to participate including respiratory therapy, PT/OT, speech therapy, skin care nurse, pastoral care, staff nurses and the trauma team including the Trauma Faculty. Each case is presented followed by input/suggestions from other care providers. The goal of this conference is to ensure that all patient needs are met and to provide ALL members of the team with a clear understanding of the plan of care. This conference also gives caregivers an opportunity to ask questions and/or voice patient/family concerns. This conference is held every Monday at 10:00 a.m., except holidays, in the SICU Conference Room. A detailed note must be filed in the electronic record. Refer to the documentation section in this manual located on pages 24 and 25.
Performance Improvement and Patient Safety

Multidisciplinary Trauma Peer Review Committee
The Multidisciplinary Trauma Peer Review Committee is held the first Wednesday of every month. The purpose of the committee is to review all trauma deaths, review complications and trended trauma data and discuss sentinel events. Trauma Faculty are required to attend 50% of the meetings. Membership is by invitation only.

Trauma Operational Process Performance Improvement Committee
This committee consists of representatives from multiple disciplines. The group is charged with addressing, assessing and identifying system issues as they relate to trauma care with the goal to correct program deficiencies to continue to optimize patient care. Committee members meet the first Wednesday of every month.

Trauma Case Review
Trauma Service staff conduct a monthly trauma case review. Any staff member can recommend review of a case by submitting the information to the Program Director in Trauma Services. The purpose of the review is to offer an educational opportunity related to a specific case in which performance improvement, or system issues were identified. This educational opportunity allows the group to assist in identification of areas for improvement along with review of the current literature related to the case presented. Case reviews are designed to include all disciplines involved in the care of the patient. Representatives from each area will be required to summarize care provided in their unit utilizing a template provided by Trauma Services. All patient identifiers are removed from the presentation. Attendees are required to sign-in and each presentation is initiated by discussion of patient confidentiality according to the Texas Health and Safety Code Section 161-032 and the Medical Practice Act Article 1409. The Trauma Service office will store all sign-in sheets for future reference.

Additional Trauma Team Members

Trauma Case Manager
The role of the Trauma Case Manager is performed by the Mid-level Practitioners and is multifold. Their primary focus is that of patient advocate. They assist patients through the maze of hospital and outpatient services. In order to provide this service, they may make suggestions to the medical team to facilitate the patient through the continuum of care. The Mid-level Practitioners are the gatekeepers for our patient population. Our goal is to assure the patient has everything in place in a timely manner to avoid excessive days in the hospital. Some delays, such as complications, will be unexpected and therefore beyond our realm of control. A Case Manager/Mid-Level Practitioner will be available to round with the team. It is imperative that the Case Manager be notified of any change in the patient’s plan of care. We can be reached through the Trauma Service Office at extension 70152. Discharge appointments will be made by the Trauma Case Manager/Midlevel Practitioner prior to discharge.

Occupational Therapy
Occupational therapy is skilled treatment that helps individuals achieve independence in all areas of their lives. This department offers:
• Assessments and treatment for activities of daily living and functional movement
• Customized treatment programs aimed at improving abilities to carry out the activities of daily living
• Recommendations and training in the use of adaptive equipment
• Evaluation of home environments and recommendations on necessary adaptation for safety and level of assistance needed for the patient
• Guidance to family members and caregivers

Patients requiring these services include but not limited to the following:
• Closed head injuries, traumatic brain injuries, spinal cord injuries
• Traumatic fractures to extremities as well as amputations
• Trauma to the trunk resulting in internal injuries, back pain, rib fractures
• Soft tissue injuries to the trunk and extremities resulting in pain and loss of function
• Open wounds that need debridement and whirlpool
• Burns
• Those needing splinting of the extremities

To speak with a therapist, you may call extension 28878 or 24739.

Physical Therapy
Physical Therapy is the skilled treatment that helps individuals maximize their independence in all areas of their lives. Patients requiring this service include:
• Closed head injuries, traumatic brain injuries, spinal cord injuries
• Traumatic fractures to extremities as well as amputations
• Trauma to the trunk resulting in internal injuries, back pain, rib fractures
• Soft tissue injuries to the trunk and extremities resulting in pain and loss of function
• Open wounds that need debridement and whirlpool

The physical therapy department will teach patients to use assistive devices for gait training; teach patients to transfer in and out of bed; assess patients for assistive devices and wheelchairs; teach patients to move about their environment in a safe and energy efficient manner; and improve patients’ strength and range of motion. They will also provide teaching the family to assist with the patients care. To speak with a therapist, you may call extension 28878 or 24739.

Speech-Language Pathology (SLP)
Consider consultation with SLP for cognitive communication evaluations, and speaking valve evaluations for patients with trach/vent dependence. Be specific in your consult for the exact evaluation and treatment you are requesting. To speak with a therapist, you may call extension 22711.

Informed Consent and Patient Rights
1. Most courts emphatically hold that consent to treatment, to be effective, must be informed. Informed consent is rarely an issue during life-saving processes. Acute trauma incapacitates many patients, rendering them incapable of communicating or understanding the emergency treatment. The more urgent the medical situation, the less likely that consent of any kind will be an issue. Therefore, informed consent will not be discussed in detail. Remember, where the patient or his third-party substitute can give consent, that consent must be based on knowledge and understanding of the treatment to
be given and the risks involved in either undergoing or failing to undergo recommended treatment.

2. The law usually presumes consent. In an action for malpractice based on lack of consent, the plaintiff must prove that the physician did not obtain consent. If it is practicable to obtain actual consent for treatment from the patient or someone authorized to consent for him, this must be done. However, in an emergency situation in which immediate action is necessary for the protection of the patient’s life, the law will imply consent if it cannot be obtained. The law presumes that most reasonable persons under the same or similar circumstances would want their lives saved, if at all possible. This presumption is generally true even when the patient is not competent to consent for himself, as in the case of a minor or someone under the care of a third party, such as a natural guardian, a legal guardian, or a person whom the law of the state allows to substitute consent for the patient. If the emergency immediately endangers the life or permanent health of the patient, a physician should do what the occasion demands.

3. A physician must understand the difference between capacity and competence. A fully conscious minor is usually not considered competent to consent to surgery, even if he understands what is happening. Some states have created exceptions to this rule, but generally his parents must consent for him. However, a competent adult may lack the capacity to consent due to a comatose state. Whether someone lacks the capacity to consent depends on the facts in each case, for courts have even held that an intoxicated adult has the capacity to consent. The general standard given by the courts in cases involving questions of capacity to consent is whether the patient understands the risks involved in consenting to treatment and in refusing to consent to treatment.

Documentation

Documentation on the Trauma Service is vital in providing a clear picture of the patient’s mechanism of injury and identified injuries. With the exception of EPIC downtime, all documentation is done through EPIC. Multiple templates were created for the Trauma Service and must be utilized with documentation. Below is a list of the trauma templates to be used:

- STR Death Note
- STR Discharge Summary
- STR H/P
- STR Patient Discharge Instructions
- STR Post-op Note
- STR Progress note
- STR Tertiary Assessment Form

Every patient admitted to the trauma service is required to have a Tertiary Assessment note placed on their chart post injury day #1. Our clientele at times may be impaired at the time of injury. The goal of this assessment is to provide a systemic patient reassessment in order to identify any missed injuries. A complete assessment must be done the morning of PID#1 and appropriate test orders.

Each patient will have a daily EPIC note on the medical record. Notes must indicate Post Injury Day # (PID#) or Post-op Day # (POD#), full assessment and plan of care. In addition, you must file a note when the patient’s condition changes and requires medical intervention.
Trauma Services has developed several electronic order sets you will use to assist in you in your daily tasks. The order sets are as follows:
- Trauma Services (STR)/ED Trauma Orders
- Trauma Services (STR) Observation Admission Orders
- Trauma Services (STR) Admission Orders
- Trauma Services (STR) Splenectomy Immunization Order Set
- ER STR/Trauma Standard Discharge

**Tetanus Immunization**

Attention must be directed toward adequate tetanus prophylaxis in the multiple injured patient, especially if open extremity trauma is present.

1. **General Principles**
   a. The physician must determine for each patient with a wound what is required for adequate prophylaxis against tetanus.
   b. Regardless of the active immunization status of the patient, meticulous surgical care, including removal of all devitalized tissue and foreign bodies, should be provided immediately for all wounds. Such care is essential as part of the prophylaxis against tetanus.
   c. Passive immunization with Tetanus Immune Globulin-Human (human T.A.T.) must be considered individually for each patient. The characteristics of the wound, conditions under which it was incurred, its treatment, age, and previous active immunization status of the patient must be considered. Passive immunization is not indicated if the patient has ever received two or more injections of toxoid in the past.
   d. For precise tetanus prophylaxis, an accurate and immediately available history regarding previous active immunization against tetanus is required.
   e. Immunization in adults requires at least three injections of toxoid. A routine booster of adsorbed toxoid is indicated every ten years thereafter. In children under seven, immunization requires four injections of diphtheria and tetanus toxoids combined with pertussis vaccine. A fifth dose may be administered at four to six years of age. There after, a routine booster of tetanus and diphtheria toxoid is indicated at ten-year intervals.

2. **Previously Immunized Individuals**
   When the physician has determined that the patient has previously been fully immunized and the last dose of toxoid was given within ten years: For tetanus prone wounds (i.e., deep penetrating, dirty wounds with extensive tissue injury) and if more than five years have elapsed since the last dose, give 0.5 ml adsorbed toxoid. If adequate prior toxoid injections have been given, this booster may be omitted.

3. **Individuals NOT Adequately Immunized**
   When the patient has received only one or no prior injection of toxoid, or the immunization history is unknown:
   a. For non tetanus prone wounds, give 0.5 ml adsorbed toxoid.
   b. For tetanus-prone wounds:
      1) Give 0.5 ml adsorbed toxoid
2) Give 250 units (or more) of Human T.A.T
3) Consider providing antibiotics, although the effectiveness of antibiotics for prophylaxis of tetanus remains unproved
4) Administer, using different syringes and sites of injection
Blood Replacement

1. Blood transfusion or blood product transfusion is usually not indicated for Class I or Class II hemorrhage. Replacement with crystalloid solution using 3:1 (crystalloid replaced: blood lost) formula will usually suffice.

2. In life-threatening situations when blood replacement is necessary:
   a. Properly typed and cross-matched blood is first choice.
   b. Type specific blood is the next choice
   c. “O” positive uncross-matched blood is last choice (extreme emergency)
      1) For females of child-bearing age, use low titer “O” negative blood
      2) For males, may use low titer “O” positive blood

3. Blood filters of macrospore type should be used.

4. Massive transfusions should only be given using warming devices to avoid myocardial dysrhythmias, hypotension and hypothermia. Review the massive transfusion protocol located on page 85 of this manual.

5. Massive transfusion coagulopathy
   a. Usually a dilutional problem
      1) Treatment with fresh whole blood or fresh frozen plasma and platelets
      2) Platelet problems usually do not occur until after 10 units of banked blood given.
         a) If coagulopathy after 10 units of banked blood, treat with 6 - 10 platelet packs every 20 units of banked blood.
         b) Majority of subjects DO NOT need calcium replacement.
            (1) If Q-T interval of EKG is prolonged and/or patient receiving transfusion at greater than 100ml/min, patient should receive 0.2 gram CaCl₂ for every 500ml transfused.
            (2) Total dose of CaCl₂ should not exceed 2 grams unless hypocalcemia is documented by laboratory.

Level I Rapid Infuser

The Level I System 1000 is designed for safe and rapid in-line warming of IV fluids as they are administered to patients. Under pressure, 1 liter of IV fluid can be administered in 1 minute. Blood and packed RBC’s may be infused through the Level I and will be delivered near 40°C. The system must be attached to an IV site with a minimum of 16 gauge or larger. It is preferable to have 8.5 FR sheath in place for rapid fluid replacement. The Level I System will be set up and run by the Trauma Resuscitation Nurse and is her sole responsibility. The Trauma Resuscitation Nurse is trained in the set-up and management of this system.

Wound Care

1. General
   a. Local Wound Management – Using sterile gown, gloves, mask, and hair cover.
      i. Debride all open wounds (if significant)
      ii. Irrigate out particulate matter
   b. Penetrating wounds
      i. Remove foreign bodies when feasible
ii. Tetanus immunization

c. Facial lacerations involving the brow, nares, eyelid, lips, or ears are to be evaluated by the facial team on call.

