This handbook is meant to provide supplemental reading and guideline material for the residency program of the UT College of Medicine Chattanooga Unit Department of Surgery.

Mention of specific commercial equipment or therapeutic agents does not constitute endorsement by the UT College of Medicine; trade names are used only for clarity of purpose. It is the responsibility of the licensed medical provider to decide how best to use available therapy in the best interests of the patient. Every effort has been made to check drug doses specified in these guidelines. However, the responsibility to check doses lies with the practitioner.

Every effort has been made to make this handbook consistent with official policy and doctrine. However, the information contained in this handbook is not official UT College of Medicine policy or doctrine, and it should not be construed as such unless it is supported by other documents.
Erlanger Health System
Shock Trauma Survival Guide
(Tenth Edition, 2016 Version 1)

Editors

Angela Basham-Saif, BSN, RN
Trauma Program Manager
Erlanger Health System

Beth Jordan, BSN, RN
Trauma/Ortho Service Line Administrator
Erlanger Health System

S. Lori Neal, RN, MSN, ACNP-BC, FNP-BC
Chief Editor
Trauma Services Nurse Practitioner
Erlanger Health Systems

Acknowledgements

Phillip Burns, MD, FACS
Chairman, Dept. of Surgery
Erlanger Health System

Philip Smith, MD, FACS
Associate Professor-
UT College of Medicine, Chatt. Unit, Department of Surgery
Medical Director, Trauma Services
Erlanger Health System
Contributing Authors

Donald E. Barker MD, FACS
Professor Surgery –
UT College of Medicine, Chatt. Unit, Department of Surgery
Medical Director, LifeForce, Erlanger Health System

Benjamin Dart, MD, FACS
Associate Professor –
UT College of Medicine, Chatt. Unit, Department of Surgery
Erlanger Health System

Robert Maxwell, MD, FACS
Director, Critical Care Fellowship;
Professor – UT College of Medicine, Chatt. Unit, Department of Surgery
Director – Shock Trauma ICU; Director – SICU
Erlanger Health System

Darren, J. Hunt, MD, FACS
Associate Professor--
UT College of Medicine, Chatt. Unit Department of Surgery
Erlanger Health System

Vicente Mejia, MD, FACS
Associate Professor –
UT College of Medicine, Chatt. Unit, Department of Surgery
Erlanger Health System

Philip Smith, MD, FACS
Associate Professor –
UT College of Medicine, Chatt. Unit, Department of Surgery
Medical Director, Trauma Resuscitation Team
Erlanger Health System
Table of Contents

Introduction/General Information ........................................................................................................ 6
Beeper #’s .............................................................................................................................................. 7
Policies and Protocols:
Trauma Alert Policy # 7135.33A ........................................................................................................... 9-13
Trauma Activation Criteria Chart ....................................................................................................... 14
All Quiet-EMS Transfer of Care # 7135.114 ....................................................................................... 15
Assessment (Initial) ............................................................................................................................... 16-19
Bladder Scanning Process #PC-221 .................................................................................................... 20
Bladder Protocol # 7135.220 (for Para & Quadriplegia) ................................................................. 21-22
Bowel Protocol # 7135.221 (Neurogenic) ......................................................................................... 23-25
Blunt Cerebrovascular Injury and Treatment Protocol ................................................................. 26-27
Bundle Consent .................................................................................................................................. 28-32
Central Line Management # 7135.204 .............................................................................................. 33-34
Chest Tube Management #7135.203 .................................................................................................. 35-36
Continuous Renal Replacement Therapy Policy #8029.023 .......................................................... 37-39
Determination of Brain Death # 8316.004 ...................................................................................... 40-46
Digital Stimulation # 7135.222 ........................................................................................................... 47
DVT/Venous Thromboembolism Guideline # 7135.202 ................................................................... 48-51
Enteral Feeding # 7135.16A .................................................................................................................. 52-54
Extremity Vascular Trauma # 7135.217 .............................................................................................. 55
Flexion/Ext. for Awake Trauma Patients # 7135.207-2 .................................................................... 56
Gastric Residual Guidelines ............................................................................................................... 57
Hypothermia Guideline # 7135.206 .................................................................................................... 59
Informed Consent PC-014 Consent to Treat ....................................................................................... 60-62
Instructions for filling out the Blood Transfusion Order Set ......................................................... 63
Massive Blood Resuscitation Protocol # 7135.215 ......................................................................... 64-66
MD Duties- Trauma Resuscitation Team # 7135.07A ....................................................................... 67-68
Neurosurgical Consultation # 7135.31B ............................................................................................ 69-70
Pregnant Trauma Patient .................................................................................................................... 71
Rapid Sequence Induction # 7135.111 .............................................................................................. 72
Rapid Weaning Guideline#7135.200 .................................................................................................. 73-74
Rapid Weaning Guideline ARDS #7135.208-1 .................................................................................. 75
Removal of Urinary Catheter by Nursing #PC-217 .......................................................................... 76
Screening, Brief Intervention & Referral to Treatment (SBIRT) ....................................................... 77-79
Sepsis Protocol # 7135.218 .................................................................................................................. 80-83
Spine Assessment & Cord Injury # 7135.207 ................................................................................... 84-85
Resuscitative Thoracotomy # 7135.211 ............................................................................................ 86
Trauma Transfer Guideline # 7135.210 ............................................................................................ 87
Trauma Transfer to Ortho Service # 7135.33A .................................................................................. 88
Traumatic Brain Injury Evaluation and Management # 7135.216 .................................................. 89-94
Traumatic Wound Closure # 7135.212 ............................................................................................ 95-96
Urine with Reflex to Culture Protocol ............................................................................................... 97
APPENDIX A: Medications (Common Narcotics, Anti-Seizure Proph, and Common gtts)............. 98-101
APPENDIX B: Assessment & Injury Scales (GCS, Los Ranchos& Inj Score, etc) ......................... 102-108
APPENDIX C: Order set Quick List ................................................................................................. 109-111
Erlanger Health System is designated as a Level I Trauma Center by the State of Tennessee Department of Health. A Level I designation is the highest level of definitive and comprehensive emergency and trauma care for patients with complex injuries. A Trauma Team consisting of emergency physicians, trauma surgeons, neurosurgeons, critical care doctors, anesthesiologists, radiologists, nurses and CT techs are in-house, 24 hours-a-day and immediately available to the trauma patient. The Level I Trauma Center at Erlanger Health System has provided life-saving trauma care to Tennessee, Georgia, Alabama and North Carolina residents since 1988. In addition to treating the seriously injured, clinical faculty affiliated with the Level I Trauma Center at Erlanger and the University of Tennessee College of Medicine Chattanooga Unit conducts research and educates other health care professionals about the most recent advances in trauma care. Our trauma center features a multidisciplinary team of board certified doctors, nurse practitioners, nurses and technicians ready to treat the most severely injured patients 24 hours a day, 7 days a week. Comprehensive trauma care services include dedicated, state-of-the-art trauma resuscitation rooms, operating rooms, intensive care units, step-down unit, trauma surgery floor, radiology and a 64-slice CT scanning.

The following is a list of people directly associated with the Trauma/Surgical Critical Care department at Erlanger Health System:

<table>
<thead>
<tr>
<th>Name</th>
<th>Pager</th>
</tr>
</thead>
<tbody>
<tr>
<td>Donald Barker, M.D.</td>
<td>514-2072</td>
</tr>
<tr>
<td>Benjamin Dart, M.D.</td>
<td>490-1025</td>
</tr>
<tr>
<td>Darren Hunt, MD</td>
<td>Pager - 5400</td>
</tr>
<tr>
<td>Robert Maxwell, M.D.</td>
<td>514-7939</td>
</tr>
<tr>
<td>Vincent Mejia, M.D.</td>
<td>490-1063</td>
</tr>
<tr>
<td>Philip Smith, M.D.</td>
<td>490-1760</td>
</tr>
<tr>
<td>Pat Lewis, RN, Research Nurse</td>
<td>Pager - 5186</td>
</tr>
<tr>
<td>Beth Jordan, RN, Trauma/Ortho Service Line Administrator</td>
<td>Pager – 4643, Ext. 6704</td>
</tr>
<tr>
<td>Angela Basham-Saif, RN, Trauma Program Manager</td>
<td>Ext 7229</td>
</tr>
<tr>
<td>Sandy Wolfe, RN, Clinical QI Coordinator</td>
<td>Ext 6705</td>
</tr>
<tr>
<td>Regena Young, RN, Outreach &amp; Injury Prevention Coordinator</td>
<td>Ext 5620</td>
</tr>
<tr>
<td>Heather Kelly, Trauma Registrar</td>
<td>Ext 6709</td>
</tr>
<tr>
<td>Christina Ware, Trauma Registrar</td>
<td>Ext. 2274</td>
</tr>
<tr>
<td>Jammie Dill-Pickel, NP</td>
<td>Pager – 1417, Ext. 6707</td>
</tr>
<tr>
<td>S. Lori Neal, NP</td>
<td>Pager – 1417, Ext. 6707</td>
</tr>
<tr>
<td>Jennifer O’Neal, NP</td>
<td>Pager – 1417, Ext. 6707</td>
</tr>
<tr>
<td>Trauma Nurse “Red Shirt”</td>
<td>Pager – 1891, Ext. 6742</td>
</tr>
</tbody>
</table>
Critical Care Nurse Clinicians (aka “Red Shirts”) can be reached at pager #1891 or ext. 6742.

The team consists of the following members:
Jessica Appleby, RN
Heather Bell, RN
Courtney Gross, RN
Jana Jackson, RN
Jill Hale, RN
Katie Johnston, RN
Vanessa Korter, RN
Renee Mills, RN
Emily Pittman, RN
Jared Weber, RN
Kayla Whitaker, RN
David Wolfkill, RN

Trauma Nurse Practitioners can be reached at pager # 1417 or ext. 6707

Trauma NP team consists of the following members:
Jammie A. Dill, MSN, FNP-BC, ACNP-BC
S. Lori Neal, MSN, FNP-BC, ACNP-BC

Call members of this team for questions re: hospital processes, trauma guidelines & protocols and advanced procedures.
POLICIES

And

Protocols
TRIUMA ACTIVATION CRITERIA
Trauma Alert Policy (Adult) #7135.33A

Policy statement: In order to provide an immediate systematic approach to the care of the critically injured adult trauma patient, we have developed a tiered trauma response based on American College of Surgeons COT guidelines. This is done in an effort to match the resources of the Level 1 Trauma Center to the needs of the injured patient.

Scope: Trauma Services, Trauma Attending Physicians, Trauma Nurse Practitioner, Emergency Department (ED) Nursing and support staff, Trauma Committee Members, Critical Care Nurse Clinician, Life Force, Surgery House Staff, ED physicians, Operating Room, Anesthesia, Radiology, Respiratory Therapy, Laboratory/blood bank, Medical Affairs and Executive Management.

Procedure:
I. **Level One Trauma Alert** will be initiated by the ED physician or Trauma Surgeon within 15 minutes prior to arrival of trauma patients who meet one or more of the following criteria; or who after arrival, are found to meet one or more of the following criteria after examination by the ED physician or Trauma Surgeon:
   - GCS < 9 with traumatic mechanism or
   - Confirmed Systolic BP < 90 or
   - HR > 120
   - Intubated patients transferred from the scene of trauma OR
   - Patients who have respiratory compromise or are in need of an emergent airway
     - Includes intubated patients who are transferred from another facility with ongoing respiratory compromise (does not include patients intubated at another facility who are not stable from a respiratory standpoint)
   - New paralysis or suspected spinal cord injury
   - Any patient receiving blood transfusion or ongoing volume resuscitation to maintain vital signs
   - Gunshot wounds to the head, neck, torso or extremities proximal to the elbow/knee

**Level One Alert - Trauma Team Response- the following personnel will be alerted:**
1. Trauma Attending
2. Designated Trauma Senior Resident (PGY 4 or above)
3. Designated Trauma Junior Resident
4. ED physician
5. Trauma Nurse Practitioner
6. Critical Care Nurse Clinician
7. ED Nurse
8. ED Technician
9. ED Radiology
10. Respiratory Therapist
11. ED Charge RN
12. Guest Representative and/or Chaplain
13. Registration
14. Blood Bank
15. Operating Room
16. Anesthesia
17. Security

Documentation, Labs, and Radiology:
1. The Major Trauma history and physical form will be completed
2. The Nursing Trauma Flow Sheet will be completed
3. A Level One Trauma Panel will be collected to include:
   a. I-Stat 10 (Na, K, CL, tCO2, Glu, BUN, Cr, iCa, Hct, anion gap)
   b. PT/PTT
   c. Platelet Count
   d. Lactate (if indicated)
   e. Type and Screen
4. Radiology test will include:
   a. Portable chest x-ray
   b. Others as ordered
   c. Computerized Tomography Head, Neck, Thorax, Abdomen, and Pelvis as needed

5. Other tests will include:
   a. Electrocardiogram
   b. Others as ordered

II. **Level Two Trauma Alert** will be initiated by the ED physician or Trauma Surgeon within 15 minutes prior to arrival of trauma patients who do not meet the Level One Trauma Alert criteria but do meet one or more of the following criteria; or who after arrival are found to meet one or more of the following criteria after examination by the ED physician or Trauma Surgeon:
   - Stab wound to the head, neck, chest, or torso
   - Unstable pelvic fracture
   - Two or more proximal long bone fractures
   - Fall >20 feet with obvious signs of trauma
   - Motorcycle crash >20 MPH with obvious signs of trauma
   - High risk auto crash:
     - Intrusion (including roof) >12 inches into the passenger compartment
     - Ejection (partial or complete) from vehicle
     - Death of occupant in same passenger compartment
   - Signs of significant blunt torso trauma including but not limited to:
     - Absent breath sounds; chest wall instability, or deformity
     - Abdominal seatbelt sign
   - GCS 9-13 with mechanism attributed to trauma
   - Crushed, degloved, mangled, amputated, or pulseless extremity proximal to the elbow or ankles
   - Pregnancy >20 weeks with suspected abdominal or pelvic trauma
   - Hemodynamically stable intubated patients that are transferred from another facility

**Level Two Alert - Trauma Team Response** - the following personnel will be alerted:
1. Trauma Attending
2. Designated Trauma Senior Resident (PGY 3 or above)
3. ED physician
4. Trauma Nurse Practitioner
5. Critical Care Nurse Clinician
6. ED Nurse
7. ED Technician
8. ED Radiology
9. Respiratory Therapist
10. ED Charge RN
11. Guest Representative and/or Chaplain
12. Registration
13. Security
14. Maternal Fetal Medicine (MFM) with unstable pregnant patient

**Documentation, Labs, and Radiology**
1. The MajorTrauma history and physical form will be completed
2. The Nursing Trauma Flow Sheet will be completed
3. A Level Two Trauma Panel will be collected to include:
   a. I-Stat 10 (Na, K, Cl, tCO2, Glu, BUN, Cr, iCa, Hct, anion gap)
   b. PT/PTT
   c. Platelet Count
   d. Lactate (if indicated)
   e. Type and Screen
   f. ABG (if indicated)
   g. Pregnancy test on all females of childbearing age
4. Radiology test will include:
   a. Portable chest x-ray
   b. Others as ordered
   c. Computerized Tomography Head, Neck, Thorax, Abdomen, and Pelvis as needed

5. Other tests will include:
   a. Electrocardiogram
   b. Others as ordered

III. Level Three Trauma Alert will be initiated by the ED physician within 15 minutes prior to arrival of trauma patients who do not meet the Level One or Two Trauma Alert criteria but do meet one or more of the following criteria; or who after arrival are found to meet one or more of the following criteria after examination by the ED physician:
   - Fall from any height on anticoagulant medication with signs of head trauma not meeting Level 1 or 2 activation criteria
   - Trauma with altered mental status (amnesic to events, GCS 14-15, positive LOC)
   - Questionable chest and/or abdominal injury from trauma
   - Diminished pulses in an extremity with signs of trauma
   - Auto vs. Pedestrian/Bicyclist thrown, run over, or with significant (>20 MPH) impact
   - ANY Burns >40% BSA or inhalation injury
   - Transfers not meeting Level 1 or 2 activation criteria
   - Trauma in the Elderly Population
     - Patients of advanced age >55 years
     - SBP <110 may represent shock after age 65
     - Patients with significant cardio or respiratory co-morbidities
   - Physician Discretion

**If after evaluation of the patient by the ED physician it is determined that the patient’s condition warrants a higher activation; physician may upgrade based on the set criteria.**

**For patients on anticoagulants with suspected head injury: CT of the head should be obtained immediately; time to CT should not exceed 30 minutes from the patient’s arrival to the ED.**

**For patients needing to be admitted to the hospital an immediate consult to the trauma service is warranted.**

Level Three Alert - Trauma Team Response- the following personnel will be alerted to respond to the patient’s bedside for evaluation and treatment immediately upon patient’s arrival: (The ED physician should be at the bedside no less than 30 minutes after the patient’s arrival)
1. ED Physician
2. Emergency Department Nurse as Primary Nurse
3. Critical Care Nurse Clinician as a facilitator of care when available for initial evaluation
4. Emergency Dept Technician
5. Emergency Radiology
6. Respiratory Therapist
7. Registration
8. Security

Documentation, Labs, and Radiology:
1. The Major Trauma History and Physical form will be completed
2. The Nursing Trauma Flow Sheet will be completed
3. A Level Three Trauma Panel will be collected to include:
   a. I-Stat 10 (Na, K, Cl, tCO2, Glu, BUN, Cr, iCa, Hct, anion gap)
   b. PT/PTT
   c. Platelet Count
   d. Pregnancy test on all females of childbearing age
4. Radiology test will include:
   a. Portable chest x-ray
   b. Computerized Tomography Head, Neck, Thorax, Abdomen, and Pelvis as needed
   c. Other tests as ordered
5. Other tests will include:
   a. Electrocardiogram
   b. Others as ordered

VI. **Trauma Evaluation/Consult** will be obtained on patients who do not meet either the Level One or Level Two Trauma Alert criteria, but who after initial physician evaluation have injuries which require Trauma Service admission or further evaluation by a trauma surgeon. Trauma evaluation can occur anywhere in the hospital.

**The ER Physician will call the Trauma Chief, who will respond to the ER or designate someone to respond, to evaluate the patient within 1 hour.**

**If the patient deteriorates after arrival to the Emergency Department, the status may be changed at any time.**

**Trauma Evaluation / Consult Response:**
1. Trauma Attending
2. Designated Trauma Resident (PGY 3 or above)
3. Additional support personnel and/or Critical Care Nurse Clinician optional – by request of Trauma Chief/Resident

**Documentation, Labs, and Radiology:**
1. The Major Trauma History and Physical, a written note, and or a dictated consult will be completed as appropriate along with standard ED forms.
2. A Level Three Trauma Panel will be collected to include:
   a. I-Stat 10 (Na, K, CL, tCO2, Glu, BUN, Cr, iCa, Hct, anion gap)
   b. PT/PTT
   c. Platelet Count
   d. Pregnancy test on all females of childbearing age
3. Radiology test will include:
   a. Portable Chest X-Ray
   b. Computerized Tomography Head, Neck, Thorax, Abdomen, and Pelvis as needed
4. Other tests will include:
   a. Electrocardiogram as needed
   b. Others as ordered

Special consideration should be given to obtaining trauma evaluation for patients with:
- Age > 55
- Cardiac disease
- Respiratory disease
- Insulin-dependent DM
- Cirrhosis
- Morbid obesity
- Pregnancy
- Bleeding disorders
- Immunosuppression
- Anticoagulants

**Notification**
In the event the prehospital information or initial examinations (for the cases that arrive without prior notification) indicated a need for Trauma Alert Activation, the ED physician should initiate the appropriate Trauma Team response.

To alert personnel for a Level One, Two or Three Trauma Alert, the ED will page via wireless office for “Trauma BEH,” and provide the following information:

**State**- Level of Trauma alert:
   Level One Trauma Alert
   Level Two Trauma Alert
Level Three Trauma Alert

**Mechanism of Injury (MOI)** - (MVC, fall, GSW, etc.; if penetrating, state location of injury)
- a. Age
- b. Sex
- c. Vital signs (VS)- stable or unstable
- d. Intubated- Yes/No
- e. Estimated time of arrival (ETA) in minutes (or NOW if patient is in the ED)
- f. Mode of arrival- air or ground
- g. ED room number

The notification process will be as follows:

1. **ED Charge nurse notifies:**
   - a. ED physician
   - b. Registered Nurse- (1 ED RN to assigned to assist the trauma team)
   - c. ED unit clerk
   - d. ED patient representative
   - e. ED patient care technicians

2. **ED unit clerk:**
   - a. Activates Trauma pager
   - b. Notifies registration personnel
   - c. Call Anesthesia (if requested)

3. **Trauma Chief Resident notifies:**
   - a. Operating room (if applicable)
   - b. Appropriate sub-specialities (if applicable)
ERLANGER TRAUMA SERVICES ACTIVATION CRITERIA

1. If the injury falls into any of the above category, FIRE LEVEL 1 Trauma Alert
   - GCS <9 with trauma mechanism or
   - Confirmed Systolic BP <90 or
   - HR >120
   - Intubated patients transferred from the scene of trauma, OR
   - Patients who have respiratory compromise or are in need of an emergent airway
     - Includes intubated patients who are transferred from another facility with ongoing respiratory compromise (does not include patients intubated at another facility who are now stable from a respiratory standpoint)
   - New Paralysis or suspected spinal cord injury from trauma
   - Any patient receiving blood transfusions or ongoing volume resuscitation to maintain vital signs
   - Gunshot wounds to the head, neck, torso, or extremities proximal to the elbow/knee

   If not………..