2. Abscess
   a. Signs and Symptoms
      1) Pain, tenderness
      2) Warmth (locally)
      3) Swelling
      4) Drainage
      5) Systemic toxicity may be noted
   b. Treatment
      1) Antibiotics usually not indicated in localized infection
         a) Drainage adequate
         b) Drains or packs not usually indicated if adequate skin ellipse removed.
      2) Systemic toxicity or significant cellulitis requires antibiotics, wound care, and usually hospital admission.
      3) Significant abscess should be drained in the Operating room, not the Emergency Department, e.g., peri-rectal, ischial-rectal, etc.
   c. Antibiotics
      The standard antibiotic coverage for penetrating abdominal trauma is a broad spectrum single antibiotic with adequate coverage of Staphylococcus, gram negative aerobes and anaerobes. Choices are ampicillin/sulbactam (3 grams) q6h, or cefoxitin (2 grams) q6h. For patients with a demonstrated allergy to penicillins or cephalosporins, a combination of levofloxin and clindamycin or a combination of aztreonam and clindamycin have both been proven efficacious. Patients with blunt abdominal trauma requiring exploration also require perioperative antibiotics. Antibiotic therapy should be continued for 24 hours post surgery. Further continuation of antibiotics may be appropriate if treating an established infection. During operative procedures, the antibiotics should be dosed at half their normal dosing intervals to maintain sufficient tissue levels of antibiotic.

Special Considerations

1. Marine injuries
   a. Special consideration for antibiotic coverage should be given to patients wounded in the water. The use of antibiotics that will cover the majority of organisms present in sea water for one week is recommended (Levofloxacin, Doxycycline).
   b. The majority of stings suffered in the water will respond to local wound care and debridement.
   c. Occasionally, barbs or stingers remain in patients and these should be removed like any other foreign body.
   d. The use of agents to detoxify superficial stings (Portuguese Man-O-War) include meat tenderizer and weak vinegar solution. For Stingray punctures place the affected extremity in the hottest water the patient can stand.
2. **Penetrating Wounds (punctures)**
   a. The wound should be cleansed and debrided as needed.
   b. Tetanus immunization should be considered on all puncture wounds, as outlined in the previous section.
   c. Antibiotics should be considered for penetrating injuries to the foot or hand, or with immunocompromised patients.
   d. Soaking the wound in warm water, three or four times per day until the wound is healed, may also be helpful.

3. **Snake bites**
   a. 20-30% bites sustained from poisonous snakes have no envenomation. If no systemic or local signs of toxicity are apparent, the patient should be observed.
   b. All patients with signs of systemic or local toxicity are to be admitted.
   c. Make every attempt to identify the species of snake.
   d. Utilization of antivenom should be reserved for patients manifesting signs and symptoms of systemic toxicity, extensive local swelling, coagulopathy or DIC. Test dosing, and subsequent intravenous injection of antivenom (Crofab) should be performed in consultation with the Toxicology service.
   e. Local wound care, débridement, and fasciotomy should be reserved for patients suspected of development of compartment syndromes, and severe toxicity.
   f. Prophylactic antibiotics are sometimes indicated.

4. **Thoracic Injuries**
   a. Chest tube insertion alone: 1st generation cephalosporin until removed
   b. Contemplating operative exploration of thorax: Antibiotics are indicated
   c. Penetrating injuries: 1st generation cephalosporin

**Pain Management**
Pain is defined as “a state in which an individual experiences and reports the presence of severe discomfort or an uncomfortable sensation” (Friedman, L.). Effective pain management is achieved through administration of adequate pain medication. IV narcotics **should not** be given to these patients unless cleared by the Trauma Faculty. Treatment of choice in the Emergency Room for immediate pain relief is IV push Morphine. Once the patient is admitted, consider placing the patient on an IV PCA (Patient Controlled Analgesia). Not all patients will require some form of IV pain relief. Consider analgesics such as Norco, Flexeril and Motrin for pain relief. Special consideration should be given to those patients with a known intracranial bleed or potential abdominal injuries.
DVT Prophylaxis
a. All patients with serious injury should receive for DVT prophylaxis. Treatment includes but is not limited to: Sequential Compression Device (SCD) and Heparin or Lovenox therapy unless contraindicated.
b. Give extra consideration to those patients with long bone fractures.
c. Contraindications to Heparin and Lovenox therapy include intracranial hemorrhage, spleen or liver hematoma or lacerations.
d. Patients admitted for 23-hour observation DO NOT NEED DVT PROPHYLAXIS.
e. Consider IVC filter if anticoagulation is contraindicated or if patient will be immobile for an extended period of time.

Trauma Scales - Information

1. General
a. Should be performed on admission and RECORDED on patient with abnormal levels of consciousness/severe injuries
b. Assessment of pre-hospital scale should also be estimated for Glasgow Coma Scale.
c. Neurosurgical/Neurologic consultation should be obtained.

2. Glasgow Coma Scale
a. Record
   1) Eye opening response
   2) Verbal response
   3) Motor response
b. Criteria: The Glasgow Coma Scale (GCS) has received wide usage, but it is only a rough guide to measure changes in brain function. If a patient does not talk or follow commands, he can be considered unconscious (but not necessarily in coma). The three parts of the GCS are eye opening, verbal response and best upper limb response (for a 15 - 3 point spread).
   1) Eye Opening Response
      a) 4: Spontaneous -- already open with blinking (normal)
      b) 3: To speech -- not necessary to request eye opening
      c) 2: To pain -- stimulus should not be to the face
      d) 1: None -- make note if eyes are swollen shut
   2) Verbal Response
      a) 5: Oriented -- knows name, age, etc.
      b) 4: Confused conversation -- still answers questions
      c) 3: Inappropriate words -- speech is either exclamatory or at random
      d) 2: Incomprehensible sounds -- do not confuse with partial respiratory obstruction
      e) 1: None -- (Make note if intubation prevents speech.)
   3) Best Upper Limb Motor Response *(Central Noxious stimuli should be utilized to elicit motor response in the unconscious patient.)
      a) 6: Obeys -- moves limb to command and painful stimulus is not required
b) **5:** Localizes -- changing the location of the painful stimulus causes the limb to follow
c) **4:** Withdraws -- pulls away from painful stimulus
d) **3:** Abnormal flexion - decorticate posturing
e) **2:** Extensor response - decerebrate posturing
f) **1:** None -- indicate if limb is restrained

*Note: One scores the best limb for the GCS*

3. **Injury Severity Scale** - Only assigned after discharge
   a. Record
      1) AIS for each separate body region
         a) Head and face
         b) Neck
         c) Chest
         d) Spine
         e) Abdomen and pelvic contents
         f) Extremities and pelvic girdle
         g) Integument
      2) ISS (Injury Severity Scale) is the sum of squares of highest three categories above.
   b. Criteria
      Use the 2008 revised Abbreviated Injury Scale (AIS) to grade all injuries for a given person. (Note that the “data” codes 6-9 of the original AIS are not used, but a new code 6 includes Maximum Severity Injuries that are currently untreatable.) Then assign to each of the six areas defined below the AIS code of the most severe injury in the area. For example, if a person had two chest injuries, codes 1 and 3, the code of chest injury should be 3.

      The Injury Severity Score (ISS) is the sum of the squares of the highest AIS code in each of the three most severely injured areas. In illustration, a person with a laceration of the aorta (chest AIS = 5), multiple closed long-bone fractures (extremities AIS = 4), and retroperitoneal hemorrhage (abdomen AIS = 3) would have an Injury Severity Score of 50 (25 + 16 + 9). (An Injury Severity Score should not be computed for patients with any AIS 6 injuries, such as transection of the torso. These injuries are uncommon; they are rated 5 in the Baker Study cited below.)


      The AIS is used in coding only specific individual injuries. Exceptions are made for burns and for complaint of overall ache, stiffness or tenderness, since, by their nature, these types of injuries do not lend themselves to clear-cut boundaries of a specific body area; also, where an injury to a single body unit is described collectively, e.g., fractured teeth, multiple fractures in the same extremity. Refer to the Overall AIS for coding multiple injuries.
<table>
<thead>
<tr>
<th>SEVERITY CODE</th>
<th>SEVERITY CATEGORY</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>None</td>
</tr>
<tr>
<td>1</td>
<td>Minor</td>
</tr>
<tr>
<td>2</td>
<td>Moderate</td>
</tr>
<tr>
<td>3</td>
<td>Serious (not life-threatening)</td>
</tr>
<tr>
<td>4</td>
<td>Severe (survival uncertain)</td>
</tr>
<tr>
<td>5</td>
<td>Critical</td>
</tr>
<tr>
<td>6</td>
<td>Maximal (currently untreatable)</td>
</tr>
<tr>
<td>9</td>
<td>Unknown</td>
</tr>
</tbody>
</table>
PATIENT CARE GUIDELINES

Approach to the Seriously Injured Patient
Primary Survey and Resuscitation: ABC’s - undress the patient

1. Airway patency
   a. Assessment
   b. Management - Establish a patent airway
      1) Chin lift
      2) Clear airway of foreign bodies
      3) Oropharyngeal airway
      4) Endotracheal or nasotracheal intubation
      5) Cricothyroidotomy (rarely indicated)
   c. Maintain C-spine in neutral position with inline manual traction as necessary when establishing an airway

2. Breathing Control
   a. Assessment
      1) Expose chest
      2) Rate and depth of respirations
      3) Inspection and palpation for bilateral chest movement and subcutaneous air
      4) Auscultation
   b. Management
      1) Alleviate tension pneumothorax
      2) Seal open pneumothorax
      3) Oxygen administration (by mask-reservoir device)

3. Circulatory Control
   a. Assessment
      1) Pulse – Adults with sustained HR >120 SHOULD HAVE A FAST EXAM
         a) Quality
         b) Rate
         c) Regularity
      2) Skin color
      3) Capillary blanch test
   b. Management
      1) Initiate 2 large-bore peripheral IV’s (16 gauge or greater)
      2) Blood for Trauma labs
      3) Warmed Ringer’s Lactate solution and blood replacement (if required)
      4) EKG Monitoring
      5) Maintain normothermia with warmed fluids/blood, warming lights, and blankets

4. Disability - Brief Neurological Examination
   a. Level of consciousness/movement/GCS
   b. Pupils
      1) Size
      2) Reaction
5. **Exposure**  
a. Remove all clothing while preventing hypothermia.

6. **Urinary Catheter - Contraindication (urethrogram 1st)**  
a. Severe pelvic fracture  
b. Meatal blood present  
c. Free-floating prostate on rectal exam (done before catheter insertion)

7. **Nasogastric Tube**  
a. Contraindicated via nasal route with basilar skull fractures, facial fractures, or nasal fracture - use oral route.

**Secondary Survey and Management**

1. **Head and Skull**  
a. Palpation  
b. Inspection  
c. Re-evaluate pupils  
d. Cranial nerve function

2. **C-spine control**  
a. Assessment  
   1) Inspection  
   2) Palpation  
b. Management - Maintain adequate immobilization; **body and head must be immobilized together.**

3. **Maxillofacial Trauma**  
a. Assessment  
   1) Inspection  
   2) Palpation  
b. Management  
   1) Maintain airway  
   2) Hemorrhage control

4. **Chest**  
a. Assessment  
   1) Inspection  
   2) Palpation  
   3) Auscultation  
b. Management  
   1) Pleural decompression  
   2) Thoracentesis  
   3) Pericardiocentesis
5. Abdominal Injury
   a. Assessment
      1) Inspection
      2) Auscultation
      3) Palpation
   b. Diagnostic Studies
      1) Abdominal ultrasonography
      2) Abdominal CT scan
      3) Peritoneal lavage

6. Rectal Exam: Sphincter tone, blood, prostate position, bowel wall integrity.

7. Fractures
   a. Assessment
      1) Inspection: Deformity
      2) Palpation: Tenderness, crepitus, abnormal movement, pulses
   b. Management
      1) Appropriate splinting
      2) Radiologic evaluation
      3) Relief of pain

8. Neurologic
   a. Assessment
      1) Sensorimotor evaluation
      2) Paralysis
      3) Paresis
   b. Management
      1) Adequate immobilization - head and body immobilized together
      2) Cervical-traction tongs (Gardner-Wells)

9. Back
   a. Assessment
      1) Inspection: Log-roll the patient and inspect the back
      2) Palpation: Tenderness along the bony spine

10. Consider
    a. Tetanus prophylaxis
    b. Antibiotics
       1) Prophylaxis
       2) Treatment
    c. Prophylaxis for DVT
    d. Prophylaxis for ETOH withdrawal
    e. Prophylaxis stress ulcer
Management - General
Initial Assessment

1. **Primary Survey**: Evaluation and resuscitation
   a. **Airway management with C-spine control**
   b. **Breathing**
   c. **Circulation with hemorrhage control**
   d. **Disability**: Neurological status/GCS/RTS
   e. **Expose**: Completely undress the patient the cover to prevent hypothermia

2. **Resuscitation Phase**: Treatment of life-threatening conditions
   a. Airway establishment/EKG monitor
   b. Shock management - IV’s and blood work
   c. Urinary catheter - if not contraindicated
   d. Nasogastric tube - if not contraindicated

3. **Secondary Survey**: Re-examination of patient from head to toe using look-listen-feel technique
   a. Total Evaluation
      1) Head/Skull
      2) Maxillofacial
      3) Neck
      4) Chest
      5) Abdomen
      6) Perineum/Rectum
      7) Extremities: Fractures
      8) Back
   b. Complete neurological exam
   c. Special techniques
      1) Radiological evaluation - See note*
      2) Laboratory studies (additional)
      3) Peritoneal lavage
      4) CT scan

4. **History**: From patient and/or family:
   A - Allergies
   M - Medications currently taken
   P - Past illnesses
   L - Last meal
   E - Events preceding the injury

5. **Definitive Care Phase**:
   a. Fracture splinting/stabilization
   b. Highly specialized tests (CT scan, arteriography, etc.)
   c. Operative intervention
   d. Disposition: ICU/floor
Continuous monitoring of the patient is essential. Vital signs in an unstable patient should be taken and recorded frequently while the patient is in the Emergency Department or undergoing special procedures.

*Note: Radiological Evaluation*

1. After patient stabilization (ABC’s), radiologic evaluation should commence, maintaining C-spine control at all times.

2. Whole Body Imaging or Panscan is performed following the protocol on page 84. Review this protocol for indications to performing a Panscan.

3. **Supine** chest roentgenogram should be obtained initially.

4. Dorsal spine, skull, extremities should then be evaluated (when needed) on a secondary basis.

5. Patients with suspected cervical injury should be maintained in cervical collar CT scan is completed. An MRI and flexion/extension films may also be indicated.

6. Detailed skeletal survey based on physical findings and patient complaints of pain.

7. Adequate immobilization: **Body and head must be immobilized together.**
Airway
Upper Airway

1. **Common obstruction**
   a. Tongue
   b. Foreign body
   c. Edema of glottic area

2. **Manual method to open airway**
   NOTE: MAINTAIN C-SPINE CONTROL
   a. Chin lift
   b. Jaw thrust

3. **Mechanical methods to open airway**
   a. Oropharyngeal airway
   b. Nasopharyngeal airway
   c. Endotracheal intubation

4. **Operative methods** - rarely indicated
   a. Cricothyroidotomy
      1) Needle (14 gauge or larger)
      2) #4 tracheostomy tube via cricothyroid membrane
   b. Tracheostomy
Clinical Differentiation of Shock
Non-Hemorrhagic Shock

1. **Cardiogenic Shock**
   a. May occur due to myocardial contusion, cardiac tamponade air embolus, or MI.
   b. Requires constant EKG monitoring
   c. Monitor for Cardiac tamponade
      Signs and symptoms:
      1) Tachycardia
      2) Muffled heart sounds
      3) Dilated, engorged neck veins
      4) Decreased blood pressure resistant to fluid therapy

2. **Tension Pneumothorax**
   a. Total lung collapse
   b. Mediastinal shift to the opposite side
   c. Impairment of venous return
   d. Decreased cardiac output
   e. Subcutaneous air
   f. Decreased breath sounds/hyperresonance
   g. Tracheal shift
   h. Acute respiratory distress

3. **Neurogenic shock**
   a. Usually spinal cord injury
   b. Hypotension without tachycardia

4. **Septic shock**
   a. Modest tachycardia
   b. Warm pink skin
   c. Near normal systolic blood pressure
   d. Wide pulse pressure
Circulation

1. **Circulatory Control**
   2 large-bore peripheral IV’s (16 or 14 gauge)
   a. Place away from the site of injury (i.e., fracture) or suspected bleeding source.
   b. Use upper extremities if penetrating wound to abdomen
   c. Venipuncture or cutdown

2. **Shock**
   Classification - any injured patient who is cool and tachycardiac is in shock until otherwise proven. Consider the massive transfusion protocol with class III or IV hemorrhage.
Hemorrhage

1. **Class I Hemorrhage**
   a. Acute blood loss up to 15% of circulating blood volume
   b. Minimal change in vital signs
   c. Normal capillary blanch test
   d. Treatment: Crystalloid IV solutions only

2. **Class II Hemorrhage**
   a. Acute blood loss up to 20-25% of circulating blood volume
   b. Vital signs
      1) Tachycardia - 100/min
      2) Tachypnea - 10-30/min
      3) Narrowed pulse pressure
      4) Capillary blanch test < 2 seconds
   c. Treatment: Crystalloid IV solution only

3. **Class III Hemorrhage**
   a. Acute blood loss up to 30-35% of circulating blood volume
   b. Vital signs
      1) Tachycardia 120/min
      2) Tachypnea 30-40/min
      3) Decreased systolic blood pressure
      4) Narrowed pulse pressure
      5) Decreased urinary output 5-15 ml/hr
      6) Capillary blanch test >2 seconds
      7) Mental confusion
   c. Treatment: Crystalloid initially followed by whole blood (when available)

4. **Class IV Hemorrhage**
   a. Acute blood loss up to 40-50% of circulating blood volume
   b. Vital signs
      1) Tachycardia 140/min
      2) Tachypnea 35/min
      3) Decreased systolic blood pressure (50-60 mmHg)
      4) Narrowed pulse pressure
      5) No urinary output
      6) Capillary blanch test > 2 seconds
      7) Marked lethargy
   c. Treatment: Crystalloid and whole blood
## Classes of Acute Hemorrhage

**Normal 70Kg Male**

<table>
<thead>
<tr>
<th></th>
<th>Class I</th>
<th>Class II</th>
<th>Class III</th>
<th>Class IV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blood loss in ml</td>
<td>up to 750ml</td>
<td>1000-1250ml</td>
<td>1500-1800ml</td>
<td>2000-2500ml</td>
</tr>
<tr>
<td>Blood loss in %(^1)</td>
<td>up to 15%</td>
<td>20-25%</td>
<td>30-35%</td>
<td>40-50%</td>
</tr>
<tr>
<td>Pulse Rate(^2)</td>
<td>72-84</td>
<td>100</td>
<td>120</td>
<td>140 or greater</td>
</tr>
<tr>
<td>Blood Pressure(^3)</td>
<td>118/82</td>
<td>110/80</td>
<td>70-90/50-60</td>
<td>50-60 systolic</td>
</tr>
<tr>
<td>Pulse Pressure (mmHg)</td>
<td>36 mmHg</td>
<td>30 mmHg</td>
<td>20-30 mmHg</td>
<td>10-20 mmHg</td>
</tr>
<tr>
<td>Capillary Blanch Test</td>
<td>Normal</td>
<td>Positive</td>
<td>Positive</td>
<td>Positive</td>
</tr>
<tr>
<td>Respiratory Rate</td>
<td>14-20</td>
<td>20-30</td>
<td>30-40</td>
<td>35</td>
</tr>
<tr>
<td>Urine Output (ml/hr)(^4)</td>
<td>30-35 ml</td>
<td>25-30 ml</td>
<td>5-15 ml</td>
<td>negligible</td>
</tr>
<tr>
<td>CNS-Mental Status</td>
<td>Slightly anxious</td>
<td>Mildly anxious</td>
<td>Anxious and confused</td>
<td>Confused Lethargy</td>
</tr>
<tr>
<td>Fluid Replacement (use 3:1 rule for fluid resuscitation)</td>
<td>Crystalloid</td>
<td>Crystalloid</td>
<td>Crystalloid + Blood</td>
<td>Crystalloid + Blood</td>
</tr>
</tbody>
</table>

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\(^1\) % of blood volume in a standard 70 Kg male

\(^2\) Assume normal of 72/min

\(^3\) Assume normal of 120/80

\(^4\) Assume a normal of 40-50 ml/hr

T O O R  R A P I D L Y  F O R  R E S U S C I T A T I O N
Head Trauma

1. **Assessment of Head Injury**
   a. **History**
      1) Type of injury: how suffered
      2) Response of patient (loss of consciousness and how long)
   b. **Vital Signs**
      1) **Respiratory**
         a) Acute rise in intracranial pressure produces respiratory slowing
         b) As pressure rises, rate of respiration increases
         c) These respirations are noisy
         d) C-spine injury can compromise respirations above C-4 respiratory arrest
      2) **Blood Pressure**
         a) Increase in blood pressure may indicate increase in intracranial pressure (Must rule out pain, anxiety, or preexisting hypertension)
         b) Wide pulse pressure if secondary to intracranial pressure rise
         c) Hypotension is rarely due to head injury except as terminal event).....**TREAT SHOCK AGGRESSIVELY**
      3) **Pulse**
         a) Evaluation of intracranial pressure may produce a bradycardia
         b) Rapid pulse in a closed head injury is a grave sign or suggestive of volume loss secondary to other reasons
      4) **Temperature**
         a) Hypothermia/Hyperthermia may occur secondary to environmental factors
         b) Brain-injured patients tend toward hypothermia.
   c. **Neurologic Exam**: Glasgow Coma Scale (see page 88)
      1) Test cranial nerves
      2) Maintain cervical stability
      3) Check for depressed and non-depressed skull fractures (physical and radiologic exam)

2. **Diagnosis of Brain Injury**
   a. **Concussion**
      1) No significant anatomic brain injury
      2) Temporary loss of consciousness
         a) May be amnesic from time of injury
         b) Admission suggested:
            (1) Associated organ derangement
            (2) Loss of consciousness for greater than 5 minutes
            (3) Under the age of 12 years
            (4) Persistent vomiting and/or convulsions
            (5) Skull fracture
b. **Contusion**
   1) Prolonged episode of unconsciousness
   2) Alteration in mental status
   3) Localizing signs on neurologic exam
   4) Diagnoses by CT scan

c. **Intracranial Hemorrhages**
   1) **Meningeal hemorrhage**
      a) Acute Epidural Hemorrhage
         (1) Usually a tear in the middle meningeal artery
         (2) Associated with linear skull fractures over parietal temporal areas
         (3) Symptoms
             (a) Loss of consciousness followed by lucid interval, followed by a secondary depression of consciousness
             (b) Hemiparesis on opposite side of injury
             (c) Dilated and fixed pupil on same side as injury
         (4) Treatment
             (a) Rapid operative intervention
             (b) Prognosis excellent if treated rapidly; underlying brain injury usually not significant
      b) Acute subdural hematoma
         (1) Skull fracture may or may not be present
         (2) Underlying brain injury usually severe
         (3) Symptoms
             (a) Rapid deterioration
             (b) Usually no lucid interval
         (4) Treatment
             (a) Rapid operative intervention
             (b) Prognosis is dismal secondary to degree of brain substance injury
      c) Subarachnoid hemorrhage
         (1) No immediate treatment
         (2) Signs and symptoms
             (a) Meningeal irritation
             (b) Headache
             (c) Photophobia
         (3) Beware of associated cervical spine injury with meningeal irritation.