2. Stab wound to the head, neck, torso
   - Unstable pelvis fracture
   - Two or more proximal long bone fractures
   - Fall >20 feet with obvious signs of trauma
   - Motorcycle crash >20 MPH with obvious signs of trauma
   - High risk auto crash:
     - Intrusion (including roof) >12 inches passenger compartment
     - Ejection (partial or complete) from vehicle
     - Death of occupant in same passenger compartment
   - Signs of significant blunt torso trauma including, but not limited to:
     - Absent breath sounds; chest wall instability, or deformity
     - Abdominal seatbelt sign
   - GCS 9-13 with mechanism attributed to trauma
   - Crushed, degloved, mangled, amputated or pulseless extremity proximal to the elbow or ankles
   - Pregnancy >20 weeks with suspected abdominal or pelvic trauma
   - Hemodynamically stable intubated patients that are transferred from another facility

   If the injury falls into any of the above category, FIRE LEVEL 2 Trauma Alert
   If not………..

3. Fall from any height on anticoagulant medication with signs of head trauma not meeting Level 1 or 2 activation criteria
   - Trauma with altered mental status (amnesic to events, GCS 14-15, positive LOC)
   - Questionable chest and/or abdominal injury from trauma
   - Diminished pulses in an extremity with signs of trauma
   - Auto vs. Pedestrian/bicyclist thrown, run over, or with significant (>20 MPH) impact
   - ANY Burns >40% BSA or inhalation injury
   - Transfers not meeting Level 1 or 2 activation criteria
   - Trauma in the Elderly Population
     - Patients of advanced age >55 years
     - SBP <110 may represent shock after age 65
     - Patients with significant cardio or respiratory co-morbidities
   - Physician Discretion

   If the injury falls into any of the above category, FIRE LEVEL 3 Trauma Alert
All Quiet – EMS Transfer of Care
# 7135.114

**SCOPE:** Trauma Services, ED Staff and Physicians, Trauma Surgery physicians and Residents.

**OBJECTIVE:** To provide a systematic approach of receiving patients from pre-hospital care providers and the initial assessment of ABC’s of the trauma patient.

**POLICY:** Upon activation of the “Major Trauma Protocol” pager all personnel required to the activation will don appropriate personnel protective equipment (PPE). Upon the patient entering the trauma room with the pre-hospital care providers the following will occur:

1. There will be silence among all staff in the trauma room. **“All Quiet”**
2. The ED physician and/or Trauma chief will assess the following and verbally express his/her findings and do appropriate interventions when a problem is identified.

**A = Airway**
- Patency
- Without obstructions
- OETT – verify placement and verbalize
- NETT – verify placement and verbalize
- Surgical airway
- Obstructions
  - None
  - Blood
  - Teeth
  - Edema
  - Vomitus
  - Foreign body
  - Trismus

**B = Breathing**
- Effort
- Spontaneous
- Labored
- Retractions
- Assisted
- Breath Sounds (Bilaterally)
  - Clear
  - Decreased
  - Absent
  - Rhonchi

**C = Circulation**
- Pulses
  - Central and peripheral
  - Weak peripheral
  - Central only
  - Absent
- Control Hemorrhage

**After the Primary Survey is completed and appropriate interventions have been done the following will occur:**
- The pre-hospital providers will give a brief verbal report to the trauma team and answer any questions regarding pre-hospital treatment.
- Upon completion of report the pre-hospital team will be released without further delay
Assessment (Initial trauma)

**Policy:** To provide a systematic approach to assessment and management of the critically injured adult trauma patient.

**Scope:** All trauma patients admitted or consulted to the Trauma Service.

**Procedure:**

I. **Primary Survey**

Trauma patients are assessed and treatment priorities established based on their injuries, vital signs, and mechanism of injury. Vital functions must be assessed quickly and efficiently and logical sequential treatment priorities must be established based on overall patient assessment. Patient management consists of primary survey, resuscitation of vital functions, detailed secondary survey, and definitive care. These constitute the ABCDE's of trauma care:

- **A** – Airway maintenance with cervical spine protection
- **B** – Breathing and ventilation
- **C** – Circulation with hemorrhage control
- **D** – Disability: Neurologic status
- **E** – Exposure/Environmental control: completely undress the patient, but prevent hypothermia

A. **Airway** – The airway should be assessed first to ascertain patency. If the patient is able to verbalize, the airway is not likely to be in immediate jeopardy; however, repeated assessment of airway patency is prudent. Additionally, severely head injured patients with an altered level of consciousness or a Glasgow Coma Scale (GCS) score of 8 or less usually requires intubation.

a. **Assess** for airway obstructions
   1. Foreign bodies.
   2. Facial, mandibular, or tracheal/laryngeal fractures can result in airway obstructions.
   3. Blood
   4. Vomitus
   5. Broken teeth
   6. Tongue

   **If an obstruction is present, suction or remove the obstruction and reassess airway for patency. If obstruction still present then:**

b. **Perform measures to establish a patent airway while maintaining cervical spine immobilization.**
   1. Jaw thrust
   2. Nasopharyngeal airway in the conscious patient
   3. Oropharyngeal airway in the unconscious patient with no gag reflex
   4. Oral or Nasal intubation

   **If nasal or oral intubation cannot be accomplished or is contraindicated, a surgical airway should be performed.**

**Remember:** A definitive airway should be established if there is any doubt about the patient’s ability to maintain his/her airway. A surgical airway is performed by the Trauma Attending, Emergency Department Physician, Trauma Chief, Trauma NP or the Critical Care Nurse Clinician.

B. **Breathing** – Once airway patency has been established, adequate ventilation must be addressed. Ventilation requires adequate function of the lungs, chest wall, and diaphragm.

  a. **Assess:**
     1. Respiratory rate
     2. Respiratory depth
     3. Respiratory pattern
     4. Chest wall integrity – open wounds/flail segments
     5. Chest wall excursion
     6. Breath sounds for presence, equality, and adventitious sounds
     7. Skin color
     8. Jugular veins and trachea position
Injuries that may acutely impair ventilation:

- **Pneumothorax** – Injury to the lung leading to accumulation of air in the pleural space with a subsequent loss of intrapleural pressure.
  - Signs and symptoms – dyspnea, tachypnea, tachycardia, hyperresonance, decreased or absent breath sounds, chest pain.
  - Treatment – May require chest tube placement and/or intubation, repeat chest x-ray.

- **Open Pneumothorax** – a pneumothorax resulting in a wound through the chest wall. Air enters the pleural space through the wound and the trachea.
  - Signs and symptoms – same as pneumothorax with the addition of an open sucking wound.
  - Treatment – cover wound with occlusive dressing taped on three side to allow escape of air, same as pneumothorax.

- **Hemothorax** – An accumulation of blood in the pleural space. Massive hemothorax is a rapid accumulation of 1500ml or more of blood in the intrapleural space.
  - Signs and symptoms – dyspnea, tachypnea, chest pain, shock, tracheal deviation, decreased breath sounds, dullness to percussion
  - Treatment - May require chest tube placement and/or intubation, repeat chest x-ray.

- **Tension Pneumothorax** – LIFE THREATENING. Air enters the pleural space on inspiration, but air cannot escape on expiration resulting in a rising intrathoracic pressure on the side of the injury. This results in a mediastinal shift that compresses the heart, great vessels, trachea, and the uninjured lung. Tension pneumothorax is a *clinical diagnosis*.
  - Signs and symptoms – tracheal deviation to the uninjured side, hypotension, JVD, severe respiratory distress, cyanosis.
  - Treatment – immediate chest decompression.

- **Flail Chest** – Fracture of two or more sites on two or more adjacent ribs resulting in a free-floating segment of the chest wall.
  - Signs and symptoms – dyspnea, chest wall pain, paradoxical chest wall movement – the flail segment moves in during inspiration and out during expiration.
  - Treatment – Intubation, positive pressure ventilation, pain control.

---

b. Perform interventions to ensure adequate gas exchange.
   1. Administer supplemental O2 via nasal cannula, non-rebreather mask, etc.
   2. Ventilate the patient via a bag-valve-mask device with an attached oxygen reservoir system.
   3. Perform endotracheal intubation and ventilate via a bag-valve-mask device with an attached oxygen reservoir system.

C. Circulation – Hemorrhage is the leading cause of preventable deaths following injury. Hypotension following injury is hypovolemic in origin until proven otherwise. Therefore, rapid and accurate assessment of the injured patient’s hemodynamic status is therefore essential. Key elements that yield critical information within seconds are level of consciousness, skin color, and pulse.
   a. **Assess:**
      1. Level of Consciousness – Decreased circulating blood volume = decreased cerebral blood flow, resulting in altered levels of consciousness.
      2. Skin color – Patients with pink skin, especially in the extremities and the face, are rarely hypovolemic. Alternatively, patients with gray, ashen, or white skin are usually critically hypovolemic.
      3. Pulse – Rapid, thready pulses are usually signs of hypovolemia. Absent central pulses are ominous signs of hypovolemia and alert the need for immediate resuscitation if death is to be avoided. Normovolemic pulses are full, slow and regular.

   b. Perform measures to control bleeding and restore circulation.
      1. Control Bleeding – uncontrolled external hemorrhage is managed by direct pressure on the wound. The use of tourniquets is not recommended because they result in crush injury and distal ischemia.
      2. Restore circulation
         a. Establish two large bore IV’s, preferably in the upper extremities. If unable to establish in the UE’s, then move on to venous cutdown or central line placement.
         b. Draw blood for type and crossmatch, baseline labs, pregnancy tests for all females of childbearing age, and I-stat’s.
         c. Rapid infusion of Normal Saline.
d. If no response to 2 liters of normal saline, then consider administration of blood products.

** Hypovolemic shock should NOT be treated with pressors, steroids, or sodium bicarbonate, nor should it be treated with continued crystalloid/blood infusion.  
**If the blood loss continues, it should be addressed with operative intervention.

**

D. Disability – A brief neurological assessment is conducted at the end of the primary survey to determine the degree of disability as measured by the patient’s level of consciousness.

1. Assess
   a. Level of Consciousness
      1. A – Alert
      2. V – Responds to Verbal stimuli
      3. P – Responds to Painful stimuli
      4. U – Unresponsive to all stimuli
   b. Pupils for size, shape, equality, and reactivity to light.

**If the patient is not alert or verbal, it is imperative to continue to monitor airway, breathing and circulation. Monitor for signs of herniation – unilateral or bilateral pupillary dilation, asymmetric pupillary reactivity, motor posturing.

E. Exposure/Environmental Control

   1. Remove the patient’s clothing to facilitate a thorough examination and assessment.
   2. Logroll the patient with full C-spine immobilization.
   3. Examine sacrum for areas of redness, an early sign of skin breakdown.
   4. Palpate the entire spine posteriorly to determine areas of tenderness in the cervical, thoracic and lumbo-sacral spine. If tenderness is present, assume the spine to be unstable.
   5. Examine for areas of increased kyphosis or spinous process step-off.
   6. Perform rectal examination to assess sphincter tone and sensation.
   7. Observe for priapism.
   8. After assessment is complete, remember to cover the patient with warm blankets or an external warming device to prevent hypothermia.

II. Perform Secondary Survey

After all components of the primary survey have been addressed and life-saving interventions performed, it is time to move on to the secondary survey. This assessment is a brief and systematic approach to identifying all injuries.

F. Full Set of Vital Signs/Five Interventions

- Vital signs including a manual blood pressure, heart rate, respiratory rate, oxygen saturation, and temperature.
- Five interventions:
   1. Insert indwelling urinary catheter – only after rectal exam has been performed.
   2. Insert a gastric tube. In the case of extensive facial fractures, insert the gastric tube through the patient’s mouth.
   3. Laboratory studies to include type and screen, I-stat 10, ABG’s as indicated, PT, PTT, UA and pregnancy test for women of child-bearing age.
   4. X-rays to include at least a PA chest, and pelvis. If patient complains of back pain, then T and L spine films should be performed. X-rays should be performed on any deformed, swollen, or painful extremity.
   5. CT scans ordered based on patient’s known injuries and mechanism of injury.

G. Give Comfort Measures

1. Address the patient’s pain level using the 0-10 scale and administer analgesics to control pain.
2. Consider family presence to calm and reassure the patient. Ex:
   a. Fentanyl 50-100mcg every 15 - 30 minutes until patient’s pain is under control.
   b. Morphine Sulfate 2-4 mg every 10 – 20 minutes until patient’s pain is under control.

Once patient’s pain is under control and patient is calm and cooperative, then administer analgesics as needed for complaints of pain.
H. **History/Head-to-Toe Assessment**

1. **History - AMPLE**
   b. Medications – currently used medications.
   c. Past illnesses/Pregnancy – medical /surgical history; pregnancy history and/or possibility of being pregnant.
   d. Last meal – time of last meal in case of need for surgery.
   e. Events/Environment related to the injury – Injury can be predicted based on the MOI.

2. **Head-to-Toe Assessment**
   **Head and Face**
   1. Inspect for contusions, abrasions, deformities, lacerations, puncture wounds, ecchymosis, & edema.
   2. Inspect for exposed bone, loose or broken teeth, and asymmetry of facial expressions.
   3. Palpate for facial fractures.
   **Pupils**
   1. Pupils for size, shape, equality, and reactivity to light
   2. Gross visual acuity.
   3. Eye muscle movements
   **Ears**
   1. Battle’s sign – ecchymosis behind the ear.
   2. Drainage such as blood or clear fluid which may be cerebrospinal fluid.
   **Nose**
   1. Drainage such as blood or clear fluid which may be cerebrospinal fluid (CSF).
   2. If CSF present, do not pack nose.
   3. Palpate for fractures.
   **Neck**
   1. Signs of penetrating or blunt trauma.
   2. Position of the trachea and appearance of external jugular veins.
   **Chest**
   1. Presence, rate, depth, and effort of respirations.
   2. Use of accessory muscles.
   3. Paradoxic chest wall movement.
   4. Lacerations, abrasions, contusions, avulsions, puncture wounds, air or bone crepitus, etc.
   5. Breath sounds for presence and equality.
   6. Heart sounds for murmurs, friction rubs, and/or muffled sounds.
   **Abdomen**
   1. Lacerations, abrasions, contusions, avulsions, puncture wounds, impaled objects, ecchymosis, distention, scars, seatbelt marks, etc.
   2. Palpate for pain, rigidity, guarding, masses or areas of tenderness.
   3. Bowel sounds.
   **Pelvis/Perineum**
   1. Lacerations, abrasions, contusions, avulsions, puncture wounds, impaled objects, ecchymosis, scars,
   2. Pelvic stability
   3. Blood at the urethral meatus.
   4. Priapism
   5. Inability to void.
   **Extremities**
   1. Lacerations, abrasions, contusions, avulsions, puncture wounds, impaled objects, ecchymosis, scars, angulations, deformity, open wounds, etc.
   2. Skin color and temperature.
   3. Pulses
   4. Uncontrolled bleeding.
   5. Bony crepitus or areas of tenderness.
   6. Motor function
   7. Sensation

Remember to reevaluate the trauma patient frequently to monitor for new findings or deterioration of previous findings. Monitor vital signs and urinary output. Follow-up on previously ordered x-rays, CT scans, laboratory tests, etc.
Bladder Scanning Process
#PC-221

Policy statement: To provide direction for nursing to utilize Bladder Scanner.

Scope: Nursing Personnel, Medical Staff and Allied Health Professionals

Procedure:
Cleaning and Disinfection of the Probe and Scanner
1. Wipe off gel with a soft damp cloth or tissue. Use mild detergent (use hand soap) and water if needed.
2. Disinfect the probe after using with 70% alcohol or PDI wipes. Do not soak the probe in alcohol.
3. Clean the scanner screen and scanner components 70% or less alcohol or PDI wipes.

See attached Algorithm:
**Physician Order is NOT required to utilize Bladder Scanner when following attached protocol/algorithm**

Try these alternatives BEFORE using a Bladder Scan:
- Assist males to stand/females to sit if permissible
- Provide privacy
- Run tap water
- Use warm compresses to low abd or a warm sitz bath

INDICATIONS for Bladder Scan Use (Adult Patients):
- Patient has not voided in 8 hours
- MD order for Bladder Scan
- Patient displays symptoms of retention:
  - Palpable bladder
  - Lower abdominal discomfort
  - Dribbling of urine
  - Urgency

DO NOT Re-Cath Continue to Monitor
DO NOT Re-Cath Continue to Monitor

DO NOT re-Cath
- Encourage fluids
- See alternatives above
REPEAT Bladder Scan process q 2 hrs x 2 as needed.
If no void within a 12 hr period:
Straight Cath patient regardless of volume then notify MD with results/output

DO NOT re-Cath
- Encourage fluids
- See alternatives above
REPEAT Bladder Scan process q 2 hrs x 2 as needed.
If no void within a 12 hr period:
Straight Cath patient regardless of volume then notify MD with results/output

Straight Cath patient (In & Out Catheter)
- Do NOT straight cath more than twice;
- If needed a 3rd time, use in-dwelling urinary catheter, then notify physician.
- Document procedure and output.

**Notify MD prior to Straight Cath if recent Bladder, Rectal or Prostate Surgery**

New admissions: Nursing should not place an indwelling catheter without an Attending Physician or Chief/Fellow’s authorization
**Bladder Protocol (for Paraplegia & Quadriplegia)**

**Policy statement:** Develop a regimented and consistent approach to bladder management in Quadriplegic or Paraplegic patients with alteration of normal bladder function (Neurogenic Bladder Dysfunction) and to facilitate consistent nursing interventions.

**Scope:** All Trauma/Surgical Critical Care Staff/Nursing along with all Erlanger

**Definitions:**
Neurogenic bladder dysfunction can be a result of diseases and/or injuries of the brain or spinal cord. These include but are not limited to congenital malformation, spinal cord injury or lesion, tumor or neoplasm of brain or spine, degenerative disease, vascular occlusion or hemorrhage, and traumatic/anoxic brain injuries.

**Procedure:**
I. Bladder program may be initiated when the patient is,
   a. alert enough to cooperate.
   b. functionally able to participate and/or has family available and willing for training.
   c. catheter free. (The foley catheter may be removed two weeks post injury if medically stable with IV fluids discontinued and intake and output consistent without the need to critically monitor or prior to two weeks post injury if the above is met. A Physician should assess and order the removal of the catheter and initiation of the bladder program.

II. Nursing and the physician should perform a comprehensive genitourinary assessment including urinary output and any signs or symptoms of complications or infections.

III. **Intermittent catheterization (IC)** programs should be scheduled according to urine outputs. IC procedure performed as per sterile technique outlined in catheterization policy.
   a. IC every 4 hours if urine volume exceeds 500 ml. per catheterization for 48 hours.
   b. IC every 6 hours if urine volume is less than 500 ml. per catheterization for 48 hours.
   c. Goal is to maintain bladder volumes less than 500 ml. with each catheterization.
   d. Urinary output should be < 2400 ml. per day when intermittent catheterization is used.
   e. Attempt to limit fluids to 2000 ml. of fluid per day (once IV fluids discontinued). Best practice is to limit po fluids in the P.M.
   f. If patients are sensitive to catheterization, may use 2% xylocaine jelly with lubrication and apply to the tip of the catheter.
      1. Following use, wash the xylocaine jelly tip with soap and water and dry and store with topical medications.
      2. A physician’s order should be obtained prior to using xylocaine jelly.

IV. The patient should be protected from nosocomial infection.
   a. Staff members should perform catheterizations using sterile technique.
   b. The nurse should inform the patient that sterile technique is only practical during hospitalization and should educate and instruct the patient and caregiver on how to perform clean IC and how to clean and store IC equipment for home use.
      1. Each catheter reusable at home for 1 week.
      2. The catheters and collecting devices should be washed with soap and water after each use, dried, and stored in a clean dry place.
      3. The patient and caregiver should be educated on proper hand washing technique to be utilized prior to each catheterization.

V. The nurse should assess the patient for potential complications related to the bladder program.
   a. The patient should have an ongoing assessment and evaluation for signs and/or symptoms of a urinary tract infection(cloudy foul smelling urine, hematuria, elevated temperature, c/o dysuria, burning or pain) or any other problems related to bladder function. The physician should be notified of any abnormal findings.
b. The patient and caregiver should be educated on signs and symptoms of a urinary tract infection and instructed on when to seek medical attention.

c. Every patient being monitored on the bladder management program should have a graphic record initiated upon start of the program documenting each intermittent catheterization procedure, urine volume color, turbidity, sediment and calculi with patient’s response to the procedure. 

d. This record should be kept at the bedside.

e. The patient and caregiver should be educated regarding the importance of this record and should receive instruction on how to maintain when performing self catheterizations.

VI. The patient should be monitored for signs and symptoms of **autonomic dysreflexia**. An over-distended bladder may stimulate this condition. Signs and symptoms include cold skin and goose bumps above the level of injury, hypertension, and bradycardia. If noted raise the head of the bed, perform intermittent catheterization, and notify the physician.