   2) **Brain hemorrhage and lacerations**
      a) Closed brain lacerations
         (1) Symptoms depend on location
         (2) Hemiplegia may occur
         (3) Visual field defects are common
         (4) Diagnosis by CT scan
b) Impalement injuries
   (1) *Do not remove foreign body that is protruding until neurosurgical assistance is obtained.*
   (2) Skull x-rays necessary

3) **Treatment - General**
   a) Fluid restriction
      (1) Keep IV fluid therapy at low rate unless hypotension present.
      (2) Prevent over-hydration which results in increased cerebral edema.
      (3) Shock is not caused by brain injury
   b) Steroids - See Appendix 2
      (1) Occasionally used in an effort to prevent or reduce cerebral edema
      (2) Use only in consultation with neurosurgery
   c) Diuretics
      (1) Hyperosmolar diuretics, e.g., Mannitol
         (a) Effective in acutely shrinking the brain and lowering intracranial pressure
         (b) Urinary catheter required
         (c) Do not use in hypotensive patients
         (d) Dosage of Mannitol 25 - 50 grams IV push (or drip)
      (2) Loop diuretics, e.g., Lasix
         (a) Urinary catheter required
         (b) Watch closely for development of hypotension
         (c) Dosage initially 40 - 80 mg IV push
   d) Deliberate Hypocapnia
      (1) Results in arterial vasospasm
         (a) Lowers brain perfusion
         (b) Lowers intracranial pressure
      (2) Maintain pCO₂ at 26-28 Torr by hyperventilation
         (a) Requires endotracheal tube
         (b) May require iatrogenic paralysis
      (3) Watch out for development of cerebral ischemia or swelling; monitor intracranial pressure and ABGs
   e) Anticonvulsant treatment
      (1) Seizure activity
         (a) Initial treatment; Diazepam 10 mg IV over 2 minute period (may repeat x 1)
         (b) Begin Dilantin 1 gram (50 mg/min IV), slowly
         (c) May use Phenobarbital if seizure persists
      (2) May use prophylactically if neurosurgeon desires

4) **Evaluation**
   a) Physical/neurological exam
   b) Initial evaluation with supine chest x-ray
(2) Followed by a Trauma Panscan
(3) Flexion/extension films may be warranted if initial spine films are within normal limits and point tenderness exists.

c) Other tests
(1) Lumbar puncture
(2) Brain scan
(3) Skull films - to rule out depressed fractures or skull fractures in dangerous areas, i.e., across distribution of meningeal artery. Skull films not necessary if CT to be performed.
Spine and Spinal Cord Trauma

1. General
   a. Manipulation or movement of a suspected spine injury can cause additional injury: STABILIZE THE SPINE. Remember: a gunshot can also fracture a spine.
   b. Vertebral injuries can be present without spinal cord or other systemic symptoms.
   c. INJURY SHOULD BE PRESUMED UNTIL FRACTURES AND DISLOCATIONS HAVE BEEN RULED OUT IN BOTH BLUNT AND PENETRATING TRAUMA
      1) Any patient with a CNS injury should be treated as if a co-existing spine injury were present.
      2) Evidence of significant external trauma above the clavicles is always an indication for cervical spine CT scan.

2. Assessment
   a. General
      1) Examine the spine without any movement prior to radiologic evaluation.
      2) Do not remove the cervical collar without maintaining in-line traction.
   b. Vertebral Assessment
      1) Maintain cervical traction
      2) Feel for pain or tenderness over vertebra
      3) Palpate for step off over dorsal spine
   c. Neurologic Exam
      1) Level of consciousness
      2) Sensory exam
      3) Motor exam
      4) Autonomic dysfunction
         (a) Sacral and perineal exam
         (b) Presence of sacral sparing
   d. Levels: Sensory
      1) Two inches behind tip of ear: Level C-2
      2) Top of shoulder: Level C-4
      3) Tip of thumb: Level C-6
      4) Tip of middle finger: Level C-7
      5) Tip of fifth finger: Level C-8
      6) Nipple line: Level T-4
      7) Lower tip of sternum: Level T-6
      8) Umbilicus: Level T-10
      9) Below iliac crest: Level L-1
     10) Just above patella: Level L-3
     11) Top of fifth toe: Level S-3
     12) Anal area: Sacral sparing
e. **Levels: Motor**
   1) Proximal to C-4 - Respiratory paralysis
   2) C-5 involves motor function of:
      a) Deltoids
      b) Biceps
      c) Brachial muscles
   3) C-6 involves motor function of:
      a) Abductor pollicus longus
      b) Extensor pollicus brevis
      c) Extensor pollicus longus
      d) Extensor carpi radialis longus
      e) Extensor carpi radialis brevis
   4) C-7 involves motor function of:
      a) Triceps
      b) Finger extensors
      c) Flexor carpi radialis
      d) Flexor carpi ulnaris
   5) T-1 involves motor function of:
      a) Flexor digitorum sublimus
      b) Flexor digitorum profundus

f. **Cervical spine - Radiologic exam**
   1) Following treatment of life-threatening problems (A, B, C, D, E)
      a) A-P chest at same time
      b) Trauma Panscan if warranted by protocol. If not warranted, proceed with below.
   2) Types of odontoid fractures
      a) Type I: above base of odontoid - usually stable
      b) Type II: at base of odontoid - usually **unstable** (in children the hypophysis is in this area)
      c) Type III: fracture of vertebral body
   3) Types II and III should be treated with surgical intervention or Halo immobilization.

g. **Hangman’s fracture (C-2)**
   1) Involves posterior elements of C-2
   2) Extension/distraction or extension/axial compression injury
   3) Should **not** be placed in cervical traction if the mechanism of injury is secondary to distraction
   4) Immobilize injury acutely - **unstable**

h. **C-3 through C-7**
   1) Usual mechanism of injury in stable fractures
      a) Flexion
      b) Extension
      c) Lateral bending
      d) Axial loading
2) Mechanism of injury in unstable fractures
   a) Flexion axial loading
   b) Extension axial loading
   c) Flexion - rotation
3) Assess distance between pharynx and anterior/inferior border of C-3. Soft tissue thickness should equal 5mm
   a) 5mm - indirect evident of vertebral fracture (usually associated with minimally displaced C-2)
   b) Children usually have 2/3 of prevertebral thickness of C-3
4) Unstable fractures of C-3 to C-7
   a) Disruption of anterior and posterior elements
   b) 3.5mm overriding of adjacent vertebrae
   c) 11° angulation between two adjoining vertebrae
   d) Unilateral facet dislocation if 25% override of superior vertebrae on inferior vertebrae
   e) Bilateral facet dislocation if 50% override of superior vertebrae on inferior vertebrae
5) Cord injuries
   a) Associated with tear drop sign (bone chip of anterior/inferior aspect of vertebrae)
      (1) Stable fracture (usually)
      (2) Cord injury due to displacement of fragment (or disc) into canal.

3. **Treatment**
   a. Immobilize all fracture/dislocations
   b. Maintain in-line spinal traction during examination and radiographic exam.
      *Note: Head and body must be immobilized together.*
   c. Obtain neurosurgical consultation when spinal injury diagnosed or suspected.
**Thoracic Trauma**

1. **General**
   a. One of four trauma deaths is secondary to chest injury
   b. Two out of three deaths secondary to chest injury occur after arrival to the hospital.
      1) 15% require major surgery
      2) 85% are manageable by simple procedures
   c. Life-threatening chest injuries requiring immediate intervention
      1) Airway obstruction
      2) Tension pneumothorax
      3) Open pneumothorax
      4) Hemothorax
      5) Flail chest
      6) Cardiac tamponade
   d. Potential life-threatening injuries - found on secondary survey
      1) Pulmonary contusion
      2) Aortic disruption
      3) Tracheobronchial disruption
      4) Diaphragmatic disruption
      5) Myocardial contusion

2. **Lethal Chest Trauma**
   a. **Airway obstruction**
      1) Should be dealt with as initial priority as indicated in AIRWAY section
   b. **Tension Pneumothorax**
      1) One-way valve air leak in a closed chest
      2) Air is forced into thoracic cavity resulting in creation of positive intrathoracic pressure.
         a) Results in collapse of affected lung
         b) Shift of mediastinum to opposite side
         c) Decreased venous return
         d) Compression of contralateral lung
      3) Diagnosis
         a) Tracheal deviation
         b) Respiratory distress
         c) Unilateral decrease/absence of breath sounds
         d) Distended neck veins
         e) Cyanosis/shock
      4) Management
         a) Decompression of thorax with needle or catheter acutely
         b) Placement of chest tube (see procedure section)
c. **Open Pneumothorax**

1) Penetrating wound to chest with open thorax

2) Diagnosis
   a) Chest wall defect
   b) Sucking chest wound
   c) Collapsed lung
   d) Respiratory distress

3) Management
   a) Closure of defect with an occlusive dressing. Tape on 3 sides to allow formation of flutter valve if chest pressure builds up.
   b) Chest tube insertion via new incision (see procedures)
   c) Definitive operative closure of defect usually required.
   d) Take dressing off if patient decompensates (may be developing tension pneumothorax)

4) CPR is not effective with open chest wounds - do internal massage

d. **Hemothorax**

1) Blood present in thoracic cavity as a result of blunt or penetrating trauma.

2) Diagnosis
   a) Absent or decreased breath sounds
   b) Dullness to percussion

3) Management
   a) 2 large bore IV’s for fluid replacement
   b) Type and crossmatch blood
   c) Insertion of chest tube after above accomplished
      (1) Observation: <1000cc blood obtained after chest tube insertion
      (2) Operative intervention
         (a) >1500cc blood obtained after chest tube insertion
         (b) 150 cc/hr drainage after insertion of chest tube for prolonged period (i.e., 2 - 3 hours)
   d) Chest tube insertion after trauma should be done in a sterile fashion with cap, mask, and gown.

e. **Flail Chest**

1) Part of chest wall loses bony continuity with rest of thoracic cavity.

2) Multiple rib fractures are common.

3) Normal respiratory physiology disrupted by abnormal motion of chest wall.

4) CPR not effective with severe flail. Consider open massage

5) Diagnosis
   a) Crepitance/pain over segment of cheat wall
   b) Paradoxical wall motion or asymmetrical motion of chest wall.
   c) Poor air exchange
   d) Respiratory distress sometimes present
6) Treatment
   a) Oxygen/Adequate ventilation
   b) Intubation if severe
      (1) “Internal stabilization”
      (2) Volume ventilation with mechanical respirator
   c) Control pain from rib fractures
      (1) Analgesics
      (2) Intercostal block very effective
   d) Watch for signs of underlying lung injury
   e) Operative stabilization if does not respond to above, or if very large flail segment (rarely indicated)

f. Cardiac Tamponade
   1) Commonly results from penetrating trauma
   2) Diagnosis
      a) Beck’s Triad
         (1) Elevated venous pressure
         (2) Decreased arterial pressure
         (3) Muffled heart tones
      b) Pulsus paradoxus—weakening of pulse during inspiration
   3) Management
      a) Pericardiocentesis (see procedure section)
      b) Thoracotomy necessary to control pericardial blood collection

3. Potential Life-threatening Injuries
   a. Pulmonary contusion
      1) Most common lung injury after blunt chest trauma
      2) Respiratory failure....Adult Respiratory Distress Syndrome closely associated
      3) Diagnosis
         a) Respiratory distress
         b) Respiratory failure
         c) Local or generalized opacification on chest roentgenogram
      4) Management
         a) Observation if limited injury
         b) Mechanical ventilation indicated:
            (1) If respiratory distress present or PaO₂ /FiO₂ ratio is 200.
            (2) Impaired level of consciousness
            (3) Multi-system disorders
            (4) Abdominal injuries resulting in ileus or operation
            (5) Skeletal injuries requiring immobilization with respiratory difficulty
b. **Traumatic Aortic rupture**

1) 90% fatal
2) Occurs at site of ligamentum arteriosum of aorta; intact adventitia prevents immediate death in 10%
3) Diagnosis - Chest roentgenogram
   a) Widened mediastinum (best sign) - greater than 0.26 width of mediastinum at aortic knob divided by transverse diameter of the chest at that level
   b) Blurring or obliteration of aortic knob
   c) 1st and 2nd rib fractures
   d) Deviation of trachea to right
   e) Pleural cap
   f) Elevation and rightward shift of right mainstem bronchus
   g) Depression of left mainstem bronchus
   h) Deviation of esophagus or nasogastric tube to right
   i) Obliteration of space between pulmonary artery and aorta
4) Diagnosis confirmed by aortogram
5) Physical exam
   a) Hemothorax on left
   b) Disparate upper and lower extremity blood pressure
   c) Paraplegia
6) Treatment
   a) Operative repair is indicated
   b) Graft usually not required: Primary repair indicated for most aortic tears

c. **Tracheobronchial Injuries**

1) **Laryngeal trauma**
   a) Penetrating - usually obvious
   b) Blunt - fracture indicated by:
      1) Crepitus
      2) Subcutaneous emphysema
      3) Hoarseness
   c) Labored respirations may be present
   d) Bronchoscopy helpful in diagnosis of subtle injury
2) **Bronchial injury**
   a) Usually occurs within one inch of the carina
   b) Diagnosis
      1) Hemothysis
      2) Subcutaneous emphysema
      3) Pneumothorax
      4) Persistent air leak
      5) Bronchoscopy helpful in diagnosis
3) **Treatment**
   a) Maintenance of airway
   b) Tracheostomy frequently necessary for laryngeal trauma (see procedure AIRWAY section)
   c) Repair of bronchial injury requires thoracotomy
d. **Esophageal Trauma**
1) Penetrating trauma
   a) Most common cause of injury
   b) Diagnosis
      (1) Suspected due to path of penetrating object
      (2) Pneumothorax without obvious cause
      (3) Particulate and food is chest tube drainage system
      (4) Continuous bubbling of chest tube drainage system which is equal on inspiration and expiration
      (5) Mediastinal air
      (6) Blood in mouth or on nasogastric aspiration
      (7) Confirm diagnosis by water soluble contrast study
      (8) Esophagoscopy usually not helpful
   c) Management
      (1) When injury confirmed, primary operative repair is procedure of choice (if injury is recent)
2) Blunt trauma
   a) Can result in esophageal rupture
   b) Usually produces linear tear in lower esophagus
   c) Diagnosis and management are similar to above

e. **Traumatic Diaphragmatic Hernia**
1) More common on left than right
2) Diagnosis
   a) Easily missed - subtle changes noted by chest roentgenogram
   b) Elevated left diaphragm
   c) Air-fluid level in chest
   d) Look for location of nasogastric tube
   e) Diagnosis confirmed by various contrast studies
3) Treatment
   a) Operative reduction of hernia contents via abdomen or thorax, with closure of diaphragm. (Acute: abdominal approach is preferred)

f. **Myocardial contusion**
1) Usually the result of blunt anterior chest trauma
2) Diagnosis
   a) Abnormalities of EKG
      (1) EKG can mimic myocardial infarction
      (2) Frequent PVC’s
      (3) Atrial fibrillation, bundle branch block. S-T segment changes also seen
   b) Isoenzyme changes - Similar to that of MI
      (1) CPK with MB fraction
3) Treatment
   a) monitor for dysrhythmia - treat aggressively
   b) Oxygen
   c) Anti-dysrhythmic; if necessary lidocaine or bretylium drip
4. Procedures
   a. Chest tube insertion
      1) 2 large bore IV lines, fluid infusion, and vital sign monitoring
      2) Determine the insertion site: Usually at the nipple level (4th or 5th intercostal space) at the midaxillary line. A second chest tube may occasionally be use for hemothorax.
      3) Prepare and drape the chest at the site of the predetermined chest tube insertion. Sterile gloves, gown, mask, and hair cover required.
      4) Locally anesthetize the skin and around the rib.
      5) Make a 2-3 cm transverse (horizontal) incision at the predetermined site and bluntly dissect through the subcutaneous tissues JUST OVER THE TOP OF THE RIB.
      6) Puncture the parietal pleura with the tip of a clamp, and put a gloved finger into the incision to feel any adhesions, clots, and be sure you are in the chest.
      7) Clamp the proximal end of the thoracostomy tube and advance the thoracostomy tube into the pleural space the desired length; never force the tube into the chest.
      8) Look for “fogging” of the chest tube with expiration or listen for air movement.
      9) Connect the end of the thoracostomy tube to an underwater seal apparatus.
     10) Suture the tube in place.
     11) Apply an occlusive dressing, and tape the tube to the chest.
     12) Obtain a chest x-ray.
   b. Pericardiocentesis
      1) Monitor the patient’s vital signs and EKG before, during, and after the procedure.
      2) Prepare the xyphoid and subxiphoid areas, if time allows.
      3) Locally anesthetize the puncture site, if necessary.
      4) Use a 16 or 18 gauge spinal needle.
      5) Assess the patient for any mediastinal shift which may have caused the heart to shift significantly.
      6) Puncture the skin 1-2 cm inferior to the left of the xiphochondral junction, at a 45° angle to the skin.
      7) Carefully advance the needle cephalad and aim toward the top of the left scapula.
      8) If the needle is advanced too far into the ventricular muscle, an injury pattern, e.g., extreme ST-Twave changes, or widened and enlarged QRS complex will appear on the EKG monitor. This indicates that the pericardiocentesis needle should be withdrawn until the previous baseline EKG tracing reappears. PVC’s may also occur, secondary to irritation of the ventricular myocardium.
      9) When the needle tip enters the blood-filled pericardial sac, withdraw as much non-clotted blood as possible.
     10) In a simple cardiac tamponade, the aspiration of the pericardial blood will result in improvement in the blood pressure.
11) During aspiration, the epicardium will reprise the inner pericardial surface as will the needle tip. Subsequently, an EKG pattern may reappear. This indicates that the pericardiocentesis needle should be withdrawn slightly. Should this injury pattern persist, withdraw the needle completely.

12) Reassess all vital signs.

13) The patient should be transported to the O.R. rapidly if the patient is stable.
Abdominal Trauma

1. General
   a. Physical examination is essential in subsequent management
   b. Intra-abdominal injury suspected
      1) Mechanism of injury
      2) Location and/or presence of ecchymosis
      3) Areas where abdomen has been penetrated
      4) Local or referred pain if the patient is awake

2. Initial Assessment
   a. Look - listen - feel
   b. Penetrating wounds
      1) Gunshot wounds to the abdomen
         a) Bleeding is usually manifested by abdominal pain, a quiet abdomen or shock.
         b) Bowel perforation is slower to manifest itself; local peritoneal signs are usually the best indicator.
         c) Abdominal exploration is mandatory in all but trivial injuries.
      2) Stab wounds to the abdomen
         a) Superficial abdominal wounds (i.e., obviously not penetrating peritoneum) - follow physical exam
            (1) Primary repair if slash
            (2) Leave open if stab
         b) Violation of peritoneum
            (1) Obvious peritoneal irritation requires exploration
            (2) Serial physical examination is suitable to rule out abdominal injury. Need exploration if peritoneal irritation develops.
         c) Questionable abdominal injury - do nothing; follow physical exam.
            (1) If peritoneal signs develop, explore the patient
            (2) 24 hours observation then discharge
   c. Blunt trauma
      1) Mechanism of injury
         a) Compression of hollow or solid viscus against vertebral column
         b) Direct transfer of energy to an organ
         c) Rapid deceleration with tear of organ
         d) Most common organs injured with blunt trauma:
            (1) Liver
            (2) Spleen
            (3) Pancreas
            (4) Duodenum
            (5) Bladder
            (6) Small or large bowel
3. Management
   a. A-B-C-D-E
   b. Intubation
      1) Nasogastric tube
         a) To relieve gastric dilation
         b) To decrease chance of aspiration of gastric and bowel contents
         c) To rule out presence of blood in the stomach
         d) CONTRAINDICATIONS:
            (1) Cribiform plate fracture
            (2) Penetrating neck wounds
         e) If cribiform plate fracture is present, insert orally
      2) Urinary catheter
         a) To monitor urinary output
         b) To evaluate the presence of hematuria
         c) CONTRAINDICATIONS:
            (1) Meatal blood
            (2) Scrotal hematoma
            (3) High riding prostate
         d) If any contraindication is present, do urethrogram first.
      3) Trauma Panscan
         a) Patient with altered mental status or with abdominal pain
         b) No immediate operative procedure contemplated
         c) Patient is stable
      4) Diagnostic ultrasound (FAST)
         Ultrasound can be used to detect the presence of hemoperitoneum by properly trained and credentialed individuals. Ultrasound has a sensitivity, specificity, and accuracy comparable to diagnostic peritoneal lavage and abdominal computed axial tomography in experienced hands. Thus, ultrasound provides a rapid, noninvasive, accurate, and inexpensive means of diagnosing intraabdominal injury (blunt or penetrating) that can be repeated frequently. Ultrasound scanning can be done at the bedside in the resuscitation room while simultaneously performing other diagnostic or therapeutic procedures. The indications for the procedure are the same as for DPL. The only factors that compromise its utility are obesity, the presence of subcutaneous air, and previously abdominal operation.
      5) Peritoneal lavage
         a) Physical exam is most important parameter
         b) Peritoneal lavage indications:
            (1) Patient with altered mental status, or with abdominal pain, past history of shock or high index of suspicion
            (2) Patients who will undergo a long, non-abdominal, operative procedure with the same indications as above.
         c) Insert urinary catheter
         d) Insert nasogastric tube
         e) CONTRAINDICATIONS for peritoneal lavage
            (1) ABSOLUTE
               (a) Multiple abdominal operations
               (b) Obvious indications for explorative celiotomy
            (2) RELATIVE
Gravid uterus: Culdocentesis is an alternative

Peritoneal lavage does not rule out retroperitoneal injury.

4. **Procedure Section**
   a. **Peritoneal Lavage**
      1) Decompress the urinary bladder by inserting a urinary catheter.
      2) Surgically prep the abdomen, i.e., from costal margin to the pubic area and flank to flank, anteriorly. Wear sterile gloves, gown, mask, and hair cover.
      3) **Anesthetize** locally, in the middling, one-third the distance from the umbilicus to the symphysis pubis.
      4) Incise the skin and subcutaneous tissues, vertically, to the fascia. Make sure you have cutaneous hemostasis.
      5) Incise the fascia and the peritoneum.
      6) Insert a peritoneal dialysis catheter into the peritoneal cavity.
      7) After inserting the catheter into the peritoneum, advance and direct the catheter toward either the left or the right pelvis.
      8) Connect the dialysis catheter to a syringe and aspirate.
      9) If gross blood is not obtained, instill normal saline (1 liter 10 ml/kg in children < 50kg) through IV tubing attached to the dialysis catheter.
      10) Gentle agitation of the abdomen distributes the fluid throughout the peritoneal cavity and increases the mixing with blood.
      11) Allow the fluid to remain 5-10 minutes before siphoning it off.
          a) This is done by putting the fluid bag on the floor and allowing the peritoneal fluid to drain from the abdomen through the IV fluid back into the IV bag. Collect at least 200cc’s of the peritoneal fluid.
          b) This may take several minutes.
      12) After the fluid has returned, send samples to the lab for erythrocyte count (unspun).
      13) The following indicates a positive test
          a) RBC > 100,000 mm$^3$
          b) WBC > 500
          c) Amylase > 75
          d) + Bile
          e) + Gram stain
      14) Negative lavage indicates the absence of free blood in the peritoneal cavity and probably the absence of intra-abdominal injuries; it does **NOT** rule out retroperitoneal injuries.
   b. **Pneumatic Anti-Shock Garment (not indicated for in-hospital use)**
      1) Proper application of the trousers
          a) Record the patient’s vital signs.
          b) Unfold the trousers and lay flat on the long spine board.
          c) Carefully slid trousers with the spine board under the patient, maintaining immobility of the spine.
          d) Fold the trousers about the left leg first and fasten.
          e) Fold the trousers around the right leg and fasten.
          f) Attach the air tubes to the connections. Be sure all stopcocks are open.
      2) Inflation of the trousers
a) Recheck the vital signs.
b) Inflate the legs first then the abdomen.
c) Determine the amount of inflation necessary by the patient’s blood pressure response.
d) Inflation should stop when the patient’s BP has reached 100 mmHg systolic.
e) When the optimal blood pressure is obtained, turn the stopcocks to hold the pressure in the suit.
f) DO NOT INFLATE ON THE BASIS OF PRESSURE READINGS IN THE TROUSERS THEMSELVES BUT ON THE BASIS OF THE PATIENT'S BLOOD PRESSURE.
g) **Never exceed** 30 mmHg pressure in the suit.
h) Monitor the patient’s blood pressure and add pressure to the trousers as needed to maintain that pressure.