VII. The patient should be assured prompt responses to autonomic dysreflexia, urinary tract infections and any noted problems with the bladder management program.

VIII. Recommended home supplies for the patient at the time of discharge should be:

- Urological supplies (5 reusable catheters, back up foley kit if indicated).
- Gloves.
- 1 sterile IC kit for sterile specimen if needed.
- Back up foley tray if indicated.
- One 10 ml and one 60 ml syringe.
Bowel Protocol (Neurogenic)  
# 7135.221

**Policy statement:** Develop a regimented and consistent approach to bowel management in patients with alteration of normal bowel function and to facilitate consistent nursing interventions.

**Scope:** All Trauma Surgical Critical Care Staff/ Nursing

**Definitions:**  
Neurogenic bowel dysfunction can be a result of diseases and/or injuries of the brain and spinal cord. These include but are not limited to congenital malformation, spinal cord injuries or lesions, tumor or neoplasm of brain or spine, degenerative disease, vascular insult or hemorrhage, traumatic/anoxic brain injuries, psychological regression.

Neurogenic bowel is an inability to inhibit or initiate bowel evacuation due to interruption of nerves supplying the rectum and external sphincter.

**Current neurogenic bowel function - types and characteristics:**

1. **Reflexic/Hypertonic bowel or upper motor neuron bowel (UMN)** - a result of a spinal cord injury above the sacral segments. Spinal cord and colon connections remain intact which allows reflex coordinated stool propulsion. Voluntary relaxation of the external sphincters is impaired which inhibits urge to defecate sensation. **Thus, digital stimulation works.**
   a. Sensory loss of urge to defecate  
   b. Inability to control reflex defecation  
   c. Bowel empties automatically  
   d. Positive BCR (Bulbocavernosus reflex)

2. **Areflexic/Flaccid/Hypotonic bowel or lower motor neuron (LMN)** – a result of a spinal cord injury at or below the sacral segments. No spinal cord mediated reflex occurs. **Thus, digital stimulation would not work.**
   a. Ineffective reflex  
   b. Flaccid anal sphincter  
   c. Continuous seeping of fecal matter  
   d. Negative BCR (Bulbocavernosus reflex)

3. **Uninhibited bowel** - a result of an injury to cortical and subcortical lesions above C1. Some examples are strokes, traumatic brain injuries, and multiple sclerosis. Bowel sensation and the BCR and anal reflexes are intact. Sensory impulses reach the brain but are unable to be interpreted. Due to the decreased urge or awareness to defecate there is decreased voluntary control of the anal sphincter leading to involuntary elimination.

**Procedure:**

I. Obtain a physician’s order prior to initiating any bowel program. Factors to consider when determining type of bowel program to initiate are:
   1. Type of neurogenic bowel or dysfunction.  
   2. Pre-injury history of bowel habits.  
   4. Willingness for patient and/or caregiver to participate.  
   5. Funding available for needed equipment and supplies.  
   6. Skin integrity.  
   7. Discharge plans/life factors.  
      A. Amount of assist available.  
      B. Home accessibility.

II. Nursing and the physician should perform a comprehensive bowel/GI/abdominal assessment QD. Assessment should include last bowel movement.  
   ♦ See order set for neurogenic bowel. (orderset #10051)

III. Physician and nursing should regulate consistency of patient’s stool with appropriate diet, fluid, and bowel program.

   1. Ensure adequate fluid intake 2000 ml per day unless contraindicated.
2. Begin a high residue diet. Consider one dose of bran per day mixed with ½ cup of applesauce and 2 tsp. of prune juice and or change in diet. Goal is for no less than 15 grams of fiber per day.
3. Choose a consistent time for the bowel program based upon the gastrocolic reflex (occurs approximately 30 minutes after a meal), the patient’s previous bowel habits and the anticipated schedule at discharge.

IV. Recommendations for Bowel Programs:
A. Reflexic bowel (upper motor neuron) -
   1. Perform digital stimulation program once daily as ordered by the physician (most often follows suppository or enema). See guidelines and ordeset.
      a. must assess for cardiac history and inability to tolerate vasovagal stimulation and/or neurological injury which is prone to neuro storms.
   2. Suppository per rectum QD in conjunction with additional bowel medications as determined by the physician.
   3. Consider laxatives and/or stool softeners if taking narcotics or iron. Hold for loose stools.
   4. Encourage yogurt for patients taking antibiotics.

B. Areflexic bowel (lower motor neuron) –
   1. Digital stimulation not effective.
   2. Suppository per rectum inserted with water soluble lubricant as per physician order.
   3. Perform rectal clearing using water soluble lubricant and/or numbing agent prior to inserting the suppository and 30 minutes after the suppository.
   4. May need to adjust program to A.M. and P.M. based upon patient’s needs as preparing for discharge.
      Timing should be consistent in order to regulate an areflexic bowel.
   5. Encourage yogurt for patients on antibiotics.
   6. Consider a bulk forming agent to stimulate peristalsis and for retaining water in the stool.
   7. Consider starting patients on laxatives if taking narcotics or iron.

C. Uninhibited bowel –
   1. For patients with voluntary control and urgency or constipation,
      a. Begin fiber supplement.
      b. Drink at least 6-8 glasses of fluid per day.
      c. Plan bowel evacuation at consistent times daily. Best 30 min after meals to stimulate gastro-colic reflex.
      d. Drink a cup of hot liquid prior to scheduled evacuation.
      e. Elevate knees above hips on toilet unless contraindicated.
      f. Rub abdomen in clockwise motion.
      g. Allow at least 15 minutes to evacuate bowels.
      h. Bowel training usually takes approximately 2 weeks.

V. If patient has little or no voluntary control may consider adding a suppository every day or every other day to the above program as per physician order.

VI. The nurse should complete an ongoing assessment of the effectiveness of the bowel program and assess for any complications. Complications include but are not limited to: rectal bleeding, hemorrhoids, pain, constipation, diarrhea, nausea and vomiting, or an increase in accidental defecations. The physician should be notified with any complications or concerns.

♦ Every patient being monitored on the bowel management program should have a graphic record initiated upon the start of the program documenting the program in use, results with color amount and consistencies of stool along with the amount of time required for results. This should be kept at the bedside. Additional documentation should include effectiveness and patient response to the bowel program along with their independence level and ability to demonstrate the procedures.

♦ The patient and caregiver should be educated regarding the importance of this record and should receive instruction on how to maintain while performing self directed bowel program.
VII. The patient should be assured a prompt response with any noted problems with the prescribed bowel management program.

VIII. The patient should be monitored for and the physician notified with any signs or symptoms of autonomic dysreflexia.
   a. Signs and symptoms include cold skin and goose bumps above the level of injury, hypertension and bradycardia.
   b. Rectal stimulation and bowel distention can trigger autonomic dysreflexia in patients with a spinal cord injury at T6 or above. Application of a numbing agent as prescribed by the physician 5 minutes prior to digital stimulation or suppository insertion may help to decrease the risk.

IX. The nurse should complete education with the patient and/or the caregiver regarding the patient’s prescribed bowel program.
   a. The nurse should assess the effectiveness of the program and the patient/caregivers ability and willingness to perform the program on a competent level.
   b. The nurse should educate the patient/caregiver regarding medications utilized in the prescribed bowel program and assure understanding.
   c. The nurse should allow the patient/caregiver complete control of and responsibility for the program as able.
   d. The nurse should provide continuous evaluation of the program and document the patient’s and caregiver’s independence level and ability to demonstrate the prescribed procedures.
Blunt Cerebrovascular Injury Screening and Treatment Policy

Description for EHS Intranet: Carotid Injury, Cerebrovascular Injury

Policy statement: Develop a consistent approach for the screening, diagnosis, and treatment of blunt cerebrovascular injury.

Scope: All patients presenting to Erlanger Health System Baroness Campus with traumatic injuries

Blunt cerebrovascular injuries include injuries to the common carotid, internal and external carotid, and vertebral arteries. Most blunt cerebrovascular injuries are clinically occult at admission. Most injuries are only diagnosed after ischemic CNS insults have occurred. The mortality from such injuries can be as high as 25%, with 48-80% of survivors suffering severe, permanent neurologic sequelae. Appropriate screening modalities can be used to identify those patients at risk for such injuries.

Definitions:
Blunt Cerebrovascular Injury – BCVI
BCVI – an injury or injuries to the carotid or vertebral artery.

Procedure:

Signs/symptoms of BCVI:
- Arterial hemorrhage
- Cervical bruit
- Expanding cervical hematoma
- Focal neurological deficit
- Neurologic examination unexplained by neuroimaging findings
- Ischemic stroke on secondary Head CT

Risk factors for BCVI (Denver Criteria):
- Lefort II or III fractures
- Cervical spine fracture patterns:
  - Subluxation
  - Fractures extending into the transverse foramen
  - Fractures of C1–C3
- Basilar skull fracture with carotid canal involvement
- Diffuse axonal injury with Glasgow Coma Scale score <6
- Seatbelt contusion on neck (not isolated)
- Near hanging with or without anoxic brain injury
- Unexplained anisocoria

Screening Modality:
- 64 slice-CT Angiogram should be performed on all patients who have risk factors for BCVI. This should be done at the time of the initial trauma scans.
- All patients with a positive CT angiogram should have consideration of a formal 4-vessel cerebral arteriogram
- Duplex Ultrasound is not sensitive enough to be used as a screening modality

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

Treatment:
- Either heparin or antiplatelet therapy can be used with seemingly equivalent results for grade I injuries.
- If heparin is selected for treatment, the infusion should be started without a bolus; a guideline for activated partial thromboplastin time goal has not been determined and should be individualized.
- In patients in whom anticoagulant therapy is chosen, conversion to warfarin titrated to a prothrombin time-international normalized ratio (INR) of 2 - 3 for 3 to 6 months is recommended.
Grade III injuries (pseudoaneurysm) rarely resolve with observation or heparinization, and invasive therapy (surgery or angiointerventional) **should** be considered.
  - Carotid stents placed without subsequent antiplatelet therapy have been noted to have a high rate of thrombosis in this population.

In patients with an early neurologic deficit and an accessible carotid lesion, operative or interventional repair should be considered to restore flow.

In children who have suffered an ischemic neurologic event (INE), aggressive management of resulting intracranial hypertension up to and including resection of ischemic brain tissue has improved outcome as compared with adults and should be considered for supportive management.
Bundled Consent
(Packet should be on the patient chart, if applicable)

Your family member has been admitted to the Intensive Care Unit (ICU) of Erlanger Hospital. He/she will be cared for by a specialty team trained to take care of critically ill patients. This team will work together to ensure that your family member receives the best care possible.

The Surgery Critical Care physicians are a part of this team—this includes both resident physicians and the supervising attending physicians [see explanation on next page]. We will be closely monitoring your family member, and often this requires us to perform invasive procedures. These procedures allow us to most effectively do things like monitor blood pressure and other vital signs, deliver medications, or assist a patient with breathing. We have compiled this packet of information to help educate you on some of the most common invasive procedures in the ICU.

These procedures include:

- Tracheal Intubation and Mechanical Ventilation
- Central Venous Line Placement
- Arterial Line Placement
- Blood Products Transfusion
- Bronchoscopy
- Chest Tube Insertion

We ask for your informed consent for these procedures, as there are risks associated with each of them. In the attached sheets, you will find some basic information about each procedure, including the risks, benefits, and possible alternative treatments. We will review each of these with you, and you may also take these sheets and review them on your own.

When you are ready, you will be provided with the appropriate forms to give consent for some or all of the procedures. If you do not wish to provide consent for any of the procedures, please let us know this so that we may document it in the medical record. Once you have consented for a procedure, you have given permission for that procedure to be done as needed. It is possible that a procedure for which you consent will not be necessary during your family member’s ICU stay. You will be updated on your family member’s condition and notified in a timely manner, when procedures are performed. Occasionally, procedures not included in this list may become necessary, and we will discuss those with you at that time.

What is a “Resident” Physician?
A Resident Physician, or “Resident,” is someone who has completed four years of college to receive an undergraduate degree, and then four years of medical school to receive a medical degree. After medical school, physicians complete a residency with focused training in their chosen specialty.

The following residents will be part of the team caring for your family member in the ICU:
Dr. ______________________
Dr. ______________________
Dr. ______________________

There will also be a “Surgery Critical Care Fellow” helping to oversee care of your family member in the ICU. The “Fellow” is a more senior General Surgery Resident who is undergoing focused specialty training in trauma and critical care management.
Dr. ______________________

What is an “Attending” Physician?
An Attending Physician, or “Attending,” is someone who has received an undergraduate degree and a medical degree. Additionally, they have completed a residency program and a fellowship training program. The Surgery Critical Care attendings helping to care for your family member are board certified general surgeons with additional specialty training in Trauma and Surgery Critical Care. See www.UniversitySurgical.com for more information on each surgeon.

The following attendings will be the supervising physicians in the care of your family member:
Dr. Donald E. Barker
Dr. Benjamin W. Dart
Dr. Robert A. Maxwell
Dr. Darren J. Hunt
Dr. Vicente A. Mejia
Dr. Philip W. Smith

Please clearly initial below to indicate ‘Yes, I consent for this procedure’ or ‘No, I do not consent for this procedure’:
Tracheal Intubation and Mechanical Ventilation Yes: _______ No: _______
Central Venous Line Placement Yes: _______ No: _______
Arterial Line Placement Yes: _______ No: _______
Blood Products Transfusion Yes: _______ No: _______
Bronchoscopy Yes: _______ No: _______
Chest Tube Insertion Yes: _______ No: _______
I hereby consent to the performance of the invasive procedures above for which I have initialed ‘Yes’. I understand that some of these procedures may be performed more than once during the ICU course. I understand that I may refuse to consent for any procedure and that I may at any time withdraw my consent. These procedures and their use in the course of ICU care have been explained to me, and I have had the opportunity to ask questions about their indications, complications, and alternatives. I have read and understand this form.

Signed: Relationship to patient: ______________________
Date: Time: __________
Witness to signature: ______________________
Physician providing procedure information: Pager # __________

Procedure: Tracheal Intubation & Mechanical Ventilation

Basic description:

Tracheal intubation is a procedure that involves placing a breathing tube (endotracheal tube) through the mouth and into the windpipe (trachea). Once the breathing tube is in place, it is connected to a breathing machine that helps the patient get air into and out of the lungs (mechanical ventilation). The machine offers different levels of support to the patient. Sometimes, the patient is breathing on his/her own, and the machine just gives him/her some extra help to breathe better. Other times, the machine may be doing all of the breathing work for the patient. There are numerous reasons why a patient might need to be intubated and put on the ventilator.

Some of the possible reasons include, but are not limited to: patient's pain cannot be controlled without constant sedation that decreases breathing; patient has severe chest trauma that makes it difficult to breathe without support; patient has severe head trauma that interferes with the breathing process; or, patient is critically ill with inflammation or infection that makes breathing more difficult.

Sometimes, intubation and ventilation are only needed for a short time. However, other patients may require it for weeks, months, or even permanently. Each person is different. Your physician can help to better explain to you what to expect for your family member with his/her particular injury and illness. Additionally, if your family member has indicated that he/she does not wish to have a breathing tube or be on a breathing machine, please make your physician aware of this so that we can respect his/her wishes.

Risks:
As with any medical procedure, there are certain risks associated with tracheal intubation and mechanical ventilation. Some, but not all, of these risks are listed below. Your physician can further discuss with you these and any other possible risks.

- Bleeding
- Sore throat
- Low oxygen level during placement of the tube
- Damage to the teeth
- Damage to the vocal cords
- Laceration of the windpipe (trachea)
- Pneumonia
- Lung collapse (pneumothorax), which could require placement of a chest tube

Benefits:
- Ability to provide the patient support with breathing and help maintaining his/her oxygen level
- Ability to give appropriate pain medication to patients with severe injuries (which can decrease breathing)

Alternatives:
- Supplemental oxygen – This is not an equal alternative to intubation with mechanical ventilation. It is, however, a way to help make a patient more comfortable if he/she does not wish to be intubated. There are several different ways to provide this, including tubes that sit at the tip of the nose, and simple masks that rest over the nose and mouth.
- Noninvasive Positive-Pressure Ventilation – This is not an equal alternative to intubation with mechanical ventilation. However, it may be used in an effort to prevent a patient from needing to be intubated. Also, it may be an option for patients who do not wish to be intubated. The most common types are “CPAP” and “BiPAP,” and they involve placing a sealed mask over the patient's face to help with breathing. This is similar to the mask that people with sleep apnea wear at night to help them breathe better while they are sleeping.

Procedure: Central Venous Line Placement

Basic description:

A “central venous line” (CVL) is a thin, soft and flexible catheter (tube / “line”) that is used to give medications, fluids, and/or nutrition through a patient’s veins. Unlike the typical IV that goes into tiny veins in your hands or arms, a CVL goes into one of the larger “central” veins (internal jugular, subclavian, femoral). It may be inserted at the neck, just below the collarbone, or in the groin, and is then sutured to the skin. It usually has several ports so that multiple medications can be given through the single tube.
Some of the possible reasons that a patient might need a CVL include, but are not limited to: the need for certain medications that can be very irritating to the smaller veins in the hands and arms; for patients with veins in the hands and arms that are very difficult to access; or, to give nutrition through the veins when patients are unable to get it by mouth.

The insertion of a CVL is a sterile procedure in order to minimize the risk of infection. A local anesthetic is often used to numb the skin to help make the procedure more comfortable for the patient. A chest x-ray will be checked after placement of a CVL in the neck or below the collarbone, to ensure appropriate placement of the line, and to evaluate the lungs for possible injury. The CVL may need to be changed if, for example, it becomes clogged or there’s concern of infection or blood clot. This might require placement of a brand new line in a different location, or it may be possible to use a special wire to exchange the old catheter for a new one (this is called “change over a wire”).

Risks:
As with any medical procedure, there are certain risks associated with a central venous line. Some, but not all, of these risks are listed below. Your physician can further discuss with you these and any other possible risks.

- Bleeding
- Injury to an adjacent artery (carotid, subclavian, femoral)
- Local infection or bruising at insertion site
- Generalized infection of the blood
- Lung collapse (pneumothorax), which could require placement of a chest tube
- Arrhythmia
- Air embolus
- Formation of a blood clot in the vein around the catheter

Benefits:
- Ability to give certain necessary medications that cannot be given through smaller, peripheral veins
- Ability to provide nutrition through the veins when patients cannot get nutrition any other way
- Ability to easily draw blood for necessary labs without having to repeatedly stick the patient
- Ability to better assess a patient’s status using measurements like ‘central venous pressure’

Alternatives:
- No venous access
- Peripheral venous access – This is an option, but not an equal alternative. (See above)
- Peripherally inserted central catheter – This may be used for many of the same reasons as a CVL, however it is typically used when access will be needed on a long-term basis (i.e. weeks). It is generally quicker to place a central venous line, so in certain situations, the CVL may be the most appropriate treatment for a patient.

Procedure: Arterial Line Placement
Basic description:
An “arterial line” (A-line, Art-line) is a small, flexible catheter (tube / “line”) that is placed into an artery. It is typically placed in the wrist (radial artery), or the groin (femoral artery), and then secured to the skin. Some of the possible reasons that a patient might need an arterial line include, but are not limited to: the need to continuously and directly monitor blood pressure in critically ill patients; to obtain frequent arterial blood gases (“ABG”) for patients with respiratory issues.

The insertion of an A-line is a sterile procedure in order to minimize the risk of infection. A local anesthetic may be used to numb the skin to help make the procedure more comfortable for the patient. The A-line may need to be changed if, for example, it becomes clogged or there’s concern of infection or blood clot. This might require placement of a brand new A-line in a different location, or it may be possible to use a special wire to exchange the old catheter for a new one (this is called “change over a wire”).

Risks:
As with any medical procedure, there are certain risks associated with an arterial line. Some, but not all, of these risks are listed below. Your physician can further discuss with you these and any other possible risks.

- Bleeding
- Local infection, bruising or swelling at insertion site
- Generalized infection of the blood
- Injury to the artery
- Injury to nearby nerves
- Formation of a blood clot in the artery around the catheter
- Embolism (a blood clot or air obstructing a blood vessel)
- Poor blood circulation of the arm or leg in which the catheter is placed, which rarely may result in loss of the limb

Benefits:
- Ability to continuously obtain a direct, accurate measurement of blood pressure in critically ill patients
- Ability to get blood for necessary labs, including arterial blood gases, without having to repeatedly stick the patient

Alternatives:
-Noninvasive blood pressure monitoring – This may be done with a blood pressure cuff. However, this does not give a continuous measurement of blood pressure. A continuous measurement may be necessary for critically ill patients who, for instance, are requiring medications to maintain their blood pressure. Additionally, values from a blood pressure cuff may be affected by various factors such as obesity or edema (swelling) of the arms/legs.

-Interruptional arterial sticks – For patients requiring frequent monitoring of arterial blood gases (e.g. respiratory issues), blood specimens can be obtained by sticking the artery with a needle and then removing it. This can become difficult if the patient is requiring multiple sticks to obtain blood. Additionally, it may be uncomfortable for the patient.