3) **Deflation of Trousers - IMPORTANT**
   a) Before deflation
      (1) Insert 2 large bore IV catheters in a peripheral vein and reestablish vascular volume.
      (2) Monitor EKG.
      (3) Assemble standby surgical and anesthesiology team.
      (4) The patient can be taken to the O.R. or transported to a definitive care facility with the device inflated.
   b) Deflate trousers slowly while monitoring the blood pressure.
      (1) Stop deflation if the blood pressure falls 5 mmHg and hold at that point until additional fluids are given to return and maintain the patient’s blood pressure.
      (2) Always begin deflation with the abdominal segment first.
      (3) Should the patient experience a sudden fall in blood pressure, the trousers should be re-inflated until more fluid can be given and/or surgical control of the hemorrhage can be carried out.
   c) REMEMBER: Deflation of the trousers without the re-establishment of blood volume will result in profound shock, cardiac arrest and death of the patient. *The greatest danger in the use of this garment is inappropriate removal.*

4) **Contraindications to use of the trousers**
   a) The only absolute contraindication to their use is **Pulmonary Edema**.
   b) Recent information questions their use, and they will probably be phased out.
Extremity Trauma

1. General
   a. Physical examination
      1) Look
         a) Deformities
         b) Swelling
         c) Muscle spasm
         d) Extremity color
      2) Feel
         a) Tenderness
         b) Loss of motion
         c) Crepitation
         d) Distal pulses
         e) Capillary refill
         f) Neurological sensation
   b. Blood loss assessment
      1) Closed injury
         a) Tibial fractures can lose 1 - 1.5 units
         b) Femur fractures can lose 2 units
         c) Pelvic fractures may lose 6 or more units.
      2) Open injury
         a) Look for and stop any overt bleeding by direct pressure
         b) Do not blindly clamp bleeding vessels
   c. Fracture assessment
      1) Look for fractures that correlate with mechanism of injury.
      2) Obtain radiologic exam of joint above and below injury when patient stable to rule out associated injury.
      3) Frequently overlooked fractures:
         a) C-6 and C-7
         b) Clavicular fracture
         c) Wrist fracture
         d) Ankle fracture
   d. Sprain assessment
      1) Grade I sprain: few structural disruptions
      2) Grade II sprain: moderate disruption
      3) Grade III sprain: all structures disrupted
   e. Dislocation assessment
      1) Disruption of joint surface with loss of continuity
      2) Describe injury in reference to distal component relative to proximal component, i.e., anterior dislocation of shoulder.
   f. Fracture dislocations
      1) Higher degree of force required
      2) Dislocations of knee have 50% associated vascular injury
g. **Neurovascular injury**
   1) Always observe for loss of circulation or sensation.
   2) Vessel injury
      a) Assess distal circulation.
      b) Obtain arteriogram when necessary to determine vessel injury.
   3) Nerve injury
      a) Nerves infrequently divided by blunt injury; usually contused.
      b) Penetrating injury may divide nerve (missile or shock wave)
      c) Repair of nerve usually attempted late due to recovery if injury secondary to contusion; transections should be repaired primarily if clean wound.

h. **Compartment injury**
   1) Increased pressure in a closed space may result in ischemia to local and distal structures.
   2) Restoration of the function can be obtained if pressure is reduced in the closed space.
   3) Impending compartment syndrome
      a) **Pain** - first symptom
      b) Paresis - pressure causes sensation loss
      c) Paralysis - pain or necrosis of muscle
      d) Swelling - decrease in venous return
      e) Pallor - loss of capillary refill
      f) Pulselessness - pressure results in decreased arterial flow

i. **Traumatic amputation**
   1) Reimplantation usually not performed under the following circumstances:
      a) Associated life-threatening injuries.
      b) Crushing type injury
      c) Over 40 years of age (variable)
      d) Injuries involving the lower extremity
   2) Preservation of amputated parts
      a) Without cooling most amputated parts will remain viable for 4-6 hours.
      b) With cooling up to 12 hours.
      c) Cleanse amputated part of any debris.
      d) Place in plastic bag with air evacuated out and the bag sealed.
      e) Place bag in ice chest containing ice (not dry ice); transport with the patient.

2. **Management**
   a. **Fractures**
      1) Open fractures: remove gross contamination
         a) Orthopaedic consultation
         b) Assess blood loss and vascular integrity
         c) Splint/immobilize
      2) Closed fractures
         a) Orthopaedic consultation
         b) Splint/immobilize
      3) Traction and/or splinting can reestablish perfusion in some cases.
b. **Joint injuries**
   1) Joint dislocations or fracture dislocations
      a) Top priority after ABC’s
      b) Rapid reduction with Orthopaedic consultation

c. **Extremity splinting**
   1) Leg/Hand/Arm
      a) Remove all jewelry and clothing from extremity.
      b) Use board or molded splint initially.
      c) Remember: Inflatable splints expand at altitude with unpressurized cabin. Watch out for vascular compromise.
      d) Air splints also change size due to temperature. Increase in size from cold to warm environment.
      e) Frequently assess neurovascular status.
   2) Femoral fractures
      a) Usually severe muscle spasm associated; require traction splint.
      b) Maintain traction until definitive treatment by Orthopaedic consult.
Burns

1. General
   a. Airway distress: Clinical signs
      1) Facial burns
      2) Singeing of eyebrows and nasal hair
      3) Carbon deposits and acute inflammatory changes in oropharynx
      4) Carbonaceous sputum
      5) History of confinement in a burning environment.
      6) Respiratory distress
      7) Treatment
         a) Endotracheal intubation (tracheostomy usually contraindicated)
         b) Respiratory support
   b. Intravenous access
      1) 10-20% surface: burn requires support intravenously
      2) Large bore 16 or 14 gauge catheters
      3) Preferred placement peripherally outside of burn area
         a) If no unburned access, may place IV in burned area
         b) Central catheterization may also be used.
   c. Assessment of injury
      1) History of injury
      2) Body surface area burned (See “Rule of Nines”, page 49)
      3) Depth of burn
         a) 1st degree burn
            (1) Reddened skin
            (2) Hair intact
            (3) Painful/Hypersensitive
         b) 2nd degree burn
            (1) Red or mottled appearance
            (2) Swelling/blister formation
            (3) Painful/Hypersensitive
         c) 3rd degree burn
            (1) Dark leathery appearance or waxy white
            (2) Hair easily removed by pulling
            (3) Surface is painless and generally dry
   d. Stabilization of burn victim
      1) Estimate extent and depth of burn
      2) Weigh the patient
      3) Airway
         a) Acute problems: Assess possibility of intubation
            (1) Tracheostomy almost always contraindicated
            (2) Respiratory distress may result from Eschar of chest wall in circumferential burns.
               (a) May require acute release to allow chest wall expansion
4) Circulating blood volume
   a) Requires support if severe burns
   b) Rule of thumb
      (1) Maintain urine output at 1 ml/kg body weight/hr if patient is 30 kg or less.
      (2) Maintain at 50 ml/hr in the adult
   c) Electrolyte infusion rates
      (1) In order to maintain above urine output
      (2) 2-4 ml/kg body weight/percent body surface area burn in 1st 24 hours. 50% of total estimated fluid volume to be infused over 1st 8 hours, with remaining fluid to be infused over the next 16 hours
      (3) Adjust fluid volume on basis of vital signs and urine output.

5) Baseline Determinations
   a) CBC, Type and crossmatch, Carboxyhemoglobin determination, electrolytes, and ABGs required.
   b) Chest roentgenogram

6) Significant burns
   a) Gastric decompression
   b) Narcotics
   c) Topical wound care: antibiotics are not indicated acutely
   d) Tetanus immunization or human immune globulin (see protocol)

7) Criteria for Burn unit
   a) 3rd degree burns greater than 10% of body surface area
   b) Partial thickness burn exceeding 20% of body surface area
   c) Serious burns involving hands, feet, or perineal area
   d) Significant burns associated with fractures or associated major injuries.
   e) High voltage electrical burns with major entrance/exit wounds or renal failure.
   f) Significant inhalation injuries with severe cutaneous burns

   e. Rule of Nines

   While the “rule of nines” is used in the hospital management of severe burns to determine fluid replacement, it can be a useful and practical guide in determining critical, moderate, and minor burn care. The adult body is generally divided into surface areas of 9% (see illustration). Should a third degree burn be reported covering more than 2% of the body surface area (such as the back of the hand and forearm), the person should be referred to the hospital. Similarly, if the burn was second degree and exceeded 10% of the total surface, this person should be referred to the hospital. Any serious burn of the face, hands or feet should be hospital treated. Also burns of the perianal and genitalia areas should be hospital treated as well as those burns which cross flexion creases.
## Depth of Burn

### Second Degree
Second degree burns are of greater depth than first degree burns and involve partial thickness. They result from a very deep sunburn, contact with hot liquids, or flash burns from gasoline flames. They are usually more painful than deeper burns which destroy nerve endings in the skin.

<table>
<thead>
<tr>
<th>Signs and Symptoms</th>
<th>Critical</th>
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<tbody>
<tr>
<td>Red or mottled appearance.</td>
<td>Burns complicated by respiratory tract injury and fractures</td>
</tr>
<tr>
<td>Blisters and broken epidermis</td>
<td>Burns involving more than 20% of body surface</td>
</tr>
<tr>
<td>Considerable swelling</td>
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</tr>
<tr>
<td>Weeping wet surface</td>
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</tr>
<tr>
<td>Painful</td>
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</tr>
<tr>
<td>Sensitive to cold air</td>
<td>Burns involving more than 20% of body surface</td>
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### Third Degree
Third-degree burns cause damage to all layers of the skin and involve subcutaneous tissue. They can be caused by fire, prolonged exposure to hot liquids, contact with hot objects or electricity.

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<td>At first may resemble a second degree burn</td>
<td>Burns involving the critical areas of the face, hands, and feet.</td>
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<td>Broken skin with fat exposed</td>
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<tr>
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TITLE: SBIRT- Screening/Brief Intervention/& Referral to Treatment

PURPOSE: To define guidelines for the identification of patients who are problem drinkers and to identify a process to provide intervention or referral for patients with problem drinking. The guidelines are established to meet the requirements of the American College of Surgeons, Committee on Trauma, Resources for the Optimal Care of the Injured.

POLICY STATEMENT: Through a coordinated interdisciplinary effort, Trauma Services will provide screening, assessment, intervention, and referral services for patients as described in these guidelines. The overall purpose of SBIRT is to improve our community’s health by decreasing problems related to alcohol and its associated factor and contributor to injury morbidity and mortality.

DEFINITIONS:

Definitions of Alcohol-Related Disorders

A variety of terms are used in the scientific literature to describe alcohol use disorders (AUDs) and other conditions characterized by excessive alcohol consumption. AUDs are disorders for which specific diagnostic criteria exist, as defined in two disease classification systems—the Diagnostic and Statistical Manual of Mental Disorders (DSM), devised by the American Psychiatric Association (APA), and the International Classification of Diseases (ICD), by the World Health Organization (WHO).

Definitions of Unhealthy Alcohol Use

The term “unhealthy alcohol use” refers to a spectrum of disorders ranging from at-risk drinking to alcohol dependence. At-risk or hazardous drinking implies that the person is drinking over the recommended limits and is therefore vulnerable to illness, injury, or social/legal problems. These recommended consumption limits are, for men, 2 standard drinks per drinking occasion or 14 standard drinks per week, and, for women and people age 65 and over, 1 standard drink per drinking occasion or 7 drinks per week. A standard drink is defined as 12 grams of pure alcohol, the amount contained in approximately 12 oz of beer, 5 oz of wine, or 1.5 oz of distilled spirits.

Once a person experiences an alcohol-related harmful event—an injury, illness, or social/legal problem such as poor grades, an argument with parents, or a driving violation—he or she is classified as a harmful drinker.
The far end of the spectrum includes alcohol abuse and alcohol dependence as defined by the diagnostic criteria that have been established in the American Psychiatric Association's *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition* (DSM–IV).

**DSM Criteria**

The most recent version of the DSM, the DSM–IV–TR (APA 2000), includes two AUDs, alcohol abuse and alcohol dependence, which have the following diagnostic criteria:

**Alcohol Abuse.** Alcohol abuse is defined as a maladaptive pattern of alcohol use leading to clinically significant impairment or distress, as manifested by the occurrence of one (or more) of the following within a 12-month period:

- Recurrent alcohol use resulting in a failure to fulfill major role obligations at work, school, or home (e.g., repeated absences or poor work performance related to alcohol use; alcohol-related absences, suspensions, or expulsions from school; neglect of children or household).
- Recurrent alcohol use in situations in which it is physically hazardous (e.g., driving an automobile or operating a machine when impaired by alcohol).
- Recurrent alcohol-related legal problems (e.g., arrests for alcohol-related disorderly conduct).
- Continued alcohol use despite having persistent or recurrent social or interpersonal problems caused or exacerbated by the effects of alcohol (e.g., arguments with spouse about intoxication, physical fights).

In addition, the patient must have never met the criteria for alcohol dependence in the past.