**Procedure: Blood Products Transfusion**

**Basic description:**
Transfusion of blood products involves giving patients blood products through an intravenous line (IV) when they have low blood counts, have had major blood loss, or their blood is not clotting appropriately. There are different parts of blood, and your family member may require one or more of these products depending on his/her particular illness or injury and medical needs. Some of the different blood products include: red blood cells; platelets; fresh frozen plasma; and, cryoprecipitate.

Some of the possible reasons that a patient might need transfusion of blood products include, but are not limited to: severe trauma with massive blood loss; significant blood loss during a surgical procedure; disease process that is causing the patient's body to destroy blood cells; or, excessive bleeding or traumatic injury with significant risk of bleeding due to a medication the patient is taking (e.g., blood thinners).

***If your family member does not wish to receive blood products, please make your physician aware of this so that we can respect his/her wishes.***

**Risks:**
As with any medical procedure, there are certain risks associated with blood products transfusion. Some, but not all, of these risks are listed below. Your physician can further discuss with you these and any other possible risks.

- Fever
- Allergic reaction (itching, hives, difficulty breathing)
- Transfusion-Associated Lung Injury (TRALI)
- Hemolytic reaction (body attacks and destroys the transfused blood cells)
- Infections, including the human immunodeficiency virus (HIV) (< 1 in 2 million), Hepatitis B (< 1 in 500,000), and Hepatitis C (< 1 in 2 million)

**Benefits:**
- Increase low blood levels, which helps improve oxygen levels in the body
- Help to slow and/or stop bleeding (applies to products like platelets, fresh frozen plasma, and cryoprecipitate)

**Alternatives:**
- **Medications to help build up blood supply** – Though these medicines may help in the long run, they do take some time to work, and will not provide support as quickly as a blood transfusion would. They may be used as an additional way to help build the blood back up, or they can be used for patients who do not want a transfusion.
- **Medications to help the blood clot better** – Depending on the particular reason why a patient’s blood is not clotting normally, there are various medications that may help the blood to clot better. This may not be an option for every patient. Your physician can help explain to you if this might be an option for your family member.
- **Transfusing the patient with his/her own blood** – This may be an option for some patients, particularly those who have traumatic injuries with active bleeding and blood that can be easily collected.

**Procedure: Bronchoscopy**

**Basic description:**
Bronchoscopy is a procedure that allows direct visualization of the airway, from the windpipe (trachea) down into the lungs (bronchi). A long, thin flexible tool that has a tiny camera on the end is carefully inserted through a breathing tube in the mouth, and down into the trachea to look at the airways. As such, this procedure is generally only performed in patients who are intubated (have a breathing tube).

Some of the possible reasons that a patient might need to undergo bronchoscopy include, but are not limited to: sudden decrease in oxygen level with need to evaluate potential causes in the airway and lungs; concern for pneumonia and the need to obtain culture specimens to determine the cause of pneumonia; aspiration and the need to clean out the lungs; or, to clean out a mucus plug that is blocking off part of the patient’s lung.

If the primary concern is a possible pneumonia, a small amount of saline will be flushed into the lungs and then suctioned back out – this provides a sample to send to the microbiology lab to help identify the cause of a potential pneumonia.

**Risks:**
As with any medical procedure, there are certain risks associated with bronchoscopy. Some, but not all, of these risks are listed below. Your physician can further discuss with you these and any other possible risks.

- Bleeding
- Low oxygen level
- Abnormal heart rhythm (arrhythmia)
- Lung collapse (pneumothorax), which could require placement of a chest tube

Benefits:
- Ability to directly visualize the airways to help identify the cause of low oxygen or other breathing problems
- Ability to obtain cultures to identify the cause and most appropriate treatment for a pneumonia
- Ability to remove a mucus plug that is blocking part of the patient’s lung

Alternatives:
- **Chest x-ray** – This is often done before recommendation of bronchoscopy. However, in an emergent setting, waiting for a chest x-ray may delay appropriate treatment. Additionally, although a chest x-ray may help diagnose a problem, an additional therapeutic procedure is often necessary to fix whatever problem is identified.
- **Suctioning through long, thin catheters without direct visualization** – Long thin tubes inserted through the nose, mouth, or through a breathing tube can be used to blindly suction the airway and lungs. This is often a useful tool regardless

Procedure: Chest Tube Insertion

Basic description:
A “chest tube” is a flexible drainage tube inserted between the ribs into the chest cavity. It helps to remove air, blood, or fluid that has collected between the lungs and the chest wall – this space is called the pleural space. This buildup of air, blood or fluid may prevent the lungs from being able to completely expand with air during breathing. The drainage provided by the chest tube allows the lungs to re-expand and makes breathing easier and more comfortable.

Air, blood or fluid may build up in the chest cavity for a number of reasons. Traumatic injuries may be the source of a collection of air in the chest cavity – this is called a pneumothorax. A pneumothorax is also one of the risks associated with insertion of a central venous line (CVL). Traumatic injuries may also result in blood filling the pleural space – this is called a hemothorax. When fluid other than blood accumulates in the chest cavity, this is called a pleural effusion. A pleural effusion may occur as a result of many different conditions, including trauma, infection, cancers, or organ failure. Whatever the cause, a chest tube may be recommended to help drain the air, blood, or other fluid that makes it more difficult for a patient to breathe.

The insertion of a chest tube is a sterile procedure in order to minimize the risk of infection. A local anesthetic is used to numb the area to help make the procedure more comfortable for the patient. An incision is made on the side or front of the chest, and a small tube is inserted into the chest cavity (pleural space) to drain the air, blood or fluid. The tube is then connected to a plastic container to collect the drainage. A chest x-ray will be checked after placement of the tube to ensure appropriate placement, re-expansion of the lung, and improvement in the collection of air, blood or fluid. Occasionally, it may become necessary to place more than one tube to completely drain all of the air, blood or fluid. The chest tube is typically left in for at least 3-5 days.

Risks:
As with any medical procedure, there are certain risks associated with insertion of a chest tube. Some, but not all, of these risks are listed below. Your physician can further discuss with you these and any other possible risks.

- Pain or discomfort during placement
- Bleeding
- Inability to completely drain the air, blood or fluid with a single chest tube
- Puncture of the lung during placement
- Puncture of the liver, spleen or diaphragm during placement
- Infection
- Pneumothorax (air in the chest cavity) that occurs during removal of the chest tube

Benefits:
- Ability of the lung to expand and fill more completely with air during breathing
- Breathing is more comfortable and easier for the patient

Alternatives:
- **Observation without drainage** – This is an option, but not an equal alternative. Breathing may become difficult or even impossible depending on the amount of air, blood or fluid that has accumulated in the chest cavity.
- **Thoracentesis** – This is an option, but not an equal alternative. This involves drainage through a needle that is inserted into the chest cavity and then removed at that same time. It does not provide any drainage once the needle is removed, and may not provide adequate drainage of thicker material, such as blood.
Central Line Management
# 7135.204

PROCEDURE: Central Line Management

A. Background
The most common procedure performed on any surgical service is central line placement and will generally become second nature to the corps. However, there are a number of pitfalls and problems which are associated with central access, not the least of which is line sepsis. The following guidelines will hopefully aid in safe line placement with minimal subsequent septic morbidity or other complications.

B. Skill certification
Junior level residents and interns should perform at least their 1st 10 central lines, 5 A-lines or 5 chest tubes under the supervision of a PGY-3 or greater. For the line placement to count as part of your credentialing process, you need to make the needle stick and pass the guide wire without direct assistance.

C. Procedural protocol
1. Non emergent central line placement
   a. When central lines are not being placed for emergent needs such as profound hypotension or life saving medications, full sterile protocol should be undertaken. Surgical attire including head cover, mask, sterile gown and gloves should be adorned prior to any central access, A-line or chest tube. Insertion site should be prepped either with the newly available Chloraprep solution (which is premixed Hexaclens and alcohol) or separately prepped with Hexaclens and then cleansed with alcohol. Two to three minute scrub time should be observed.
   b. When placing subclavian lines, always remember to prep out the subclavian as well as the jugular site in the event access cannot be obtained at one location, another attempt may be undertaken with the same prep (this will ultimately save time and $$$).
   c. Patients in cervical collars should have their collars removed and their heads stabilized by an assistant during line placement.
   d. General draping protocol should be application of sterile blue towels followed by covering the area with the fenestrated paper/cellophane drape from the kit. This drape will prevent “strike-through” and contamination of the field should fluid soil the area.
   e. During pulmonary artery catheter placement, a surgical half sheet must be used to cover from the insertion site down to the patient’s feet to prevent contamination of the catheter during insertion.

2. Emergent central line placement
   Under conditions of duress, a quick betadine prep to the area followed by application of the paper/cellophane drape will be sufficient. However, it should be duly noted this was an emergent line placement and these catheters must be changed out using nonemergent techniques within 24 hours.

D. Catheter Selection
   Catheter selection literature does appear to show decreased septic complications when the Arrowguard antibiotic coated catheters are used. Please make every effort to obtain this type of catheter in any patient when anticipated duration of line placement will exceed 5-7 days.

E. Line changing protocols
   1. Arrowguard catheters can be left in place for 14-21 days or longer if the patient is otherwise afebrile with normal white count and an insertion site which has no erythema or drainage. Patients who are in need of a fever work up with low suspicion of a line infection (i.e. the site
clean? without erythema? non-tender?) may have their line changed over a guide wire (see below). Patients with a high suspicion of a line infection may be better served with a new stick unless they are known to be difficult sticks (see below).

2. **Introducer sheaths and Pulmonary Artery Catheters (PAC) must be changed out every 5 days.** The first sheath change can be made over a guide wire, but the second change should be a new stick. Please carefully reevaluate the need for these catheters every time changing becomes an issue. *Pulmonary Artery catheters cannot be changed over a wire, and this should not be attempted. A new Pulmonary Artery Catheter must be placed when the introducer sheath is changed.*

3. A-lines should probably be changed every 10-14 days or when redness around the cath site occurs. It is usually best to change these to a new site rather than guide wire changes.

4. **Difficult sticks--**Patients who are known to be difficult sticks secondary to body habitus, previous difficulty noted during access, or presence of a halo vest may have their catheter changed over a guide wire one time provided there is no purulence or marked redness at the insertion site.

5. **Line changes over guide wire and cultures—** A 5 cm section of catheter from skin level distally should be cut and sent for culture on all catheters changed over a guide wire. Should these cultures grow more than 15 colony forming units of any bacteria, the catheter should be changed to a new site.

6. **Femoral lines--**Central lines in femoral position must be changed every 5 days. No exceptions.
PROCEDURE:

A. Background

Placement of chest tubes occurs relatively frequently for the treatment of traumatic hemopneumothorax and barotrauma in ventilated patients. Management schemes often require individualization but there are some guidelines that may be followed to hasten chest tube removal and minimize complications such as residual pneumothoraces and retained or recurrent hydrothorax.

B. General management of chest tubes

Patients with indwelling chest tubes generally should have periodic chest x-rays until the tube has been removed. These films should be portable even on floor patients so that no misadventure occurs with the tube on transport to radiology.

1. Unintubated patients
   a. Chest tubes are generally put on suction for 24 hours after placement for evacuation of air and fluid. Fluid, however, will generally drain satisfactorily by gravity and suction can be removed generally when all air leaks have resolved.

   b. Presence of an air leak is determined during deep breathing and/or coughing by examining the bubble chamber for any air coming through the line. Simple fluctuation of the fluid in the chest tube system tubing, is not an air leak and only indicative of physiologic pleural pressure changes during ventilation.

   c. Patients with residual pneumothoraces may have the suction increased on their chest drainage/collection system to 30 or 40 mm of H₂O. If a large (>15%) pneumothorax does not resolve with increased suction, consult with the chief resident because a 2nd tube may be necessary. If the residual pneumothorax (i.e. < 15%) does not change with increased suction and remains unchanged on water seal, the chest tube may be clotted or nonfunctional and ready for removal.

   d. Nonfunctioning or clotted tubes have little or no output and no physiologic motion on deep breathing or coughing. Clots may sometimes be manually stripped from the tubing. The system should not be disconnected. Any attempts to aspirate any clots or material from the tubing should only attempted after discussing with the chief and attending and should be done with the assistance of a senior resident.

   e. Chest tubes, as a general rule, should never be clamped.

2. Ventilated patients
   a. Same guidelines apply to chest tube management for ventilated patients as far as air leak and output. (see Removal of chest tubes below)

   b. Patients on high levels of PEEP, generally considered over 10 cm H₂O, or patients with high peak airway pressures, > 35 cm H₂O, may be at an increased risk for recurrent pneumothorax following tube removal.

   c. Patients with stable ventilator settings and stable chest x-ray after 24 hours on water seal may be candidates for tube removal if output is within stated guidelines.

   d. Extremely high levels of PEEP demand careful consideration concerning chest tube management.

   e. Chest tubes, as a general rule, should never be clamped.
3. **Removal of chest tubes**

a. For patients with hemothorax, the timing of chest tube removal is dependent on chest tube output. Chest tubes may be removed when the drainage is **less than 200 ml/24 hours**. Tubes still draining gross blood should generally be left in place.

b. Patients with pneumothorax and/or a history of an air leak may have their tube removed when the lung has been “up” on CXR for 24 hours while on H₂O seal provide the 24 hours output < 200 ml.

c. When placing a chest tube to water seal or increasing the suction, it is best to wait 6 hours before repeating a chest x-ray.

**When pulling a chest tube.**

- Prepare a dressing of Xeroform and 4 x 4’s and several pieces of 2" silk or adhesive tape.
- Cut the suture when the dressing is ready.
- Instruct the patient to take a **full inspiration**, hold their breath, and Valsalva maneuver. Practice this sequence several times.
- Repeat the above sequence, briskly withdraw the thoracostomy tube with the patient performing Valsalva at full inspiration
- **Immediately** apply the occlusive dressing to the thoracostomy wound. This dressing should remain in place for 48-72 hours (unless soiled).
- Patients on a ventilator should have the chest tube pulled during the inspiratory phase of their ventilatory cycle.

d. Once a tube has been removed, generally wait 6 hours to repeat a chest x-ray to assure no recurrent pneumothorax.

e. Patients having a chest tube for pneumothorax should be advised not to fly or scuba dive for 3 months following tube removal due to the risk of recurrent pneumothorax with altitude/pressure change. Patients with complicated histories of chest tube management, persistent air leaks, multiple chest tubes, etc. should confer with rounding attending regarding ultimate D/C timing following tube removal.
CRRT policy
# 8029.023

Policy statement: To establish guidelines for the Registered Nurse in the treatment of patients receiving Continuous Renal Replacement Therapy (CRRT). These guidelines will enable the Registered Nurse to provide safe and consistent monitoring of patients receiving CRRT in an Intensive Care Unit (ICU) setting.

Scope: Applies to all Registered Nurses caring for patients requiring CRRT in the Adult Critical Care setting.

Definitions:
CRRT is an abbreviation for Continuous Renal Replacement Therapy. CRRT is a form of continuous renal replacement therapy that is used for critically ill patients with multisystem organ failure, in whom acute renal failure develops. This form of dialysis differs from intermittent hemodialysis in that it is a slower, continuous mode of dialysis that permits the clearance of blood solutes both by diffusion across a semipermeable membrane (dialysis) and by convection of solutes across a membrane as they are separated from whole blood in response to hydrostatic pressure. CRRT is subdivided into the following four therapy modalities:

- **SCUF** is an abbreviation for Slow Continuous Ultrafiltration that provides fluid removal by ultrafiltration only, no replacement fluid is used. The maximal fluid rate is 2000 mL/hr.
- **CVVH** is an abbreviation for Continuous Venovenous Hemofiltration that provides solute removal by convection and net fluid removal if desired. It offers high volume ultrafiltration using replacement fluid which can be given pre-filter (pre-dilution) or post-filter (post dilution). The maximal patient fluid removal rate in CVVH is 1000 mL/hr.
- **CVVHD** is an abbreviation for Continuous Venovenous Hemodialysis that provides solute removal by diffusion, net fluid removal rate in CVVHD is 1000 mL/hr.
- **CVVHDF** is an abbreviation for Continuous Venovenous Hemodiafiltration that combines the efficiency of CVVH and CVVHD in removing solutes.
- **UF** is an abbreviation for ultrafiltration and refers to all fluid going from the patient’s blood across the membrane of the filter to the effluent bag.
- **Effluent fluid** is fluid removed from the patient, dialysate and replacement fluid.
- **Dialysate fluid** is a mixture of fluid running countercurrent of blood to remove fluid and compounds through diffusion.
- **Replacement fluid** is solution used to maintain desired ultrafiltration rate and replace essential electrolytes.

Criteria for CRRT:
- Oliguria (urine output less than 200mL/12hrs)
- Anuria (urine output less than 50mL/12hrs)
- Hemodynamic Instability
- Severe Acidemia (pH less than 7.1) due to Metabolic Alkalosis
- Azotemia (urea greater than 30mmol/L)
- Hyperkalemia (K+ greater than 6.5 or rapidly rising)
- Suspected uremic organ involvement (pericarditis, encephalopathy, neuropathy, myopathy)
- Severe Dysnatremia (Sodium (Na) greater than 160 or less than 115)
- Hyperthermia (Core temperature greater than 39.5 C)
- Clinically significant organ edema (especially lungs)
- Drug Overdose (OD) with dialyzable toxin
- Coagulopathy requiring large amounts of blood products in a patient at risk for development of Pulmonary Edema or Adult Respiratory Distress Syndrome (ARDS)

Procedure: CRRT orderset # 5168

1. Only RNs who have completed unit based CRRT orientation and training will independently perform Continuous Renal Replacement Therapy (CRRT).

2. CRRT will be performed only in an Intensive Care Setting.
3. A Nephrologist or Surgical Intensivist (Fellow with Intensivist) will be consulted by the patient’s attending physician and will determine the need for CRRT.

4. The Nephrologist or Surgical Intensivist (Fellow with Intensivist) will obtain necessary consent for treatment and initiate CRRT order set.

5. Any qualified physician responsible for the care of the patient will be responsible for obtaining the necessary large bore multi-lumen vascular access for CRRT.
   a. Large bore multi-lumen vascular access will be inserted and threaded into a central vein.
      i. Access established for CRRT is not to be used for other fluid or blood product administration except in life threatening emergencies
      ii. After venous access is established, the physician that inserted the line, or the RN caring for the patient will instill an anticoagulant (i.e. Heparin, Altepase) as ordered, diluted with saline to fill the lumen size of the catheter inserted.
      iii. The large bore multi-lumen catheter will be clearly labeled with date, time, initial, and type of anticoagulant instilled.

6. The RN performing CRRT will:
   a. Perform complete physical assessment. Review past medical history and current disease processes, therapy or medications being used and laboratory analysis
   b. Prepare the CRRT system
   c. Start machine in high treatment mode (CVVHDF) on set up then change mode to what is ordered
   d. Prior to initiation of the therapy the RN will verify orders for fluids and flow rates
   e. Utilize appropriate warming device if patient’s core temperature ≤ 94 degrees F°, per physician order
   f. Prior to initiation of CRRT, patient identification will be verified by using 2 identifiers prior to the administration of CRRT
   g. Assess blood flow of vascular catheter prior to connecting CRRT
      i. Prior to using access withdraw and waste appropriate volume from each port to avoid systemic anticoagulation of the patient
   h. Initiate CRRT as ordered per Nephrologist or Surgical Intensivist
   i. Administer infusions as ordered and hang dialysate and other admixtures when indicated
      i. Ensure correct solution is attached to the appropriate line (check all solutions like drugs)
         1. Mix solutions as directed (e.g. PrismaSate)
      ii. Adjust dialysate, replacement, blood flow, fluid removal and pre-blood pump rates as ordered by the Nephrologist or Surgical Intensivist
      iii. Calcium Chloride infusion is always to infuse through a central venous line, except under extreme circumstances (central access not available and only with approval of Nephrologist or Surgical Intensivist)
         1. Calcium Gluconate may be infused through peripheral IV
   j. Change PrismaFlex filter set every 72 hours and PRN
   k. Document reason for filter change on CRRT flow sheet
   l. Document all fluids used with CRRT
   m. Document per CRRT flow sheet pressure flow rate, and CRRT fluid balances every hour along with other outlined parameters
      i. Flow sheet documentation will also include time of flow rate, fluid changes and other CRRT interventions
   n. All order changes will be given by the Nephrologist or Surgical Intensivist
   o. Do not change dialysate, replacement, or effluent bags until prompted by the machine
   p. Record only “Actual pt fluid removed” as output on ICU flow sheet
   q. Replacement fluids that are infused directly to the patient via central or peripheral IV line are to be documented and counted as intake on the ICU flow sheet
   r. During treatment observe the ultrafiltrate for color and amount
      i. Pink tinged ultrafiltrate and/or obvious blood in ultrafiltrate are signs of ruptured membrane
         1. If above occurs, stop the machine. DO NOT RETURN BLOOD.
ii. Decrease in ultrafiltrate amount may be a sign of clotting.
s. IMMEDIATE attention will be given to all alarms.
t. If CRRT is stopped, stop infusions and lab work associated with CRRT.

7. In the event the patient has to be disconnected from CRRT:
   a. Temp Disconnect:
      i. Temporarily disconnect patient
         1. Follow the instructions given on the screen of the PrismaFlex to return the blood, disconnect the patient, re-prime and reconnect the patient to the same PrismaFlex filter set. (Very Important: if blood is not returned when CRRT is disconnected, the blood loss is 80–100 mLs)
         2. Prior to returning the patient’s blood, gather all your necessary supplies
            a. Two 10mL syringes with NS
            b. Two 3mL syringes with ordered anticoagulant (Heparin or Altepase) diluted to desired total volume as specified by catheter lumen
            c. 250 mL bag of 0.9% NS (approximately 200 mLs is needed to return the patient’s blood)
            d. 18-gauge needle or approved needleless device
            e. Gloves
            f. Masks (one for RN and one for the patient)
            g. Chloraprep prep pads or sticks
      ii. Return Blood
         1. WARNING: Do not return blood if clotting is present in blood lines or filter. Prime and Load a new PrismaFlex filter set.
         iii. Hang a 250 mL bag of 0.9% NS on the left lower hook of the PrismaFlex machine (usually takes 100 mLs)
         iv. Choose “STOP” from the touch screen of PrismaFlex
            1. Then choose “Temporary Disconnect”. The screen will display some choices.
            2. Choose “Continue” one time.
            3. The next screen has a touch screen that reads “Return Blood”.
            4. Proceed to the next step.
      v. Clamp access line (red) and lumen of catheter.
      vi. Attach 10mL syringe of NS to catheter lumen and briskly flush maintaining positive pressure as lumen of catheter is clamped
      vii. Attach 18-gauge needle/approved needleless device to the end of the red access line. Swab the injection port of the NS bag with alcohol prep pad. Insert 18-gauge needle/approved needleless device with the red access line attached into the injection port of the bag and unclamp the line.
      viii. Press and hold the “Return Blood” soft key on the PrismaFlex machine until all blood is returned to the patient.
      ix. Clamp the blue line and lumen of the catheter and flush with 10mLs of NS.
      x. Instill anticoagulant as ordered (Heparin or Altepase), diluted to desired total volume specified on each catheter lumen.
      xi. Label each port with date, initials, and type of anticoagulant instilled.
      xii. If a new PrismaFlex filter set is indicated, the nurse will “UNLOAD” the filter set and discard it in a biohazard container.
Determinaton of Brain Death –
Adults & Pediatrics and Organ/Tissue Recovery

# 8316.004

Policy Statement: Criteria for Brain Death declaration for Adults and Pediatrics.

Scope: Erlanger Health System (EHS) personnel, Medical Staff and Allied Health Professional Staff

Definitions:
Whereas, the State of Tennessee has adopted the Uniform Determination of Death Act, which is as follows:
An individual is dead who has sustained either:

I. Irreversible cessation of circulatory and respiratory function, or
II. Irreversible cessation of all functions of the entire brain, including the brain stem.

Procedure:
1. When the criteria are met and agreed upon by required physicians, the Brain Death Examination Form shall be completed by one of the physicians.
2. Brain death declaration is the formal pronouncement of death and the time documented for this declaration is the time of patient death to be used for all legal matters, including the death certificate issued by the hospital.
3. The pronouncement of death is, by law, a medical act. Therefore, consent is not required, nor is it to be requested from the patient’s next-of-kin. However, the patient’s family must be given full information concerning the brain death determination process by the attending physician prior to and at all stages during the process.
4. In cases where the Medical Examiner has jurisdiction, his permission is not required for the brain death determination process or termination of medical therapy. However, in all such cases where the Medical Examiner has jurisdiction, the Medical Examiner’s office shall be immediately notified of the death and the Medical Examiner must be informed before removal of organs.
5. When organs are to be removed from brain dead patients, a declaration of brain death must be made prior to their removal. Removal of organs must be authorized by the next-of-kin, unless the deceased patient had executed a valid organ donation agreement during his lifetime. Supportive measures will be continued until the organs have been removed.
6. All hospital rules, policies and procedures concerning matters relevant to any deceased patient (i.e. permission for autopsy, Medical Examiner’s jurisdiction, etc) apply equally to brain dead patients after a declaration of brain death has been made, and all medical therapy or supportive devices have been discontinued.

DETERMINATION OF DEATH: ADULTS

I. Neurological Criteria for Brain Death – Adults above 18 years of age

A. Prerequisites
1. Clinical or neuro-imaging evidence of an acute CNS catastrophe that is compatible with the clinical diagnosis of brain death.
2. Exclusion of complicating medical conditions that may confound clinical assessment (no severe electrolyte, acid-base or endocrine disturbance).
3. No drug intoxication or poisoning.
4. Core temperature >36°C (96.8°F).
5. Absence of hypotension (Blood pressure above 100 mm/Hg systolic).

B. The period of observation required to confirm the diagnosis of brain death will vary according to specific clinical circumstances. A minimum of six (6) hours is recommended, except when the cause of coma is not known or the potential for recovery is uncertain in which a longer period may be needed.

C. Neurological Criteria: The three cardinal findings in brain death are coma or unresponsiveness, absence of brain stem reflexes and apnea.
1. Coma or unresponsiveness – no cerebral motor response to pain in all extremities (nail-bed pressure and supraorbital pressure). True decerebrate or decorticate posturing or seizures are inconsistent with the diagnosis of death.
2. Absence of brainstem reflexes:
i. Pupils
1. Absence of pupillary response to bright light documented in both eyes.
2. Size: mid-position (4 mm) to dilated (9 mm)

ii. Ocular movement (absence of)
1. No oculocephalic reflex (testing only when no fracture or instability of the cervical spine is apparent). Dolls head phenomenon – if the head is briskly turned from side to side, there shall be no movement of the eyes toward the opposite side.
2. No deviation of the eyes to irrigation in each ear with 50ml of cold water (allow 1 minute after injection and at least 5 minutes between testing on each side).
3. No corneal reflex—Absent corneal reflex when touching the cornea with a piece of tissue paper, cotton swab or squirts of water. No eye movement should be seen.
4. Absence od facial muscle movement o noxious stimulus. No grimacing or facial muscle movement when deep pressure applied to supraorbital ride, or deep pressure on the condyles at the level of the temporomandibular joint with jaw reflex.
5. Absence of pharyngeal and tracheal reflexes.
   a. No pharyngeal or gag reflex after stimulation of the posterior pharynx with tongue blade or suction device (no gag).
   b. No cough response to insertion of catheter into the trachea, advanced to level of carina, followed by 1-2 suction passes.

iii. Apnea
1. The Attending physician, and/or their designated physician, who is competent in the application of apnea testing and brain death criteria must be present during the apnea test.
2. Absence of breathing drive—CO2 challenge documenting an increase in PaCO2 (above normal levels). Prerequisites for test:
   a. Normotension—Systolic BP > 100 mm/Hg
   b. Normothermia—Core temperature > 36 C or 96.8 F
   c. Euvolemia—An option is a positive fluid balance in the previous 6 hrs.
   d. Eucapnia (PaCO2 35-45 mm/Hg)
   e. Absence of hypoxia
   f. No prior evidence of CO2 retention (i.e. COPD, severe obesity)
3. Adjust vasopressors to a Systolic BP ≥ 100 mm/Hg
4. Perform Apnea test:
   a. Pre-oxygenation for at least 10 minutes with 100% O2 to obtain arterial PO2> 200 mmHg.
   b. Adjust ventilator settings to get eucapnia. Get baseline ABG. (Reduce down to at least 10 breaths per minute and/or < 5 cm H2O PEEP for eucapnia).
   c. If pulse oximetry O2 saturation remains > 95%, obtain ABG
   d. Disconnect from ventilator
   e. Deliver 100% O2 into trachea (use cannula or T-tube) to preserve oxygenation.
   f. Look closely for respiratory movement for 8-10 minutes (abdominal or chest).
   g. Abort if SBP < 90 mm/Hg
   h. Abort if O2 saturation via pulse oximetry is < 85% for > 30 seconds.
   i. Abort if cardiac arrhythmias are present, immediately reconnect ventilator and draw an ABG.
   j. If no respiratory drive is observed, repeat ABG after approximately 8 minutes.
   k. Reconnect ventilator
   l. If respiratory movements are absent and arterial PCO2 is > 60 mm/Hg (Or: 20mm/Hg increase in PCO2 over baseline), the apnea test result is positive (supporting diagnosis of brain death).
m. If the test is inconclusive by the patient being hemodynamically stable during the procedure, it may be repeated for a longer period of time (10-15 minutes) after the patient is again adequately pre-oxygenated.

n. If ventilator settings were changed for preparation of the apnea test, be sure to return original settings.

iv. **Confirmatory Tests** - A confirmatory test will be done on patients for whom specific components of clinical testing cannot be reliably performed or evaluated. The following confirmatory test findings are:
   b. Cerebral angiography (CTA) – no intracerebral filling at the level of carotid bifurcation or Circle of Willis.
   c. Transcranial Doppler Ultrasonography (TCD)

II. **Pitfalls in the diagnosis of brain death:**
   The following conditions may interfere with the clinical diagnosis of brain death, so that the diagnosis cannot be made with certainty on clinical grounds alone – confirmatory tests are recommended.
   A. Severe facial trauma.
   B. Pre-existing papillary abnormalities.
   C. Toxic levels of any sedative drugs, aminoglycosides, tricyclic antidepressants, anticholinergics, antiepileptic drugs, chemotherapeutic agents, or neuromuscular blocking agents.
   D. Sleep apnea or severe pulmonary disease resulting in chronic retention of CO₂.

III. **Clinical observations compatible with the diagnosis of brain death.** These manifestations are occasionally seen and should not be misinterpreted as evidence for brainstem function.
   A. Spontaneous movements of limbs other than pathological flexion or extension response
   B. Respiratory-like movements (shoulder elevation and adduction, back arching intercostals expansion without significant tidal volumes)
   C. Sweating, blushing, tachycardia
   D. Normal blood pressure without pharmacologic support or sudden increases in blood pressure
   E. Absence of diabetes insipidus
   F. Deep tendon reflexes; superficial abdominal reflexes, triple flexion response
   G. Babinski reflex

IV. **Guidelines**

   **CIRCULATORY/RESPIRATORY CESSATION**
   A. In the event of irreversible cessation of circulatory/respiratory function, patient will be declared dead by a physician licensed in the State of Tennessee. Time of Death must be recorded on Record of Death.
   B. Notification will be made to the Organ Donor Program (Reference the policy Organ/Tissue Recovery).
   C. Patients who are pronounced brain dead and under consideration for organ donation should not be coded for more than 10 minutes

   **BRAIN FUNCTION CESSATION (BRAIN DEATH)**
   A. Physicians who are active members of the medical staff, and who are skilled in the application of accepted neurological standards based on the neurological criteria to declare brain death, should pronounce brain death.
   B. Considering the responsibility entailed in the determination of death based upon neurological criteria, Neurology or Neurosurgery consultation is recommended.
   C. After a neurosurgeon/neurologist has seen the patient and made a diagnosis and a prognosis (irreversibility) regarding brain death, a senior level resident that has been educated in the diagnosis of brain death, may make the declaration of brain death after re-evaluation.
   D. Medical record documentation must include Determination of Brain Death Checklist (Addendum A).
   E. TDS is to be notified of anyone who has died or if death is imminent or a GCS of ≤ 5, or any one identified potential organ donor/patients is eligible for a declaration of death based on irreversible cessation of brain function according to the TCA 68-3-501, within 1 hour of awareness.
F. In the event of organ donation, the patient will be supported by mechanical means, under the care of the organ retrieval team and nursing staff, until this is completed.

G. Time of death **must be** recorded as the time “Brain Death” is declared. Record on Record of Death is the time the patient is pronounced brain dead.

H. One the diagnosis of brain death has been established, the patient will be removed from the ventilator support within 6 hours unless family is considering donation.

**NOTE:** The responsibility for declaring a patient dead based on neurological criteria rests with the physician and he/she is the authority for making this decision. The decision should be based on neurological criteria only. Declaration of death based on the criteria may be a difficult concept for some families to accept. Physicians and nursing staff should be sensitive to this, and prepare families accordingly.

**References:**

- AAN Summary of Evidenced-based Guidelines for Caregivers and Families of Patients: Determining Brain Death In Adults
- T.C.A. § 68-3-501 Uniform Anatomical Gift Act of TN.
- Organ/Tissue Recovery policy 8316.953
Addendum A
Checkpoint for Determination of Brain Death

Prerequisites (all must be checked)
Coma- irreversible and cause known.
Neuroimaging explains coma.
CNS depressant drug effect absent (if indicated toxicology screen; if barbiturates given, serum level < 10 mg/ml).
No evidence of residual paralytics (electrical stimulation if paralytics used).
Absence of severe acid-base, electrolyte, endocrine abnormality.
Normothermia or mild hypothermia (core temperature > 36°C).
Systolic blood pressure ≥ 100mm Hg.
No spontaneous respirations.

Examination (all must be checked)
Pupils nonreactive to bright light.
Corneal reflex absent.
Oculocephalic reflex absent (Doll eyes --tested only if C-spine integrity ensured).
Oculovestibular reflex absent. (Caloric Test)
No facial movement to noxious stimuli at supraorbital nerve, temporomandibular joint.
Gag reflex absent.
Cough reflex absent to tracheal suctioning.
Absence of motor response to noxious stimuli in all four limbs (spinally mediated reflexes are permissible)

Apnea Testing (all must be checked)
The Attending physician, and/or their designated physician who is competent in the application of apnea testing and brain death criteria must be present during the apnea test.
Patient is hemodynamically stable.
Ventilator adjusted to provide normocarbia (PaCO₂ 35 – 45 mm Hg).
Patient preoxygenated with 100% FiO₂ for > 10 minutes to PaO₂ > 200 mm Hg.
Patient well-oxygenated with a positive end-expiratory pressure (PEEP) of 5 cm of water.
Provide oxygen via a suction catheter to the level of the carina at 6 L/min or attach T-piece with continuous positive airway pressure (CPAP) at 10 cm H₂O.
Disconnect ventilator.
Spontaneous respirations absent
Arterial blood gas drawn at 8 – 10 minutes, patient reconnected to ventilator.
PCO₂ ≥ 60 mm Hg or 20 mm Hg rise from normal baseline value
OR
Apnea test aborted or deferred due to underlying pulmonary condition

Ancillary testing (only one needs to be performed) (to be ordered only if clinical examination cannot be fully performed due to patient factors, or if apnea testing inconclusive or aborted or deferred)
HMPAO SPECT- Brain Flow Study by Nuclear Med.
Cerebral angiogram- CTA

Time of Death (DD/MM/YY) _____/_____/_______
Name of Physician (print):________________________________________
Signature of Physician:___________________________________________
DETERMINATION OF DEATH: PEDIATRICS (for patients < 18 years of age)

POPULATION – The criteria are not applicable to premature infants < 37 wks.

Brain Death Examination for Infants and Children
Two physicians must perform independent examination separated by specified intervals.

<table>
<thead>
<tr>
<th>Age of patient</th>
<th>Timing of first exam</th>
<th>Inter-exam, Interval</th>
</tr>
</thead>
</table>
| Term newborn 37 weeks gestational age and up to 30 days old | First exam may be performed 24 hours after birth OR following cardiopulmonary resuscitation or other severe brain injury | At least 24 hours
|                                                     |                      | Interval shortened because ancillary study (section 4) is consistent with brain death |
| 31 days to 18 years old                            | First exam may be performed 24 hours following cardiopulmonary resuscitation or other severe brain injury | At least 12 hours OR
|                                                     |                      | Interval shortened because ancillary study (section 4) is consistent with brain death |

Section 1. PREREQUISITES for brain death examination and apnea test

A. IRREVERSIBLE AND IDENTIFIABLE Cause of Coma (Please check)

- □ Traumatic brain injury
- □ Anoxic brain injury
- □ Known metabolic disorder
- □ Other (specify)

B. Correction of contributing factors that can interfere with the neurologic examination

<table>
<thead>
<tr>
<th></th>
<th>Examination One</th>
<th>Examination Two</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Core Body Temp is over 95°F (35°C)</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>b. Systolic blood pressure or MAP in acceptable range (Systolic BP not less than 2 standard deviations below age appropriate norm) based on age</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>c. Sedative/analgesic drug effect excluded as a contributing factor</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>d. Metabolic intoxication excluded as a contributing factor</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>e. Neuromuscular blockade excluded as a contributing factor</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>

□ If ALL prerequisites are marked YES, then proceed to section 2, OR If confounding variable was present. Ancillary study was therefore performed to document brain death. (Section 4).

Section 2. Physical Examination

(Please check)
NOTE: SPINAL CORD REFLEXES ARE ACCEPTABLE

<table>
<thead>
<tr>
<th></th>
<th>Examination One Date/Time:</th>
<th>Examination Two Date/Time:</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Flaccid tone, patient unresponsive to deep painful stimuli</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>b. Pupils are midposition or fully dilated and light reflexes are absent</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>c. Corneal, cough, gag reflexes are absent Sucking and rooting reflexes are absent (in neonates and Infants)</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>d. Oculovestibular reflexes are absent</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>e. Spontaneous respiratory effort while on mechanical ventilation is absent</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>

□ The____________________(specify) element of the exam could not be performed because __________________.

Ancillary study (EEG or radionuclide CBF) was therefore performed to document brain death. (Section 4).

Section 3. APNEA test

<table>
<thead>
<tr>
<th></th>
<th>Examination One Date/Time:</th>
<th>Examination Two Date/Time:</th>
</tr>
</thead>
</table>
No spontaneous respiratory efforts were observed despite final PaCO2 > 60 mm Hg
and a > 20 mm Hg increase above baseline.
(Examination One)

No spontaneous respiratory efforts were observed despite final PaCO2 > 60 mm Hg
and a > 20 mm Hg increase above baseline.
(Examination Two)

<table>
<thead>
<tr>
<th>Pretest PaCO2:</th>
<th>Posttest PaCO2:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apnea duration:</td>
<td>Apnea duration:</td>
</tr>
<tr>
<td>_______min</td>
<td>_______min</td>
</tr>
</tbody>
</table>

Apnea test is contraindicated or could not be performed because

**Section 4. ANCILLARY testing is required when**
(1) any components of the examination or apnea testing cannot be completed;
(2) if there is uncertainty about the results of the neurologic examination;
or (3) if a medication effect may be present.

**Ancillary testing can be performed to reduce the inter-examination period, however, a second neurologic examination is required.** Components of the neurologic examination that can be performed safely should be completed in close proximity to the ancillary test.

- Electroencephalogram (EEG) report documents electrocerebral silence
  - Yes □ No □
- Cerebral Blood Flow (CBF) study report documents no cerebral perfusion
  - Yes □ No □

**Section 5. Signatures**

**Examiner One**

I certify that my examination is consistent with cessation of function of the brain and brainstem. Confirmatory exam to follow

(Printed Name) __________________________ (Signature) __________________________

(Specialty) __________________________ (PAGER #/LICENSE #) __________________________

(Date mm/dd/yyyy) __________________________ (Time) __________________________

**Examiner Two**

I certify that my examination and/or ancillary test report confirms unchanged and irreversible cessation of function of the brain and brainstem. The patient is declared brain dead at this time.

Date/Time of death: __________________________

(Printed Name) __________________________ (Signature) __________________________

(Specialty) __________________________ (PAGER #/LICENSE #) __________________________

(Date mm/dd/yyyy) __________________________ (Time) __________________________
Digital Stimulation
# 7135.222

**Policy statement:** Develop a consistent approach to bowel management, rectal digital stimulation program for patients with alteration of normal bowel function secondary to neurogenic dysfunction.

**Scope:** All Trauma Surgical Critical Care Staff/ Nursing

**Definitions:** Rectal digital stimulation is used as part of the Neurogenic Bowel Program in patients without areflexic/flaccid/hypotonic bowel. Physician’s orders must be obtained prior to performing rectal digital stimulation bowel program. Specific orders will be obtained for any patient with a cardiac history, neurologic injury prone to neuro storming, or any intolerance to vasovagal stimulation.

The purpose of rectal digital stimulation in conjunction with a bowel program is to evacuate bowel contents as per a scheduled program, to stimulate peristalsis, and to relax the anal sphincter.

**Procedure:** Physician’s order will be obtained prior to starting neurogenic bowel program.

I. Perform rectal digital stimulation 30 minutes following meal or hot liquid. A suppository and/or enema may also be used in conjunction with rectal digital stimulation as per physician orders.

II. Assemble equipment:
   - a. Examination gloves (obtain several pairs- will be changing frequently)
   - b. Water soluble lubricant and/or local anesthetic ointment (requires physician’s order).
   - c. Under pads
   - d. Wash basin, wash cloths and towels
   - e. Bed, commode or bedside commode with any bowel program equipment as per OT and PT.

III. Explain procedure to patient.

V. Wash hands.

VI. Choose appropriate, private location and position patient on commode, bedside commode or bed on the left side with knees flexed and right leg over left unless medically contraindicated.

VII. Don gloves and apply a liberal amount of lubricant (and local anesthetic if ordered) to index finger.

VIII. Gently insert lubricated index finger through the anal sphincter to approximately the second joint of the finger. If stool is present gently remove it. Remove dirty gloves, don clean gloves, apply lubricant, reinsert finger as above to begin digital stimulation.