**Alcohol Dependence.** Alcohol dependence is defined as a maladaptive pattern of alcohol use leading to clinically significant impairment or distress, as manifested by the occurrence of three (or more) of the following at any time in the same 12-month period:

- Tolerance, as defined by either of the following:
  - A need for increased amounts of alcohol to achieve intoxication or the desired effect.
  - Markedly diminished effect with continued use of the same amount of alcohol.
- Withdrawal, as manifested by either of the following:
  - The characteristic withdrawal syndrome.
  - Use of alcohol to relieve or avoid withdrawal symptoms.
- Drinking alcohol often in larger amounts or over a longer period than was intended.
- A persistent desire or unsuccessful efforts to cut down or control alcohol use.
- A great deal of time spent in activities necessary to obtain alcohol, use it, or recover from its effects.
- Giving up or reducing important social, occupational, or recreational activities because of alcohol use.
Continued alcohol use despite having a persistent or recurrent physical or psychological problem that is likely to have been caused or exacerbated by alcohol (e.g., continued drinking despite recognition that an ulcer was made worse by alcohol consumption).

Alcohol dependence may include physiological dependence if there is evidence of tolerance or withdrawal. If neither of these is present, alcohol dependence is classified as being without physiological dependence.

ICD Criteria

The most recent version of the ICD, ICD-10 (World Health Organization 1993), distinguishes between harmful use and alcohol dependence syndrome. Harmful use is defined as a pattern of alcohol use that is causing damage to health. The damage may be physical (e.g., hepatitis following long-term alcohol use) or mental (e.g., depressive episodes secondary to heavy alcohol intake). Harmful use commonly, but not invariably, has adverse social consequences; social consequences in themselves, however, are not sufficient to justify a diagnosis of harmful use.

The ICD criteria for alcohol dependence syndrome are very similar to those for alcohol dependence in the DSM-IV-TR. They specify that three or more of the following manifestations should have occurred together for at least 1 month or, if persisting for periods of less than 1 month, should have occurred together repeatedly within a 12-month period:

- A strong desire or sense of compulsion to consume alcohol.
- Impaired capacity to control drinking in terms of its onset, termination, or levels of use, as evidenced by either of the following:
  - Alcohol often taken in larger amounts or over a longer period than intended.
  - A persistent desire or unsuccessful efforts to reduce or control alcohol use.
- A physiological withdrawal state when alcohol is reduced or ceased, as evidenced by either of the following:
  - The characteristic withdrawal syndrome for alcohol.
  - Use of the same (or closely related) substance with the intention of relieving or avoiding withdrawal symptoms.
- Evidence of tolerance to the effects of alcohol, such that one of the following occurs:
  - A need for significantly increased amounts of alcohol to achieve intoxication or the desired effect.
  - A markedly diminished effect with continued use of the same amount of alcohol.
- Preoccupation with alcohol, as manifested by one of the following:
  - Giving up or reducing important alternative pleasures or interests because of drinking.
  - Spending a great deal of time in activities necessary to obtain or consume alcohol, or to recover from its effects.
• Persistent alcohol use despite clear evidence of harmful consequences, as evidenced by 
  continued use when the person is actually aware, or may be expected to be aware, of the 
  nature and extent of harm.

In addition to the diagnosis of alcohol dependence, the World Health Organization also uses the 
term “hazardous use,” which describes a pattern of substance use that increases the risk of harmful 
consequences for the user. These may include not only physical and mental health consequences but 
also social consequences. In contrast to hazardous use, hazardous use refers to patterns of use that are 
of public health significance but do not meet the criteria for a current disorder in the drinker. 
However, the term is not a diagnostic term in the ICD-10.

**Other Terms Used**

In addition to these specific diagnostic terms, various other terms are used in the literature, such as 
problem drinking, at-risk drinking, and problematic drinking. These terms can differ in their 
meanings and generally are defined in the context of the specific study.

**AUDIT (Alcohol Use Disorders Identification Test)** is a simple ten question screening test 
which can help to identify individuals who are at high risk for problems from their alcohol use. The 
test was originally developed by the World Health Organization and is used throughout the world. 
The Alcohol Use Disorders Identification Test (AUDIT) can detect alcohol problems experienced 
in the last year. A score of 8+ on the AUDIT generally indicates harmful or hazardous drinking. 
Questions 1–8 = 0, 1, 2, 3, or 4 points. Questions 9 and 10 are scored 0, 2, or 4 only.

**CRAFFT (Acronym)**  Car, Relax, Alone, Forget, Friends, Trouble - keywords in a screening 
questionnaire to identify at-risk teen substance abusers. Center for Adolescent Substance Abuse 
Research; Children's Hospital Boston) The 6 yes/no questions include both alcohol and drug use. 
CRAFFT scores greater than 2 indicates the need for further assessment and possible referral. Based 
on the National Council on alcohol Abuse and Alcoholism Recommended Set of Alcohol 
Consumption Questions (October 15-16, 2003) the following time frame is used for the initial 
screening: 1. in the pre-teen and adolescent population consumption may be more sporadic or 
opportunistic. 2. using a 30-day time frame of individuals under the age of 18 may provide the 
possibility of generalizing to recent episode.
PROCESS ELABORATION: Services include screening (S), brief intervention (BI) and referral to treatment (RT) using the SBIRT model. SBIRT is a prevention and early intervention assessment process regarding the use and/or misuse of alcohol. Patient participation is voluntary.

1) SCREENING – All trauma services admitted activated patients will be screened. Screening will be performed by a designated member of the trauma team.

**STEP 1** ASK ABOUT ALCOHOL USE

**PRESCREEN:** “Do you sometimes drink alcoholic beverages?”

- **NO**
- **YES**

**Screening Complete**

<table>
<thead>
<tr>
<th>Ask</th>
<th>Male</th>
<th>Female</th>
<th>Then</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weekly average</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A. On average how many days a week do you drink alcohol?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B. On a typical day when you drink, how many drinks do you have?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Multiple A x B =</td>
<td>&gt; 14</td>
<td>&gt; 7</td>
<td>Complete AUDIT</td>
</tr>
<tr>
<td>OR</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>What is the maximum number of drinks you have had on any given day in the past month?</td>
<td>&gt; 5</td>
<td>&gt; 4</td>
<td>Complete AUDIT</td>
</tr>
</tbody>
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## COMPLETE AUDIT

<table>
<thead>
<tr>
<th>Zone 1: Score 0 – 7</th>
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</table>
| Abstainers or very low risk users | • Provide information/education material  
|                     | • Remind about situations under which no one should drink  

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<thead>
<tr>
<th>Zone 2: Score 8 – 15</th>
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</table>
| Mild-to-moderate users | • Provide encouragement to take immediate action to reduce risks  
|                     | • Point out risk of continued use  
|                     | • Provide information/education materials  

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<tr>
<th>Zone 3: Score 16 – 19</th>
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</table>
| Moderate-to-high risk users | • Assess patient’s stage of change (precontemplation, contemplation, preparation or action)  
|                     | • Provide Brief Intervention Resource Guide  

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<thead>
<tr>
<th>Zone 4: Score &gt; 20</th>
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</table>
| Very high risk users | • Determine if detoxification is indicated  
|                     | • Coordinate clinical care  
|                     | • Provide Brief Intervention Resource Guide  

Effective Date: 01 July 2007
c) **POSITIVE SCREEN AUDIT:**
   
i. A positive screen is defined as a equal or greater than 14 drinks for males and 7 drinks for females in response to the initial screening question.
   
ii. For all positive screens the AUDIT questionnaire will be used:
   
   1. Place a patient sticker on the AUDIT questionnaire
   2. If the patient can self-complete the form, let them provide their responses to the questions.
   3. If the patient does not want to self-complete the form, read the questions and record the patient’s responses.
   4. If the patient refuses to answer the questions and/or refuses to participate in the AUDIT assessment, document on the bottom of the form the patient’s refusal and any specific statements made by the patient.

   - Score the AUDIT questionnaire. Identify the “at risk level” of the patient and provide feedback and information based on the specific ZONE.
   
   - The AUDIT questionnaire (with a patient ID label) will be sent to Clinical Preventive Medicine Service. The AUDIT questionnaire is not part of the patient’s medical record.

**POSITIVE SCREEN CRAFFT:** 2 or more “YES”

d) **TREATMENT:** Any current physical/behavioral/ or mental condition related to alcohol or substance use is evaluated as part of the total clinical assessment of the patient. Any appropriate consultations, additional assessments, tests or procedures are used in determining the most appropriate disposition of the patient.

Attachments
1. Screening Instrument: AUDIT/ CRAFFT
2. Standard Drink
3. Assessment Based on Diagnosis
4. Motivational Interviewing  NIAAA
5. Appropriate Motivational Strategies for Each Stage of Change
6. Frequenty Asked Questions
7. Information & Referral Resources brochure
8. Performance Tracking Tool example
2) REFERENCES/BIBLIOGRAPHY:


3) REVISION HISTORY:

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<tr>
<th>Effective Date</th>
<th>Version</th>
<th>Approved by</th>
</tr>
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<tr>
<td>November 2006</td>
<td>Discussion Draft</td>
<td>Discussion and review</td>
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<tr>
<td>December 2006</td>
<td>Revised Draft</td>
<td>Discussion and review</td>
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<td>Presented at Trauma Multidisciplinary</td>
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<td></td>
<td>Medical Executive Committee</td>
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Clinical Preventive Medicine Service
Screening/Brief Intervention/& Referral to Treatment

PATIENT: Because alcohol use can affect your health and can increase the incidence of injuries it is important that we ask some questions about your use of alcohol. Your answers will remain confidential, so please be honest. Place an X in one box that best describes your answer to each question.

<table>
<thead>
<tr>
<th>Questions</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. How often do you have a drink containing alcohol?</td>
<td>Never</td>
<td>Monthly or less</td>
<td>2 to 4 times a month</td>
<td>2 to 3 times a week</td>
<td>4 or more times a week</td>
</tr>
<tr>
<td>2. How many drinks containing alcohol do you have on a typical day when you are drinking?</td>
<td>1 or 2</td>
<td>3 or 4</td>
<td>5 or 6</td>
<td>7 to 9</td>
<td>10 or more</td>
</tr>
<tr>
<td>3. How often do you have five or more drinks on one occasion?</td>
<td>Never</td>
<td>Less than monthly</td>
<td>Monthly</td>
<td>Weekly</td>
<td>Daily or almost daily</td>
</tr>
<tr>
<td>4. How often during the last year have you found that you were not able to stop drinking once you had started?</td>
<td>Never</td>
<td>Less than monthly</td>
<td>Monthly</td>
<td>Weekly</td>
<td>Daily or almost daily</td>
</tr>
<tr>
<td>5. How often during the last year have you failed to do what was normally expected of you because of drinking?</td>
<td>Never</td>
<td>Less than monthly</td>
<td>Monthly</td>
<td>Weekly</td>
<td>Daily or almost daily</td>
</tr>
<tr>
<td>6. How often during the last year have you needed a first drink in the morning to get yourself going after a heavy drinking session?</td>
<td>Never</td>
<td>Less than monthly</td>
<td>Monthly</td>
<td>Weekly</td>
<td>Daily or almost daily</td>
</tr>
<tr>
<td>7. How often during the last year have you had a feeling of guilt or remorse after drinking?</td>
<td>Never</td>
<td>Less than monthly</td>
<td>Monthly</td>
<td>Weekly</td>
<td>Daily or almost daily</td>
</tr>
<tr>
<td>8. How often during the last year have you been unable to remember what happened the night before because of your drinking?</td>
<td>Never</td>
<td>Less than monthly</td>
<td>Monthly</td>
<td>Weekly</td>
<td>Daily or almost daily</td>
</tr>
<tr>
<td>9. Have you or someone else been injured because of your drinking?</td>
<td>No</td>
<td>Yes, but not in the last year</td>
<td>Yes, during the last year</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. Has a relative, friend, doctor, or other health care worker been concerned about your drinking or suggested you cut down?</td>
<td>No</td>
<td>Yes, but not in the last year</td>
<td>Yes, during the last year</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


THIS FORM IS NOT PART OF THE MEDICAL RECORD
Clinical Preventive Medicine Service
Screening/Brief Intervention/ & Referral to Treatment

PACIENTE: Debido a que el uso del alcohol puede afectar su salud e interferir con
ciertos medicamentos y tratamientos, es importante que le hagamos algunas preguntas
sobre su uso del alcohol. Sus respuestas serán confidenciales, así que sea honesto por
favor. Marque una X en el cuadro que mejor describa su respuesta a cada pregunta.