IX. Press gently but firmly against the rectal wall and anal sphincter rotating first at 12:00, then 3:00, then 6:00, then 9:00 for approximately 10 sec. each position. Continue for only one to two minute maximum at a time. Remove finger from anus when anal sphincter is relaxed. If no results may repeat gentle rectal digital stimulation in 15 minutes x 1. Don clean glove and reapply lubricant with each insertion of the finger.

X. When results are produced, assist the removal of stool when necessary. Must wait 15 minutes before continuing the program. Continue to dilate the patient until no more stool is produced for 5 minutes.

XI. Discontinue procedure and notify the physician if rectal bleeding occurs, reflex tachycardia develops, bradycardia develops, any symptoms of autonomic dysreflexia develop or any other adverse affects.

XII. Cleanse the perineal area with soap and water and dry following the procedure.

XIII. Return the patient to a safe and comfortable position.

XIV. Dispose of stool and contaminated material appropriately and document the procedure, the results and the patient’s tolerance to the program.

XV. Educate the patient/caregiver on the procedure and assess for ability and willingness to competently perform. Document the education process.
DVT/Venous Thromboembolism Guideline

# 7135.202

**Policy Statement:** The Venous Thromboembolism (VTE) Guideline provides a standardized plan of care for the prevention of VTE in the trauma patient. This guideline was developed in addition to the general hospital policy to address the complexities of management of the multiply injured patient.

**Scope:** All patients admitted to the Trauma Service at Erlanger Medical Center, Baroness Campus.

*Erlanger policy dictates that a Thrombosis Risk Factor Assessment shall be performed on all hospital admissions. That guideline provides general stratification and recommendations for VTE prophylaxis and can be reviewed in the Nursing Assessment area of the Physicians’ Portal.

The hospital order set #4540 Thrombosis Prophylaxis contains generic orders for prophylactic anticoagulation for clarifications in dosing regimens. (Can be found on the Intranet or the Physician’s Portal under “Order Sets”, choose the “Pharmacy, Anticoagulation Drugs” folder.)

**A. Background**

VTE occurs in approximately 1.5/1000 adults annually and approximately 1% of all hospitalized patients. Deep vein thrombosis (DVT) is associated with a 30-day mortality rate of ~2% while pulmonary embolism (PE) has an overall 30-day mortality of approximately 10%. In the United States, more than 50,000 patients per year die from PE. While the reported incidence of VTE in the literature for trauma patients varies widely, these patients have multiple interrelated risk factors that deserve special consideration.

**B. DVT risk factors**

**Major**
- Age > 50 years
- Severe closed head injury (GCS<9)
- Increasing severity of injury (↑ISS)
- Spine fractures
- Pelvic fracture
- Long-bone fracture
- Hip dislocation
- Morbid obesity (BMI >30, >100lbs above IBW)
- History DVT
- Immobilization > 3 days
- Laparotomy

**Minor**
- Age 40-50
- Coagulopathy on admission
- Central line placement
- Immobilization 1-3 days
- 4 units PRBC transfusion 1st 24 hours
- Varicose Veins
- Inflammatory Bowel Disease
- Swollen legs (current)
- Minor surgery planned (<1 hr anesthesia)

**C. Contraindications to Prophylactic Anticoagulation**

1. Patients with intracranial hemorrhage, acute spinal cord injury or blunt solid organ injury have relative contraindications to heparin therapy for the first 48 hours following injury. Heparinoids can be administered after 48 hours when patients are otherwise adequately resuscitated, have a normal coagulation profile, stable neurologic findings, and stable CT scans of the head or abdomen.

2. When above criteria are met, initiating pharmacoprophylaxis will then be left up to the discretion of the trauma attending of record.

3. Patients with the following are exempt from pharamcoprophylaxis and should be considered for early IVC filter placement

   Severe closed head injury with persistent GCS 8 or less.
   Spinal cord injury with neurologic deficit.
   Pelvic fractures with prolonged immobilization.
   Multiple long bone fractures requiring prolonged immobilization.

4. ICU patients with ongoing resuscitation and/or coagulopathy should have their heparin therapy deferred until which time they have corrected these abnormalities.
5. Patients with Grade IV or V liver or Grades I – V splenic injuries or pelvic fractures with moderate to large pelvic hematomas, may start anticoagulation in 48 to 72 when their resuscitation is complete and their H/H and Coags are stable.

6. Patients in whom these contraindications do not pertain and have at least TWO minor or one major risk factor should begin anticoagulation therapy with the admission orders. If there are any variances from this protocol, the reasons need to be documented in the chart.

7. Prophylaxis should not be held prior to or following surgery unless there are documented bleeding abnormalities. Exception: Prophylactic anticoagulation should be given no later than 8 p.m on the evening prior to surgery and hold the a.m. dose on the morning of surgery for pelvic and/or acetabular surgery.

D. DVT screening

1. Patients sustaining the following conditions should undergo their first lower extremity venous duplex exam within 72 hours (hospital day 3) or before discharge if prior to hospital day 3:
   - Tibia fracture
   - Femur fracture
   - Pelvic fracture
   - Hip dislocation
   - Laparotomy
   - Thoracotomy
   - Thoracic or Lumbar Spine fracture
   - Bedrest
   - SCI with Neurologic Deficit

2. Patients with lower extremity or pelvic fractures should then undergo venous duplex examinations every 7 days (after initial scan) while hospitalized until ambulating with > 50% of their normal weight bearing status on the affected extremity.

3. Patients otherwise immobilized with the following conditions should undergo weekly ultrasounds starting 7 days from admission:
   - Closed head injury
   - Cerebral aneurysm or Brain tumor
   - Bed rest not otherwise specified (NOS)
   - Chest trauma
   - Neuro patient with intracerebral bleed
   - S/P craniotomy NOS
   - Cervical Spine injury without neurologic deficit

4. Routine screening ultrasounds should not be ordered on the weekends including the one at 3 days. Vascular techs should only be called on the weekends for the acute work-up of DVT or PE. Scans, which would normally fall on Saturday’s should be done Friday, and scans for Sunday’s on Monday.

5. Once patients are ambulatory and have had one follow-up negative duplex, then D/C the weekly study.

F. Prophylaxis regimens

1. Unfractionated Heparin (UH) – Usual dose is 5000 units SC TID. Obese or large patients that are felt to be at a particularly high risk, 7000 units may be given TID. Patients on SC heparin at home need monthly platelet monitoring for heparin induced thrombocytopenia (HIT).

2. Low Molecular Weight Heparin (LMWH) - Usual dose for Fragmin (dalteparin) is 5000 IU once daily. Usual dose for Lovenox (enoxaparin) is 40 mg twice daily.

3. All non-weight-bearing patients require knee high (unless thigh high requested by physician) SCD. Patients in skeletal traction or external fixators can use SCD or A-V Impulse Foot pump on the affected extremity. Tibia/fibula fractures will require A-V Impulse Foot pump on affected extremity.

G. DVT or PE treatment

1. Patients should be kept at bed rest for 24 hours following diagnosis of DVT (unless filter placed) with elevation of affected extremities. Discontinue SCD to affected extremity.

2. Load patients with 70-75 units/kg UH and then place on an infusion of 15-20 units/kg/hr. Coags are then checked every 6 hours. Please refer to the Heparin Weight Based-adults (orderset
for dose adjustments based on the PTT. (Can be found on the Intranet or the Physician’s Portal under “Order Sets”, choose the Pharmacy, Anticoagulation Drugs” folder on page 2.)

3. The low molecular heparin agent on formularly is Fragmin (dalteparin). The therapeutic dose of Fragmin is 200 U/kg subcutaneously for weight < 90 Kg and 100 U/kg subcutaneously q 12 hrs if weight > 90 kg.

4. DVT needs treatment for 3 months and PE for 6. Patients receiving UH may be loaded with Coumadin after 24 hours of therapeutic anticoagulation. This decision should be discussed on rounds. When therapy is near completion (3-6 months), a follow-up venous duplex exam should be documented to demonstrate resolution of the thrombus.

5. Coumadin should not be started until a heparin infusion has been initiated. Coumadin should be dosed according to the Coumadin order set (# and with assistance from the pharmacy anticoagulation service.

H. Heparin Induced Thrombocytopenia (HIT)

1. Hospitalized patients on UH should have a platelet level checked at least weekly monitoring for heparin induced thrombocytopenia (HIT). When platelets fall below 100K or to half of baseline levels, then patients may be at risk for HIT and an antiplatelet antibody should be checked. Patients with platelet counts < 100K remaining on UH should have daily platelet levels checked while antiplatelet antibodies study is pending (5-7 days). D/C UH if platelets fall < 70K. Patients on LMWH should probably have a platelet count monitored at least monthly due to the occasional occurrence of HIT in these patients.

2. Patients with potential or documented HIT may undergo prophylaxis with Arixtra. Dosing for prophylaxis is 2.5 mg/day.

3. Patients requiring treatment for DVT or PE with HIT should be treated with Argatroban (order set 10001) or Lepirudin (order set 10000).

I. DVT or PE treatment

Indications for IVC filter placement include the following:

Category I
“Traditional” indications for IVC filter placement include:
- Recurrent PE despite full anticoagulation,
- Proximal DVT and contraindications to full anticoagulation,
- Progression of iliofemoral clot despite anticoagulation.

Category II
“Extended” indications for prophylactic vena cava filter placement:
- Large free-floating thrombus in the common femoral vein, iliac vein or IVC,
- Following PE in which recurrent emboli may prove fatal,
- During/after surgical embolectomy.

Category III
Insertion of a “prophylactic” vena cava filter should be considered in high-risk trauma patients:
1. Who cannot receive anticoagulation because of increased bleeding risk
2. Have one or more of the following injury patterns:
   a. Severe closed head injury (GCS <9),
   b. Spinal cord injury with para or quadriplegia,
   c. Complex pelvic fractures
   d. Multiple lower extremity long bone fractures.
**Venous Thromboembolism Guideline**

7135.202

---

**All Trauma Patients**

**Major Risk Factors**
- Age > 50 years
- Severe closed head injury (GCS<9)
- Increasing severity of injury (↑ISS)
- Spine fractures
- Pelvic fracture
- Long-bone fracture
- Hip dislocation
- Morbid obesity - BMI >30, >100 lbs above IBW
- History DVT
- Immobilization > 3 days
- Laparotomy

**Minor Risk Factors**
- Age 40-50
- Coagulopathy on admission
- Central line placement
- Immobilization 1-3 days
- 4 units PRBC transfusion 1st 24 hours
- Varicose Veins
- Inflammatory Bowel Disease
- Swollen legs (current)
- Minor surgery planned (<1 hr anesthesia)

---

**Knee high SCD BLE’s or Foot pump with tib/fib fractures**

**DVT Screening**

- Long Bone Fx’s – Tibia, Femur, and/or Pelvic Fractures requiring traction or operative fixation

- Yes
  - Ultrasound BLE’s hospital day #3 and every 7 days while hospitalized or until ambulating ≥50% normal weight bearing status on the affected extremity

- No
  - Ultrasound BLE’s hospital day #7 and every 7 days while hospitalized or until ambulating ≥50% normal weight bearing status on the affected extremity.

**23° Observation**

- No Treatment

**Prophylaxis**

- TBI w/abnormal CT Head
- Acute spinal cord injury
- Grade IV-VI liver
- Grade I – V spleen
- Pelvic fx w/hematoma
- Coagulopathy
- >4u PRBC or 4 liters crystalloids over resus period.

- Yes
  - Reassess Daily. If condition stabilizes; Vital Signs stable and not requiring pressors, CT Head stable and Neuro exam stable begin Prophylactic Anticoagulation – Unfractionated Heparin 5000 Units SQ TID.

- No
  - Begin Prophylactic Anticoagulation – Unfractionated Heparin 5000 Units SQ TID.
SCOPE: The Intensive Care Units (ICU) in which trauma patients are admitted.

POLICY: The Pre-Operative Enteral Feeding for Patient with Protected Airway is developed to provide a plan for efficiently providing the required nutritional support to admitted trauma patients requiring surgery.

PROCEDURE:

1. This policy ONLY applies to patients who are intubated or have tracheostomy tubes in place.

2. This does NOT apply to patients with a Dobb Hoff Tube.

3. This policy is used in conjunction with the Enteral Nutrition Support Guidelines #8051.902.

4. Non-Abdominal Surgery:
   a. Turn feeds off just prior to surgery departure or bedside procedure.
   b. Aspirate and flush gastric tube.
   c. Stop insulin infusion if advised prior to transport to OR.
   d. Alert anesthesia to perform accuchek every hour if patient had been on an insulin infusion; or perform an accuchek after one hour if patient had been given subq insulin within 2 hours of surgery.
   e. Restart tube feedings post surgery or post procedure unless orders state to hold tube feedings post surgery.

5. Abdominal Surgery and/or operative intervention requiring prone positioning:
   a. NPO 6 hours before planned surgery.
   b. Aspirate and flush gastric tube.
   c. Stop insulin infusion, if any, prior to transport to OR.
   d. Alert anesthesia to perform accuchek every hour if patient had been on an insulin infusion; or perform an accuchek after one hour if patient had been given subq insulin within 2 hours of surgery.
   e. Restart tube feedings post surgery or post procedure unless orders state to hold tube feedings post surgery.

6. Upper GI Endoscopy:
   a. Turn tube feeds off 1 hour prior to endoscopy procedure.
   b. Place NGT to suction.
   c. Stop insulin infusion, if any, prior to transport to OR.
   d. Alert anesthesia to perform accuchek every hour if patient had been on an insulin infusion; or perform an accuchek after one hour if patient had been given subq insulin within 2 hours of surgery.
   e. Restart tube feedings post surgery or post procedure unless orders state to hold tube feedings post surgery.

7. For patients with confirmed post-pyloric feeding tube, consider perioperative continuous feeding by anesthesiologist and surgeon. If patient is on insulin infusion, continue along with tube feedings.
Enteral Feeding: Tube Feeding Formula in the Non-Critically Ill Patient

Calculate Nutrient Needs

Is the gut functional or impaired?

Functional

- Standard Formula

Fiber Modification Needed?

No Fiber Formula

- Isotonic
- ARDS
- Osmolite

Fiber Formula

- High Protein
- Promote

Elemental Formula

- 1.0 Kcal
- Fluid restriction
- High Protein
- Highest Protein
- Immune Enhancing

- Optimental
- Vital 1.5
- Vital AF
- Peptamen Bariatric
- Impact Peptide 1.5

Standard Formula with moderate fiber content

- Jevity 1.2

Hi-Protein formula for wound healing

- Glucerna 1.2

Lower CHO formula

- Jevity

Fluid Restricted Hi-Cal

- Nepro

Renal Specific, Hi-protein/ON dialysis

- Suplena

Renal specific Low-protein /NOT on dialysis

- Pivot

Immune Enhancing

Free H2O Flush:

Ensure your patient is receiving adequate Free H2O.
Provide 1 ml of H2O per Kcal

ASCPEN Guidelines:
- Enteral feedings should be started within the first 24-48 hours following admission
- Feeds should be advanced toward goal over the next 48-72 hours
- Enteral feedings should be withheld until the patient is fully resuscitated and/or stable
Enteral Feeding: Tube Feeding Formula in the Critically Ill Patient

**Is the patient Critically Ill?**

- **YES?**
  - Is the Injury Severity Score (ISS) > 16
    - yes: Use an Immune Enhancing Formula
      - STANDARD Pivot 1.5
      - Elemental Impact Peptide 1.5
    - no: Use Standard Formula
      - Promote (NO Fiber)

- **NO?**
  - See page # 47
    - Selecting a Tube Feeding Formula in the Non-Critically Ill Patient

---

**Immune enhancing formulas are appropriate for 5 – 10 days. After 10 days patients should go back to one of the standard formulas listed above**

---

**Definition of Critically Ill**

- Patients expected to require an ICU stay of >2-3 days.
- Not those patients that are in the ICU for temporary monitoring or those patients with minimal metabolic or traumatic stress.
Procedure:

I. Unstable patient with isolated penetrating injuries
   1. External compression vs. tourniquet with BP cuff (avoid direct vessel clamping if possible)
   2. I.V. access with volume loading maintain SBP of 70 mmHg on route to OR
   3. Rapid triage in E.R.
   4. OR for exploration and necessary repair

II. Stable patient with penetrating extremity injury
   A. Evaluate for "hard" signs of arterial injury
      1. Absent distal pulses
      2. Expanding hematoma
      3. Distal ischemia (pallor, skin darkening)
      4. Audible bruit
      5. Palpable thrill

   B. Presence of "hard" signs warrants further evaluation
      1. Ischemia present -- consider on-table arteriogram/exploration vs. trip to interventional radiology for arteriogram
      2. No evidence of ischemia or threatened limb -- arteriogram for vessel assessment vs. on-table A-gram

   C. Evaluation for "soft" signs of arterial injury
      1. Peripheral nerve deficit
      2. History of moderate hemorrhage at time of injury
      3. Injury in "proximity" to a major artery
      4. Reduced but palpable pulse

   D. Presence of "soft" signs warrants further evaluation
      1. Manual blood pressure with doppler of injured extremity and contralateral extremity (ankle-ankle indices or AAI's or brachial-brachial indices or BBI's)
      2. For lower extremity injuries, check for posterior tibial and dorsalis pedis pulses.
      3. For upper extremity injuries, check for radial and ulnar pulses.
      4. Document findings in chart.
      5. If >10 mmHg difference exists between extremities, consult with attending, arteriography may be indicated.
      6. Patients should probably be admitted for observation and pain control for 24 hours, particularly for lower extremity wounds

E. High-velocity weapons, multiple fragment injuries, and blunt trauma can make diagnosis less obvious. These cases need individual assessment but the same recommendations regarding AAI's usually pertain.

F. Pitfalls:
   1. Axillary or groin wounds are typically not amenable to duplex evaluation
      a. CT scan with IV contrast or arteriogram may be warranted.
   2. Presence of Doppler signal alone does not exclude vascular injury and AAI' or BBI's should be used as a screening tool in all patients where it is feasible.
Flexion/Ext. for Awake Trauma Patients
# 7041.822

Policy statement: To ensure proper procedure is used in performing flexion-extension C-spines to reduce the risk to the patient and obtaining the best possible exam.

Scope: All Radiology Personnel/Trauma Services

Procedure:
When an order is received in the Radiology Department for flexion-extension, Radiology will verify C-spine CT has been performed and interpreted. If report is normal, then appropriate staff will be coordinated to perform the study. If abnormal, approval from Radiologist will be ascertained.

1. From hours of 7:00 a.m. to 4:00 p.m., the Radiology Nurse will be contacted. If not available or after 4:00 p.m., see #2.
2. Critical Care Nurse Clinicians, formerly Trauma Nurse Specialist, on duty pager 778-2121 #1891 or extension 6742.

Patient Mental Status
Patient should be oriented to person and place, easily aroused by voice and alert, and able to sit up. If not, then notify surgery chief resident on call; patient may need to return to floor without undergoing procedure. A MRI of the cervical spine without contrast (trauma protocol) should be considered.

Routine Procedure
• While patient is sitting upright, remove c-collar.
• Obtain neutral lateral image.
• Have patient actively flex head forward toward chest, as comfortably can.
• Obtain a lateral image at maximal flexion.
• Have patient return head to neutral lateral position and then extend head backwards, as comfortably can. Obtain lateral extension image.
• When study is complete, reapply c-collar and send patient back to room.

Patient Unable to Sit Up due to Other Injury
• While patient is supine on stretcher remove the c-collar.
• Have patient flex head forward and place bolster behind head.
• Have radiologic technologist obtain a neutral lateral image in this position.
• If flexion successfully completed, place bolster transversely beneath shoulders. Have patient extend head back.
• Have radiologic technologist obtain a neutral lateral image in this position.
• When study is complete, reapply c-collar and send patient back to room.

If the Clinician wants to manipulate, a radiologic technologist can obtain the images.

Non Alert Patients:
Trauma physician or neurosurgeon to take responsibility and perform plain film or under fluoroscopy with radiologist. A MRI of the cervical spine without contrast (trauma protocol) should be considered.

Pain:
At any point in procedure, if patient develops increasing pain during positioning, stabilize head and obtain an image in that position, reapply c-collar and performing nurse will notify floor nurse.
Gastric Residual Practice Guidelines at Erlanger Health Systems

Check Gastric Residual Volume (GRV) every 4 hours - For patients with:

GRV ≤ 400ml
- Replace GRV to patient
- Flush tube with 30ml water
- Advance TF if not at goal / or continue TF at goal

GRV ≥ 400ml
- Assess for signs of intolerance (see below)
- If no signs of intolerance replace GRV to patient
- Flush tube with 30ml water
- Continue TF at current rate
- Recheck TF in 2 hours

GRV ≥ 400ml
- Notify MD
- Continue to hold TF for 2 hours
- Replace GRV of 400ml, discard any amount over 400ml
- Assess for signs of intolerance
- Check HOB – place bed at 30-45° unless contraindicated
- Consider adding prokinetic agent
  - Erythromycin po 125-250 mg every 6 hours or IV 200mg BID
  - Reglan IV 10 mg every 6 hrs
- Check feeding tube placement – consider post pyloric placement
- Consider KUB for investigation of etiology of GI issues

GRV ≤ 400ml
- Replace GRV to patient
- Flush tube with 30ml water
- Replace GRV if not at goal / or continue TF at goal
- Recheck GRV in 2 hours

Consider TPN if TF is no longer feasible
- Consult NSS

Signs of Intolerance
- Abdominal distention
- Vomiting – If overt vomiting stop TF immediately and contact MD
- Nausea
- Constipation
- Excessive liquid stools (>3 loose stools/day)
  - 4 Lactinex tablets crushed with water TID or QID or
  - 1 pack Nana Flakes TID

ASPEN Guidelines:
- If early EN is not feasible the first 7 days following admission, no nutrition support therapy should be provided to the previously healthy patient (B1)
- If there is evidence of protein-calorie malnutrition on admission and EN is not feasible, start PN as soon as possible (B2)
- PN should be initiated only if the duration of therapy is anticipated to be ≥7 days (B3)
Hypothermia Guideline
# 7135.206

Indications and treatment:

Standard Core Temperature should be measured in the following ways:

- PA Catheter Temperature
- Foley Temperature
- Rectal Temperature

Standard Treatment for temperature < 96.8°

1. Apply convective warming system (Bair hugger)
2. Have heat lamps/lights on
3. Keep room temperature at 75° or greater
4. Use fluid warmer for all fluids and/or blood products
5. Respiratory Therapy to apply warmed humidified air to all mechanically ventilated patients
6. Document temperatures in the following intervals:
   a. On admission
   b. Every 15 minutes X4
   c. Every 30 minutes until temperature reaches 98°
   d. Then every 2 hours for 24 hours
   e. Then every 4 hours

Standard Treatment for Temperature 96.8° - 97.9°

1. Apply warmed blankets
2. Have heat lamp and/or lights on
3. Document temperatures in the following intervals:
   a. On admission
   b. Every 30 minutes until 98°
   c. Then every 2 hours for 24 hours
   d. Then every 4 hours
Informed Consent
PC-014 Consent to Treat

A. Informed consent is a process in which the physician provides adequate information to the patient or patient’s proper representative in order for he/she to make an informed decision on the proposed treatment, including medical treatment, blood transfusions, anesthesia, or invasive procedures that entail high risk. The following should be discussed while allowing the patient the opportunity to ask questions and receive additional information:

1. The nature of the patient’s condition;
2. The proposed treatment and possible alternatives;
3. The benefits and frequently occurring and significant risks of the proposed treatment and alternatives;
4. The likelihood of success;
5. The consequence of no treatment; and
6. The individuals providing treatment and the role of residents, fellows, students, and others in providing the treatment.

B. Medical treatment that requires use of the “Authorization for Treatment/Invasive Procedures/ Blood Administration” form (15104) are those treatments that entail significant risk, or for which there are alternatives for treatment that should be considered by the patient.

C. Invasive procedures are defined as procedures involving puncture or incision of the skin or insertion of an instrument or foreign material into the body, including but not limited to percutaneous aspirations and biopsies, cardiac and vascular catheterizations, endoscopies, angioplasties and implementation, but EXCLUDING venipunctures/intravenous therapy/nonintravenous injections for medication administration and routine urinary catheterizations, douches, nasogastric tube insertions.

D. Proper Representative is defined as any person authorized by law, court order, Durable Power of Attorney for Healthcare or, in the case of a minor, the parent or guardian. When adult patients lack the ability to give consent due to unconsciousness or question of legal competency, the reason for lack of ability must be documented. If the next of kin are available, the following is a suggested next of kin priority order (Tennessee Healthcare Decisions Act):

1. The patient’s spouse, unless the provider has been informed they are legally separated
2. The patient’s adult child
3. The patient’s parent
4. The patient’s adult sibling
5. Any other adult relative of the patient or
6. Any other adult who satisfies the requirements of this section:
   a) One who appears to be better able to make decisions either in accordance with the known wishes of the patient or in accordance with the patient’s best interest
   b) A decision maker who has regular contact with the patient;
      a. prior to and during the incapacitating illness demonstrates care and concern;
      b. is available to visit the patient during his/her illness; and
      c. engages in face-to-face contact with the healthcare providers

E. Emergency exception is granted if the life of the patient is immediately threatened and medical care will be administered without obtaining consent. The physician will indicate on the “Authorization for Treatment/Invasive Procedures/ Blood Administration” form (15104) that unless treatment or procedure is performed immediately, the patient is in danger of losing life or limb.

F. Verbal/Telephone Consent. When verbal/telephone consent is necessary, a registered nurse and other authorized licensed personnel may witness the verbal/telephone consent by the patient, the proper representative, and the signature of the physician obtaining the consent.

Procedure:

Medical or surgical procedures
1. All patients or their proper representative sign an Authorization for Treatment upon entry into the Erlanger Health System. An electronic copy of consent is entered in the HPF McKesson System.

2. All general procedures and treatments during hospitalization are explained to the patient and/or proper representative by appropriate staff. The patient/proper representative may refuse all or any part of the treatment without compromising their access to care or service. Refusal of treatment and associated risks are documented in the medical record.

3. Physician’s role in Informed Consent.
   a. It is the responsibility of the physician to obtain informed consent prior to the proposed procedure.
   b. Appropriate documentation that the physician has given an explanation and information regarding the relevant risks, benefits, potential problems, likelihood of success, significant alternatives and the possible results of non-treatment will be indicated by the physician’s signature on the “Authorization for Treatment/Invasive Procedures/ Blood Administration” form (15104). It is the physician’s obligation to adequately explain the proposed procedure to the patient/proper representative in a clear, concise manner, in language the patient/proper representative can understand and to assure the patient’s rights have been protected in securing informed consent.
   c. Ensure patients or their legal representative has signed the “Authorization for Treatment/Invasive Procedures/ Blood Administration” form prior to undergoing medical treatment or procedures that entail high risk.

4. Nursing’s role in Informed Consent
   a. It is the responsibility of the nurse involved in the patient’s care to witness phone consent, when requested.
   b. The nurse should also verify with the patient and/or by specific documentation of informed consent in the medical record that consent has been obtained by the physician prior to the procedure.
   c. In the event informed consent has not been obtained, the nurse will contact the physician who will complete the consent process, speak with the patient and provide specific documentation of the informed consent process that has previously taken place.

5. Blood transfusions
   a) When the possibility of, or actual need for transfusion of blood or blood components occurs, required informed consent will be obtained at the time of the type and screen/cross-match. Attestation that the physician has given an explanation and information regarding the need for, risk of, and alternatives to blood transfusion will be indicated by the physician’s signature on the “Authorization for Treatment/Invasive Procedures/ Blood Administration” form (15104).
      1. For inpatients, one signed form will cover the entire hospital stay. For outpatients, a new form will be required each time an outpatient presents, except for those outpatients with established chronic transfusion therapy.

6. Investigational or research procedures
   Patients undergoing treatment or procedures that are research or investigative in nature will be required to give informed consent to participation as a subject in a research study. Appropriate documentation that the physician has given an explanation and information regarding research, as required by the Internal Review Board (IRB).

7. Duration of Informed Consent

   A properly completed consent form must be in the medical record prior to commencement of the treatment/procedure and is valid for 30 days after initiated. If the treatment lasts longer than 30 days, a new form does not have to be completed, but may be completed at the discretion of the physician.

Note: No one policy can possibly cover every situation that may arise with regard to obtaining Informed Consent. Risk Management/House Supervisors can be utilized as a resource if situations arise not covered by this guideline.
SPECIAL INSTRUCTIONS FOR MINORS

1. If the patient is a minor, according to Tennesse Code Annotated § 63-6222 – “Any licensed physician may perform emergency medical or surgical treatment on a minor, despite the absence of parental consent or court order, where such physician has a good faith belief that delay in rendering emergency care would, to a reasonable degree of medical certainty, result in a serious threat to the life of the minor or a serious worsening of such minor’s medical condition and that such emergency treatment is necessary to save the minor’s life or prevent further deterioration of the minor’s condition.”

2. If a **minor child has divorced parents**, the parent with legal custody of the child should sign the consent forms. Clinical staff must be satisfied that legal guardianship has been established and documentation should appear in the medical record to support that decision.

3. If a **child is in foster care**, consents should be signed by the designated social worker from the Human Services Department or a court order must be obtained. Clinical staff must be satisfied that legal guardianship has been established and documentation should appear in the medical record to support that decision.

4. **Minor expectant mothers** may sign their own consent for any procedure pertaining to their pregnancy.

5. In the case of a **married minor parent** signing consent for his or her child, the parent is considered emancipated and is legally able to sign. If the parent is unmarried, attempts may be made to obtain the signature of a grandparent, but it is not legally necessary.

6. **Telephone authorization** for consent may be accepted when the proper representative, parent or guardian is not otherwise available. The physician must give the required information to the representative and obtain the initial consent, then the physician or registered nurse will complete the telephone authorization portion of the “Authorization for Treatment/Invasive Procedures/ Blood Administration” form (15104) with at least one additional licensed medical personnel as witness. Written confirmation of telephone authorization by mail or telegram should be requested and is to be included in medical record when available.

7. Any **changes or additions** to the originally documented consent require obtaining an additional authorization form with patient/proper representative signature. In the event the patient is premedicated, the surgeon will so note the change on the “Authorization for Treatment/Invasive Procedures/ Blood Administration” form (15104) and note the patient is aware of the change. Documentation should be completed prior to beginning the procedure.

8. Any time prior to the procedure that the patient/proper representative expresses an **objection to the performance of the procedure**, the authorization is considered invalid. Documentation of the circumstances will be included in the medical record. Should an agreement between the responsible parties be reached to proceed with the treatment/procedure following **revocation**, a new consent must be signed.
Instructions for filling out the Blood Transfusion Order Set

All orders must be dated and timed and have a legible signature and/or either printed or stamped for identification. These orders are part of the permanent medical record.

**Order Type and Screen**

a. Use Type and Screen (T&S) for patients who may need a crossmatch during this admission. A Type and Screen will identify the patient’s blood type (ABO) and to check for any antibodies that may need further work up or to insure that products may be obtained if an unusual antibody is identified. Order T&S for patients going to surgery or to labor and delivery, but not likely to need blood.

b. Do not use Type and Screen for patients that will be receiving a transfusion. All units of red cells must by crossmatched against the patient’s blood.

**Order Type and Crossmatch**

c. RBCs always need a crossmatch for each unit to be given. If a Type and Screen is ordered and a transfusion is needed, the order to crossmatch can be converted from the Type and Screen as long as the T&S has been done within 72 hours.

d. Use Type and Crossmatch for patients who need blood products today or to hold for OR in the morning.

e. Do not ask for products to be held unless for surgery that has a high risk of bleeding. Any other needs can be filled when a crossmatch is completed.

f. Do not order products stat or urgent unless that is the case. If every transfusion is ordered stat, those that really need products stat will be done as soon as possible in the order received.

**Order Transfuse**

g. Check the indication for ordering the transfusion. There are two options, either one unit with the indication for one unit, or two or more units, if the indication for transfusion meets the criteria listed.

h. Note the lab value on the order sheet to help evaluate the patient’s need.

i. Lab values are only one part of an evaluation to transfuse. If the patient is not symptomatic, he may not need blood products.

j. Do not order more than one product at a time without reevaluating the patient. Your target range should be between 7-8 gm/dL. If your patient’s hemoglobin is between 6-7 gm/dL, one unit will usually raise the hemoglobin by one gram, reaching the target range.

**Pick up products from the blood bank**

k. This order sheet should be copied when completed, including signature, and used to pick up products from the blood bank. The original goes into the chart. No other form needs to be brought to the blood bank.
Massive Blood Resuscitation Protocol
# 7135.215

Policy statement: To provide a consistent and expedient method for preparing and obtaining blood products for use in patients experiencing massive hemorrhage.

Indications:
A. Class IV Shock (blood loss greater than 1500-2000ml), with no imminent end to the blood loss (e.g. control of a discrete bleeding source) in sight.
B. Initial blood loss requiring at least 10 units of blood replacement. The actual loss of this much blood does not necessarily have to occur before the judgment is made that such loss is imminent.
C. Conditions associated with the need for massive transfusion include multi-system trauma patients with chest or abdominal bleeding, amputations or massive pelvic fractures.

NOTE: The important characteristic is that there is BOTH substantial acute or imminent blood loss AND a likelihood that substantial blood loss will continue over the short term (minutes to a few hours).

Policy:
A. Initiation of the Massive Blood Resuscitation Protocol (MBRP):
1. Only the attending physician or senior resident directly involved in the care of the patient may implement this protocol.
2. Blood Bank staff will stay ahead of all requested blood products to ensure an uninterrupted supply of appropriate blood products. The composition of the initial cooler to be prepared in an MBRP situation is as follows:
   a. PRBC’s 6 units
   b. FFP 2 units
   c. Platelets one platelet pheresis

   *pooled platelets or an acrodose unit may be used if available

   NOTE: Close communication with blood bank personnel is essential to ensure effective and efficient use of products with minimal wastage.
3. The physician who implements the protocol is responsible for ordering cessation of the MBRP when the patient’s condition stabilizes. If the care of the patient has been transferred to another attending or senior resident physician, then that physician also inherits responsibility for the MBRP.

Procedure:
A. The Critical Care Nurse Clinician (CCNC) or a designated nurse will call the Blood Bank directly and state, “Initiate massive blood resuscitation protocol on (patient name and MR#) per (initiating physician’s name)”. 
B. The Massive Blood Resuscitation orderset will be activated via IBEX, Net Access and a copy of the Factor VII orderset will be printed and attached to the chart. Orders for Massive Blood Resuscitation activated through IBEX will also generate an autopage to the trauma pager notifying all involved parties.
C. Two pink tubes will be drawn on patients who meet Major Blood Resuscitation Protocol. Tubes will be labeled with the standard blood bank identification information including a typenex number on each tube.
D. Four (4) units of O negative blood and (2) of FFP are kept in the trauma bay blood cooler for immediate transfusion. After these units have been exhausted, a cooler with an additional four (4) units of O negative can be picked up from the blood bank.*
E. The cooler will be labeled with a blood expiration date and time. After the expiration date and time the coolants will need to be replaced by blood bank.

F. Upon activation of MBRP, The CCNC or Charge RN in the ED will designate someone directly to be the blood courier. The Charge Nurse of each respective department will be responsible for designating the blood courier.

G. As soon as a blood sample is received in the Blood Bank, a type will be performed. *(Type specific blood should be available within 20 minutes from time a sample is received for typing.)* An emergency blood request form will also be put in the cooler on each unit. The Blood Bank will notify the appropriate unit as soon as the first cooler of blood products is ready for pick up.

H. When blood type is completed, the Blood Bank will prepare the following: six (6) units of PRBC, six (6) units FFP, one (1) platelet pheresis, and 10 units of cryoprecipitate. The Blood Bank will stay ahead on the following: six (6) units of PRBC, six (6) units of FFP, one (1) platelet pheresis, and (10) units of cryoprecipitate.

   a. Administration Schedule:
      i. Cycle 1 – 6 PRBC (Red tag), 2 FFP, one (1) platelet pheresis
      ii. Cycle 2 – 6 PRBC (type specific or type & crossed), 6 FFP, 1 platelet pheresis
      iii. Cycle 3 – 6 PRBC, 6 FFP, 1 platelet pheresis and 10 units cryoprecipitate.
      iv. Cycle 4 - 6 PRBC, 6 FFP, 1 platelet pheresis
      v. Cycle 5 - 6 PRBC, 6 FFP, 1 platelet pheresis and 10 units cryoprecipitate.
      vi. Cycle 6 – 6 PRBC, 6 FFP, 1 platelet pheresis

*(5) pk pooled plates or an acrodose unit of platelets may be used if available.

* Unless specified by the physician, blood products will be released in a full cycle.

I. PRBC and FFP will be given in a 1:1 ratio, one unit of FFP for every one unit of PRBC.

J. The blood courier from the appropriate unit will pick up the cooler of blood products. The blood courier is responsible for returning any unused units of blood products to the Blood Bank on or before the expiration time on the cooler.

K. The resuscitation personnel will count the number of units of PRBCs the patient has received, and number the units #1, #2, #3, etc.

L. 1gm of Calcium Chloride will be given for every three (3) units PRBC/FFP unless otherwise contraindicated or ordered.

M. The attending may consider Factor VII (Orderset #4059) at this point.

N. Tranexamic Acid (TXA) (Orderset # 10233) can be considered for patient with trauma induced coagulopathy or patients receiving the MBRP. One gram of TXA will be mixed in 100 ml 0.9% NS and will be infused over 10 minutes. An ADDITIONAL dose of 1 gram TXA can be mixed in 250 ml or 500 ml 0.9% NS to infuse over the next 8 hours. This can be administered through a central or peripheral IV as long as blood is not being infused through the same line.

O. A Bear Hugger blanket will automatically be placed on any patient that requires MBRP.

P. The nurse in charge of the patient is responsible for communicating any PT/PTT or coagulation results to the trauma surgeon in charge of the case IMMEDIATELY.

Q. CCNC, ED, ICU and/or Surgery are responsible for completing and returning any emergency blood request forms that have been issued with the blood.
R. The massive blood resuscitation protocol can be stopped at any time by calling the Blood Bank.

Operating Room Considerations:

A. All communication with the OR regarding the MBRP should go through extension #5580 or site page 5900 to reach the Anesthesiologist directly. If needed, the direct anesthesia line to the OR suite may be called by dialing the #37 plus the room number if known.

B. The anesthesiologist will call the Blood Bank directly and state, “Initiate Massive Blood Resuscitation protocol in (patient name and MR#) per (initiating physician’s name).”

C. A downtime requisition will be completed and sent to the Blood Bank as soon as possible.

D. Two pink tubes will be drawn on patients who meet Major Blood Resuscitation Protocol. Tubes will be labeled with the standard blood bank identification information including a typenex number on each tube.

E. Eight (8) units of O negative blood are kept in the OR blood cooler for immediate transfusion. After these units have been exhausted, a cooler with an additional four (4) units of O negative can be picked up from the blood bank while awaiting the first cooler of MBRP blood products.*

F. Upon activation of MBRP, the anesthesiologist in charge of the case will designate one person as the blood courier. The Charge Nurse of each respective department, outside of the Operating Room, will be responsible for designating the blood courier within their unit; making them aware that a MBRP has been activated and he/she is responsible for obtaining blood products.

G. Upon assignment of the blood courier, that individual will receive a phone to carry during the MBRP

H. The Blood Bank will notify the OR at ext #5580 as soon as each cycle of product becomes available. Further communication with Anesthesia may be done by call the assigned OR suite (37 plus the room number).

I. The blood courier (assigned by the anesthesiologist) from the OR will pick up the cooler of blood products. The blood courier is responsible for returning any unused units of blood products to the Blood Bank on or before the expiration time on the cooler.

* Further blood product administration will be based on most current laboratory values at the trauma physician’s discretion.

*In the case of a shortage of O neg. blood, O pos. may be substituted for adult male patients or adult females over the age of 50.
MD Duties – Trauma Resuscitation Team
# 7135.07A

**POLICY:** To provide specific guidelines for the physician members of the Trauma Resuscitation Team

**SCOPE:** Trauma Services, Trauma Attending Physicians, Trauma NPs, the Red Shirt, ED Nursing and support staff, Trauma Committee Members, LifeForce, Surgery House Staff, Emergency Department Physicians, Operating Room Anesthesiology, Radiology, Respiratory Therapy, Laboratory, Medical Affairs and Executive Management

**DEFINITION:**
The management of patients with significant trauma is best accomplished by a team of physicians, nurses and support personnel working together toward the common goal of quality patient care. Since timely evaluation and treatment of the severely injured patient is essential in reducing mortality and morbidity, this team must be present in the resuscitation room when the patient arrives. The complexity of many traumatized patients mandates that the Trauma Team be interdisciplinary in nature. Not only is patient care enhanced by this approach, but also the educational process is vastly improved by the pooling of information and skills from individuals of various disciplines.

**PROCEDURE:**
Implementation of the Trauma Resuscitation Team is outlined the (Trauma Alert Policy #7135.33).

I. **Trauma Resuscitation Team Physician Assignments**
To avoid loss of time and prevent confusion, each member of the Trauma Team must have prearranged tasks. Many of these tasks can and should be accomplished simultaneously immediately after the patient arrives.

II. **Emergency Department Physicians**
An Emergency Medicine (EM) attending is present in the emergency room 24 hours a day 7 days a week. The EM attending is responsible for treating general injuries, initiating evaluation and resuscitation measures if a trauma surgeon is unavailable and obtaining appropriate and timely Trauma Service consultations. The definitive treatment of significant trauma is the responsibility of the Trauma Service.

Every attempt is made to contact the trauma service prior to the patient's arrival. In the event the trauma surgeon is not present at the time of the patient's arrival, the ED attending assumes responsibility for the care of the patient until the trauma surgeon arrives. The trauma team response for major trauma alerts will be provided by a PGY-4 or higher surgery resident. The ED physician will also notify the trauma surgery service chief resident whenever, in the routine care of patients, surgical consultation for traumatic injury becomes necessary. Consultations will be provided by the Trauma NP, a PGY-1 (or higher) surgery resident and will be reviewed with a PGY-4 or higher. The ED physician has the option to activate the trauma team based on patient injuries and/or condition as outlined in the Major Trauma Alert Policy – 7135.33.