<table>
<thead>
<tr>
<th>Preguntas</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. ¿Con qué frecuencia consume alguna bebida alcohólica?</td>
<td>Nunca</td>
<td>Una o menos veces al mes</td>
<td>De 2 a 4 veces al mes</td>
<td>De 2 a 3 más veces a la semana</td>
<td>4 o más veces a la semana</td>
</tr>
<tr>
<td>2. ¿Cuántas consumiciones de bebidas alcohólicas suele realizar en un día de consumo normal?</td>
<td>1 o 2</td>
<td>3 o 4</td>
<td>5 o 6</td>
<td>De 7 a 9</td>
<td>10 o más</td>
</tr>
<tr>
<td>3. ¿Con qué frecuencia toma 5 o más bebidas alcohólicas en un solo día?</td>
<td>Nunca</td>
<td>Menos de una vez al mes</td>
<td>Mensualmente</td>
<td>Semanalmente</td>
<td>A diario o casi a diario</td>
</tr>
<tr>
<td>4. ¿Con qué frecuencia en el curso del último año ha sido incapaz de parar de beber una vez había empezado?</td>
<td>Nunca</td>
<td>Menos de una vez al mes</td>
<td>Mensualmente</td>
<td>Semanalmente</td>
<td>A diario o casi a diario</td>
</tr>
<tr>
<td>5. ¿Con qué frecuencia en el curso del último año no pudo hacer lo que se esperaba de usted porque había bebido?</td>
<td>Nunca</td>
<td>Menos de una vez al mes</td>
<td>Mensualmente</td>
<td>Semanalmente</td>
<td>A diario o casi a diario</td>
</tr>
<tr>
<td>6. ¿Con qué frecuencia en el curso del último año ha necesitado beber en ayunas para recuperarse después de haber bebido mucho el día anterior?</td>
<td>Nunca</td>
<td>Menos de una vez al mes</td>
<td>Mensualmente</td>
<td>Semanalmente</td>
<td>A diario o casi a diario</td>
</tr>
<tr>
<td>7. ¿Con qué frecuencia en el curso del último año ha tenido remordimientos o sentimientos de culpa después de haber bebido?</td>
<td>Nunca</td>
<td>Menos de una vez al mes</td>
<td>Mensualmente</td>
<td>Semanalmente</td>
<td>A diario o casi a diario</td>
</tr>
<tr>
<td>8. ¿Con qué frecuencia en el curso del último año no ha podido recordar lo que sucedió la noche anterior porque había estado bebiendo?</td>
<td>Nunca</td>
<td>Menos de una vez al mes</td>
<td>Mensualmente</td>
<td>Semanalmente</td>
<td>A diario o casi a diario</td>
</tr>
<tr>
<td>9. ¿Usted o alguna otra persona ha resultado herido porque usted había bebido?</td>
<td>No</td>
<td>Sí, pero no en</td>
<td>Sí, el</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. ¿Algun familiar, amigo, médico o profesional sanitario ha mostrado preocupación por un consumo de bebidas alcohólicas o le ha sugerido que deje de beber?</td>
<td>No</td>
<td>Sí, pero no en en</td>
<td>Sí, el</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Total
Appendices
Indications for Whole Body Imaging in Trauma

Pan Scan with:
- CT Head
- CT C-spine with recon
- CT T & L spine with recon
- CT Chest, Abdomen, Pelvis

Mechanism of Injury:
- MVC >40 mph with obvious serious injuries
- Fall >20 ft with obvious serious injuries
- Assault with loss of consciousness
- Auto vs Pedestrian with obvious serious injuries
  and/or
- Altered Mentation
  and/or
- ETOH
  and/or
- Illicit Drugs
  and/or
- GCS <15

YES

Clear with clinical exam
and/or
Perform standard x-rays: CXR, c-spine, pelvis, etc...

NO


Effective: 7/1/07
ABDOMINAL TRAUMA

**ABC’S**

**Blunt**

Hemodynamics

- Stable
- Unstable

**EXAM**

- Normal
- Surgical Abdomen
- Indeterminate
- FAST PANSCAN

**Penetrating**

Hemodynamics

- Unstable
- Stable

**EXAM**

- Surgical Abdomen
- Local Exploration
- FAST DPL
- CT

* If renal injury is suspected, CT is preferred.

*PLEASE NOTE: ADULT PATIENTS WITH BLUNT TRAUMA AND HEART RATE GREATER THAN 120- PERFORM A FAST EXAM.*
The **UTMB Adult Trauma Massive Transfusion Protocol** should be activated by faculty only by phone contact to the Blood Bank laboratory (772-1524). From that point, the Blood Bank will provide packed RBCs, FFP, Platelets, and Cryoprecipitate as outlined in the table below.

<table>
<thead>
<tr>
<th>Round</th>
<th>Packed RBC</th>
<th>FFP</th>
<th>Platelets</th>
<th>Cryoprecipitate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Round 1</td>
<td>6 units</td>
<td>6 units</td>
<td>6 units</td>
<td></td>
</tr>
<tr>
<td>Round 2</td>
<td>6 units</td>
<td>6 units</td>
<td></td>
<td>20 units</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Must draw &amp; order fibrinogen level after cryo &amp; before infusion of NovoSeven®</td>
</tr>
<tr>
<td>Round 3</td>
<td>Recombinant factor VIIa (NovoSeven®) 40 micrograms/kg</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>d</strong>osage to be determined by requesting physician; Blood Bank faculty physician may be consulted if necessary**</td>
</tr>
<tr>
<td>Round 4</td>
<td>6 units</td>
<td>6 units</td>
<td>6 units</td>
<td></td>
</tr>
<tr>
<td>Round 5</td>
<td>6 units</td>
<td>6 units</td>
<td></td>
<td>10 units</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Must draw &amp; order fibrinogen level after cryo &amp; before infusion of NovoSeven®</td>
</tr>
<tr>
<td>Round 6</td>
<td>NovoSeven® 40 micrograms/kg</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Blood Bank faculty physician must give verbal approval to the blood bank technologist to dispense a second dose of NovoSeven or additional blood products for Round 6 and beyond.</td>
<td></td>
</tr>
</tbody>
</table>

The cycle of packed RBCs, FFP, Platelets, and Cryoprecipitate is then repeated if needed.

Additional components or NovoSeven® may be given as determined by the attending physician in collaboration with the faculty Blood Bank physician.

To prevent wastage of blood components and other Blood Bank resources, it is extremely important to deactivate the MTP as soon as it is determined the patient does not need blood components as per protocol. **Please deactivate the MTP by calling the Blood Bank at 772-1524.**

Post-utilization review: Whenever the massive transfusion protocol is activated for a patient, there will be a review of its use by members of the Blood Bank staff, the Transfusion Committee, and the attending physician that asked for implementation of the protocol. The monthly review meeting occurs on the last Monday of the month at 4:00 p.m.


“In combat casualties requiring major resuscitation 10-40 units of blood products, we have found as little as 5-8L of crystalloid are utilized during the first 24 hours Representing a decrease of 50%.......the lack of intraoperative coagulopathic bleeding has been remarkable.

**Identifying patients who will require “Massive Transfusion”**

BP < 70  pH < 7.10  BD > 6.0  ISS > 25  Temp < 34C  INR > 2.0
Solumedrol Dosing for Spinal Cord Injuries

Current data on the use of this protocol remains controversial. Patients who exhibit signs of an incomplete cord injury may benefit from the solumedrol protocol. Patients with signs of complete cord injuries may not benefit from the use of this protocol.

Use of this protocol is at the discretion of the Trauma Faculty and or Spine Faculty.

Initial bolus

30 mg/kg bolus over 30 minutes

5.4 mg/kg/hr over remaining 23 hours
Bowel Training in Quadriplegic Patients

1. Colace 100 mg PO BID.

2. Every day (at the same time each day) the following steps are followed:
   a) Place Dulcolox suppository 10 mg PR
   b) Wait 15 minutes
   c) Digital stimulation in clockwise motion for 1 minute
   d) Repeat steps b and c more times if no BM

   Goal is to achieve BM every day, but if no BM obtained no further interventions are attempted.

3. PRN orders for Fleets or mineral oil enemas are on the chart but are only to be used if no BM in 48 hours.
Guidelines for

Non-operative management of Spleen injuries

EXCLUSIONS

Hypotension (BP confirmed <90) in the ER or ICU
Significant Hemoperitoneum or Blush on CT scan
Neuro trauma which precludes serial exam, severe CHI, spinal cord injury
Orthopedic injuries requiring immediate prolonged operative time or positioning which precludes emergent Laparotomy
Patient taking Anticoagulants

ELIGIBLE FOR NON-OPERATIVE MANAGEMENT

Hemodynamically normal
No other Major Operative interventions required emergently

Admit to ICU
Serial CBC q6h
Bed rest
If stable for 24 hours, transfer to floor
Continue to monitor CBC q 12 hours
No Lovenox or Heparin
Maintain bed rest for total 72 hours and monitor CBC for at least 24 hours post ambulation
Prior to discharge patients should be educated on their continued risk for bleeding. Any behavior that may cause undue stress on the abdomen should be avoided until cleared by the Trauma Surgeon. Behaviors to avoid include contact sports

Drop in hemoglobin of >4 grams over 12 hours or transfusion 2 units PRBC’s indicates failure of non-operative management.
# GLASGOW COMA SCORE

<table>
<thead>
<tr>
<th>EYE OPENING</th>
<th>BEST VERBAL RESPONSE</th>
<th>BEST MOTOR RESPONSE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spontaneous = 4</td>
<td>Oriented = 5</td>
<td>Obeys commands = 6</td>
</tr>
<tr>
<td>To Voice = 3</td>
<td>Confused = 4</td>
<td>Localizes to pain = 5</td>
</tr>
<tr>
<td>To Pain = 2</td>
<td>Inappropriate words = 3</td>
<td>Withdraws to pain = 4</td>
</tr>
<tr>
<td>None = 1</td>
<td>Incomprehensible sounds = 2</td>
<td>Flexion to pain = 3</td>
</tr>
<tr>
<td></td>
<td>None = 1</td>
<td>Extension to pain = 2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>None = 1</td>
</tr>
</tbody>
</table>
Medicare Patients: Observation or Inpatient Admission?

- **Observation is appropriate**
  - Yes
  - Can the patient's condition be evaluated/treated within 24 hours and/or is rapid improvement of patient's condition anticipated within 24 hours?
  - Yes
  - Observation is appropriate
  - No
  - Inpatient admission is appropriate (outpatient, home health care, extended care facility).
- **Unsure**
  - Does the patient's condition require treatment/further evaluation that can only be provided in a hospital setting (i.e., inpatient, or observation)??
  - Yes
  - Observation is appropriate
  - No
  - Additional time is needed to determine if inpatient admission is medically necessary; observation is appropriate.

Source: TMF
When do I call STA?

- When a patient’s death is imminent

**What is “imminent death”?**

- A patient with an acute brain injury and;
- Who requires mechanical ventilation; and
- Who is in an Intensive Care Unit or Emergency Department; and
- Has clinical findings consistent with a Neuro injury (absence of two brain stem reflexes such as pain, gag, cough, corneal reflexes, respiratory) or;
  - For whom physicians are evaluating a diagnosis of brain death or;
  - For whom has ordered that life-sustaining therapies be withdrawn, pursuant to the family’s decision

- Prior to brain death
- The absence of 2 or more brain stem reflexes.
- Prior to an end-of-life discussion with the family.
- When a family asks about donation.
- After cardiac death on non-vented patients.

**Best Practices demonstrate, Federal Regulations & Joint Commission Mandate:**

- All deaths must be called to STA. More importantly, “imminent deaths” must be called to STA in a “timely manner”.
- STA physicians are the only ones who can determine medical suitability.
- If the potential donor is medically suitable, the family must be given the option of donation.
- **Only STA staff or those trained and certified by STA are to approach families about organ donation.**
  - STA Coordinators reinforce the explanation of brain death and answer questions.
  - STA Coordinators are trained in grief support and present the opportunity for organ donation.

**What is considered to be “timely manner?”**

- Before or at pronouncement of brain death.
- Documentation of at least two absent brain stem reflexes (the patient must be maintained on continuous ventilation.)
- Prior to discussing termination of life support, allowing sufficient time for on-site response, evaluation and request/consent by STA staff.

Anyone can call Southwest Transplant Alliance to request a consultation.

- **24 HOUR REFERRAL LINE: 1-800-201-0527**
Clarification or questions related to this manual should be forwarded to the Chief of Trauma at 772-9066.