An attending ED physician functions as the emergency medicine representative to the Trauma Committee. The Trauma service also works in conjunction with the emergency department trauma committee in establishing quality programs.

The emergency department is a fundamental cornerstone in the optimal management of trauma patients. Essential to the care of the multiply injured patient is a cooperative effort by the Trauma Service and the Department of Emergency Medicine.
III. Trauma Team M.D. Duties

A. Charge MD-(Recommended Position on Patient’s Right Side)
   1. Assigned to the most senior surgeon present, Attending or Chief Resident.
   2. Designated as Trauma Team Leader, in charge of resuscitation and decision making.
   3. Responsible for overall evaluation and management.
   4. Responsible for performing primary (ABC’s) and secondary surveys.
   5. Responsible for determining priority of procedures, and necessary diagnostic tests.
   6. Responsible for determining need and timing of operative intervention, responsible for contacting the Operating Room
   7. Responsible for determining the need for appropriate consultations
   8. Responsible for supervision of central line and chest tube placement
   9. Responsible for physician assignments.
   10. Upon arrival, the senior surgeon may assume or relinquish the role of evaluation and management depending on severity.
   11. The senior surgeon maintains responsibility at all times.
   12. The charge MD role may not be delegated to first or second year residents

B. MD I-(Emergency Department Physician, Head of Patient)
   1. Assigned to ED Physician or senior surgical resident
   2. Responsible for airway management and assuring c-spine immobilization
   3. Responsible for ventilator/breathing, and supervision of respiratory therapists
   4. Responsible for ordering medications in close communication with Charge MD
   5. Responsible for cranial-facial assessment
   6. Assist other MD's

C. MD II-(Recommended Position at Left Side of Patient)
   1. Assigned to second most senior surgeon, preferable second year or higher
   2. Responsible for assisting the Charge MD in evaluation and management
   3. Responsible to disrobe patient
   4. Responsible for performing left central line and left chest tube placement under the direction of the Charge MD
   5. Responsible for assisting with Thoracotomy
   6. Responsible for rectal examination and other necessary procedures under the direction of the Charge MD
   7. Responsible for splinting fractures

D. MD III-(Recommended Position at Right Lower Side of Bed)
   1. Assigned to third most senior surgeon, preferably first year or higher
   2. Responsible to disrobe patient
   3. Responsible for obtaining arterial blood gases, and blood for lab and blood bank
   4. Responsible for foley catheter placement
   5. Responsible for right central line and right chest tube placement under the direction of the Charge MD
   6. Responsible for contacting CT Scan and Radiology Special Procedures under the direction of the Charge MD
   7. Responsible for splinting fractures
   8. Responsible for assisting in management under the direction of Charge MD and MD I
Neurosurgical Consultation
# 7135.32A

Policy: The purpose of this guideline is to define the criteria and process for obtaining urgent and non-urgent neurosurgical consultations.

Scope: All trauma patients admitted or consulted to the Trauma Service with a Traumatic Brain Injury (TBI) or a Spinal Cord Injury (SCI).

Procedure:

1. STAT Neurosurgical Consultation
   A. The Trauma Surgeon or Trauma Chief will consult Neurosurgery STAT for the following:
      i. Traumatic brain or spine injury that requires immediate neurosurgical intervention.
   B. The answering service will send a text/page with a directive of: “STAT consult; please reply immediately.”
   C. The Neurosurgeon on call will respond personally within 10 minutes for all STAT pages.
   D. If the Trauma Service has not received a reply in 10 minutes, then they will call the answering service and the answering service will directly phone the neurosurgeon on call for immediate response.

2. Urgent Neurosurgical Consultation
   A. The Trauma Surgeon or Trauma Chief will consult Neurosurgery for patients with the following:
      i. Penetrating wounds of the brain or spine.
      ii. Moderate and severe traumatic brain injury
      iii. Spinal cord injury
      iv. Cranial vault or skull base fractures
      v. Closed head injuries with mass effect
   B. The attending neurosurgeon on-call will be available for consultation 24 hours a day as an integral member of the trauma care team. Together, the attending trauma surgeon and the attending neurosurgeon on-call will institute appropriate diagnostic evaluation and treatment according to the individual clinical situation. The Trauma Surgeon will initiate the initial management of the neurotrauma patient.
   C. The answering service will send texts/page with a directive of:
      i. “See on rounds; no call back needed.” OR
      ii. “Please call back now.”
   D. If there is no call back within 10 minutes, the Trauma Service will call the answering service again. The answering service will send a second page. If there is again no call back within 10 minutes, the answering service will directly phone the Neurosurgeon on call for immediate response.

3. Non-Urgent Neurosurgical Consultation
   A. Neurosurgical consultation is available for non-urgent trauma cases at the discretion of the Attending Trauma Surgeon. The Attending Trauma Surgeon and the Attending Neurosurgeon will jointly coordinate diagnosis and treatment in these cases.
   B. Non-urgent cases will be seen within 24 hours.
   C. The answering service will be instructed to send texts/page with a directive of:
      i. “See on rounds; no call back needed.” OR
      ii. “See on rounds. Please call back now.”
   D. If there is no call back within 10 minutes, the trauma service will call the answering service again. The answering service will send a second page. If there is again no call back within 10 minutes, the answering service will directly phone the Neurosurgeon on call for immediate response.
Patient with a TBI or Spine injury

Does patient require immediate surgical intervention?

Does the patient have any of the following?
- Penetrating wounds of the brain or spine?
- Moderate to severe TBI? GSC ≤13?
- Cranial vault or skull base fx?
- CHI with mass effect?

Has the NS personally responded within 10 min?

Trauma surgeon will initiate the initial management of patient

Send "STAT" text page through Ans Svc w/: "STAT consult; please reply immediately."

Send txt page through Ans Svc stating; "Urgent consult; please call back now."

Has NS personally responded within 10 min?

Send 2nd page

Has the NS personally responded within 10 min?

Call Ans Svc to directly phone NS for immediate response.

Call Ans Svc to directly phone NS for immediate response.

Send "non-urgent" text page through Ans Svc w/: "see on rounds; please call back needed."

Send non-urgent text page through Ans Svc w/:

Do you need to speak w/ the NS at their convenience?

YES

NO

Send "STAT" text page through Ans Svc w/: "STAT consult; please reply immediately."

YES

NO

Send txt page through Ans Svc stating; "Urgent consult; please call back now."

NO

Call Ans Svc to directly phone NS for immediate response.

YES

NO

Send "non-urgent" text page through Ans Svc w/:

See on rounds; no call back needed."

DONE
Pregnant Trauma Patient

Policy statement: To provide an immediate systematic approach to the care of the critically injured pregnant adult trauma patient.

PROCEDURE:
1. The pregnant trauma patient will be managed according to established trauma service protocols, policies and patient management guidelines.

2. When a pregnant trauma patient meets Trauma Team Activation Criteria (Level 1 or 2), the obstetrical service will be notified at extension 7956. The Obstetrical Team, including PGY 4 or greater and an obstetrical RN will report to the patient location. After initial assessment by the Obstetrical Team, The Maternal Fetal Medicine (MFM) on call attending will be notified to assist with further management.

3. The Trauma Chief or Trauma Attending will notify the on call Pediatric Surgeon when an emergency Cesarean section is likely.

4. When practical, he gravid trauma patient > 20 weeks gestational age will be placed in a 15° left lateral rotation.

5. Intravenous fluids (LR or NS) will be given to maintain volume status. Liberal use of volume assessment monitoring is encouraged.

6. Doppler fetal heart tones (FHT) will be obtained with the initial vital signs and will be monitored throughout the resuscitation at the same frequency as the maternal vital signs. When ≥ 23 weeks gestational age continuous fetal monitoring (CFM) should be initiated and maintained by the Obstetrical Team until the workup is complete and the patient has been admitted or discharged.

7. PT, PTT, Fibrinogen and D-Dimer will be added to the trauma labs.

8. All radiographic imaging necessary to adequately assess the patient will be performed. The gravid uterus will be shielded whenever possible.

9. Focused Abdominal Sonography Trauma (F.A.S.T.) May be employed to evaluate the hypotensive patient for evidence of intra-abdominal injury. Diagnostic peritoneal lavage (DPL) can be performed in the unstable patient when interpretation if the FAST exam is in question. The procedure must employ an open technique with the incision made above the umbilicus and above the level of the gravid uterus.

10. If a pregnant trauma patient shows signs of fetal distress, uterine contractions, decreased fetal movement, uterine tenderness, and/or uterine bleeding, a repeat fetal US will be obtained and managed by the MFM.

11. Tocolytics will be used at the discretion of the Obstetrical Team or MFM consultant.

12. The patient’s private obstetrician will be notified of patient’s arrival and injuries per the obstetrical Team or MFM service.

13. All pregnant Level 3 trauma patients and pregnant trauma patients will be evaluated by the Obstetrical Team including PGY4 or higher and by MFM as indicated.

CONTINUOUS FETAL MONITORING (CFM): Admission status of Pregnant Trauma Patient ≥ 23 weeks gestation
- Non-critical pregnant trauma patients requiring admission and CMF as deemed by the obstetrical evaluation will be admitted to the High Risk Pregnancy Unit (HRPU) and Trauma and other services will be consulted as indicated.
- A D-Dimer may be obtained every 6 hours.
- Critically injured pregnant trauma patients requiring ICU admission will be admitted to the Trauma Service and the Obstetrical/MFM services will be consulted. CFM for ICU patients will be coordinated by the obstetrical Charge RN on duty each shift.
Rapid Sequence Induction

# 7135.111

Policy Statement: To facilitate endotracheal tube placement for definitive airway management utilizing chemical paralysis (musculoskeletal relaxation) and sedation.

Background: Definitive airway management is frequently needed in trauma patients. These patients are often unable to protect their own airways due to decreased level of consciousness coupled with copious secretions and/or blood, hypoventilation or apnea, foreign bodies, oropharyngeal trauma or facial trauma. Endotracheal intubation utilizing pharmacological agents such as sedatives and narcotics in addition to chemical paralytics facilitates the ability to establish a definitive airway (endotracheal tube). It is important to remember to have all necessary adjunct equipment/monitors assembled and in proper working order prior to initiation of the procedure.

Guideline:
This guideline is used in conjunction with the Oral Intubation Guideline #7135.104-02

Steps:
1. Administer Lidocaine 1mg/kg IV
2. Administer Midazolam (Versed) 0.1 mg/kg IV
   Or alternate medication: Etomidate 0.1-0.3 mg/kg IV
3. *Mix Vecuronium Bromide (Norcuron) in 10cc NS.
4. Administer Anectine (Succinylcholine) 1.0-2.0 mg/kg IV
5. Tube placement and confirmation
6. Administer paralytic – Vecuronium Bromide (Norcuron) dose: 0.1 mg/kg

* Long term paralytics must not be utilized without secured endotracheal intubation. Long term paralysis is defined as any chemically induced paralysis lasting longer than three to five minutes.

Note: If Succinylcholine / Anectine is strictly contraindicated, then consider using a larger dose of induction agent without short-term paralytic.

Relative Contraindications to Succinylcholine
1. Hypersensitivity to succinylcholine
2. Personal or family history of malignant hyperthermia or skeletal muscle myopathy
3. Patients in the acute phase of injury with burns, multiple trauma or extensive denervation of skeletal muscle or paralysis.
4. Known hyperkalemia
5. Penetrating eye injury or acute angle glaucoma

Precautions
1. Avoid in patients with diffuse muscle injury
2. Development of hyperkalemia
3. Development of bradycardia
4. Do not administer before unconsciousness
5. Transient increase in intracranial pressure
6. Electrolyte abnormalities
**Rapid Weaning Guideline**  
**# 7135.200**

**Policy/Purpose:** These guidelines were developed to standardize care and foster a systemic approach to weaning stable patients who are placed on mechanical ventilation within the Erlanger Health System (EHS). The intention of these guidelines is to expedite the liberation of the patient from the ventilator. While patient safety is our ultimate priority; we expect reduced ventilator days, shorter ICU length of stay, and decreased Ventilator Associated Pneumonia (VAP) will also benefit our patients. Changes to ventilators are to be made with diligent attention to physiological status and the individual patient’s needs in mind.

**Inclusion Criteria:** After stabilization of the underlying clinical condition, all patients at EHS will be eligible for participation in the guideline working toward liberation/separation from mechanical ventilation and extubation. The only exclusions will be patients with a severe closed head injury.

I. **Ventilator Set Up and Adjustment**

- Calculate predicted body weight (PBW) in kgs
  - Male – 50 + 2.3 [height (inches) – 60]
  - Female – 45.5 + 2.3 [height (inches) – 60]
- Set ventilator to SIMV Mode.
- Set VT to 4-6 ml/kg PBW.
- Set initial rate to comfort (not > 35 bpm).
- Set PSV to support spontaneous VT, keeping volumes at 4-6 ml/kg
- Set FiO$_2$ to maintain a SpO$_2$ of ≥ 92%.
- Set initial PEEP at 5-10 cm H$_2$O.
- Adjust VT and RR to achieve appropriate pH and P$_{plat}$ goals (see below)
- If patient doesn’t have at least a #7.5 size airway, and is expected to be intubated > 24 hours, recommend changing airway to at least a size #7.5 if the clinical status poses no contraindications.

**Oxygenation Goal:** PaO$_2$ 60-70 mmHg or SpO$_2$ 90-95%

- If PEEP ≥ 18/FiO$_2$ 100%
- Reduce FiO$_2$ by 1% - 5%, at a time, until down to 60% (or as close to 60% as possible) then,
- Reduce or increase FiO$_2$ by 1% - 5%, to maintain SpO$_2$ ≥ 90%
- Reduce or increase PEEP by 1-2 cm H$_2$O at a time, until PEEP is at minimal setting
- Hemodynamic instability will limit the level of PEEP that can be applied.

**Note:** APRV or PCV-IRV are modes to consider with patients requiring high levels of FiO$_2$ and/or high levels of End Expiratory Pressure.

**pH Goal:** 7.35 – 7.45

- Must determine the mechanism of acidosis: metabolic vs. respiratory.
- If metabolic: Correct the underlying cause
- If respiratory: Use caution when increasing VT and or RR. When faced with a situation where the patient has severely abnormal lung mechanics, it may be prudent to live with some degree of respiratory acidosis/permissive hypercapnia to avoid barotrauma and/or volutrauma. Notify attending physician and obtain critical care consult, if necessary.

**Acidosis Management:** (pH < 7.30)
- If RR ≥ 35 and PaCO$_2$ ≤ 30, patient needs NaHCO$_3$ (Make recommendation to the physician).
- If pH < 7.15 and RR ≥ 35, notify physician

**Alkalosis Management:** (pH > 7.45)

Decrease vent rate if possible.
**Prevention of Volutrauma**: Ideal $P_{pl} \leq 30$ cmH2O (-PEEP)
- If $P_{pl} < 30$ cm H2O: $V_t < 6$ ml/kg, may increase $V_t$ by 1 ml/kg until $P_{pl} > 30$ cm H2O or $V_t = 6$ ml/kg
- If $P_{pl} > 30$ cm H2O: decrease $V_t$ by 1 ml/kg steps (min. = 4 ml/kg), may consider APRV or PCV with inverse I:E Ratio. (Consult with patient’s physician prior to any ventilator mode changes)
- If $P_{pl} < 20$ cm H2O & breath stacking occurs: may increase $V_t$ in 1 ml/kg increments (max 8 ml/kg), may decrease $T_{insp}$ to achieve appropriate I:E ratio

**I:E Ratio goal:**

Maximum $T_{insp}$ 1.2 seconds; adjust $T_{insp}$ to allow complete exhalation and to allow for spontaneous respirations. As a general rule I:E ratio is adjusted to a minimum of 1:2 or 1:3. This is modified in situations with very abnormal resistive and compliance properties of the lung.

II. Weaning

- Each patient will be evaluated daily, to determine the patient’s ability to progress with weaning and reaching the goal of decreased vent settings to minimal support; keeping in mind the patient’s hemodynamic status. Based on the daily evaluation, settings will be adjusted accordingly. If the patient meets the following criteria, the therapist will follow our Rapid Weaning Guidelines:
  - Hemodynamically stable
  - Spontaneous Respiratory Rate (RR) < 30
  - Spontaneous tidal volume > 6ml/kg (may adjust pressure support as needed)
  - Negative Inspiratory Force (NIF) < -20
  - Rapid Shallow Breathing Index (RSBI) < 100

Individuals who do not meet above criteria will have their weaning strategy modified to best suit their unique clinical situation.

III. Criteria for Weaning Failure

- Patient becomes confused, disoriented, diaphoretic, lethargic or demonstrates any other signs or symptoms of distress.
- Clinical judgment of increased work of breathing by RCP

If weaning attempt is considered a failure, return vent to a level of support sufficient to provide stability and continue to monitor patient’s parameters daily to assess ability to re-initiate weaning.

IV. Extubation

All patients being considered for extubation should be able to follow simple commands. Evaluate all patients with orotracheal or nasotracheal intubations for signs of heavy secretions, signs of airway edema and adequate cuff leak. Inform physician of any airway concerns. Notify physician of weaning parameters and/or ABG results to obtain extubation orders.

**NOTE**: Extubation orders must be obtained prior to extubation.

**NOTE**: Transport patient on ventilator per Department Protocol
Rapid Weaning Guideline ARDS
# 7135.208-1

**Policy/Purpose:** This guideline is for patients that have met the criteria generally identified by the MD of record to wean quickly from the ventilator. This will help facilitate a decrease in Ventilator Length of stay (LOS), and Ventilator Associated Pneumonia (VAP).

**Scope:** Trauma physicians, Surgery Residents, Trauma Nurse Practitioners, Intensivists, Hospitalists, ICU nursing staff, and Respiratory Therapist.

**Documentation:** Will be done on ventilator sheets and Clinivision.se patients will typically include individuals intubated for intoxication, agitation or post operative patients.

**Criteria For Weaning:**
- Hemodynamically stable
- Spontaneous Respiratory Rate (RR) <30
- Spontaneous tidal volume>6ml/kg (may adjust pressure support as needed)
- Negative Inspiratory Force (NIF) < -20
- Rapid shallow breathing index (RSBi) <100

**Initiate Protocol:** (Patient’s HR, RR, NBP, SpO₂, ETCO₂ (if used) will be monitored with each ventilator change and recorded with any ABG’s obtained during weaning.)
- Decrease SIMV as tolerated (spontaneous RR<35), adjust PS to keep spontaneous V₄ >6ml/kg
- FiO₂ to keep Saturation >90%
- Decrease CPAP by 5 cmH₂O q30 minutes, until CPAP at 5 cm H₂O
- Once patient’s ventilator settings reach CPAP +5, PSV +8 (or on ATC), FiO₂ .40, ventilator is at minimal settings

**Criteria For Failure:**
- Patient becomes confused, disoriented, diaphoretic, and lethargic.
- Clinical judgment of increased work of breathing by Respiratory Therapist and/or RN (tachycardia, hypertension, increased accessory muscle use, increasing RSBi).
- If wean is considered failed, return vent to level of support to provide stability. An attempt should be made to document an Arterial Blood Gas (ABG) prior to resuming vent support, to document metabolic/respiratory status.

**Weaning Parameters/Pre-Extubation ABG:**
If wean is successful, ventilator has been weaned to CPAP+5, PS +8(or ATC), FiO₂ 0.40 for at least 15 minutes, obtain weaning parameters and ABG.

| NIF < -20  | pH   | 7.35-7.47 |
| RR < 35   | PaCO₂ | 32-48    |
| V₄ > 6ml/kg | PaO₂  | >65      |
| VC > 9ml/kg | Sat   | >92%     |
| RSBi <100 |

Respiratory mechanic parameter goals may be modified per the discretion of the supervising physician.

**Extubation:**
Notify physician of weaning parameters, ABG and presence/absence of cuff leak to obtain an extubation order.

**NOTE:** Extubation orders must be obtained prior to extubation.

**Supplemental Oxygen/PRN ABG:**
- Place on oxygen to keep Sat >92%
- Obtain ABG PRN – distress (tachycardia, hypertension, increased accessory muscle use, diaphoresis, lethargy, O₂ Saturation <88%, confusion)
Removal of Urinary Catheter by Nursing
# PC-217

Policy statement: To provide direction for nursing to remove urinary catheters in a set time frame (exception noted in algorithm) and process to follow after catheter is removed.

Scope: Nursing Personnel, Medical Staff and Allied Health Professionals

Procedure:
See attached Algorithm

**Physician Order is NOT required to remove catheter when following attached protocol/algorithm**

Assess the patient each shift for possible Urinary Catheter removal

REMOVE the Catheter within 2 hours of the shift assessment UNLESS one of the following situations apply:
- The patient is healing from a Stage III or IV breakdown (perineal or sacral)
- Patient has an epidural
- Strict urine output monitoring is required
- The patient has acute urinary retention &/or a urinary obstruction
- Urology or transplant patient.
- The patient is here for “End of Life” care and a urinary catheter is requested for comfort

*A PHYSICIAN HAS WRITTEN AN ORDER (or phone order) TO CONTINUE THE CATHETER

IF THERE IS A CONTINUED NEED FOR URINARY CATHETER:
* Nurse documents the indication for continuation in the Shift Assessment
* For SURGICAL (SCIP) patients, the MD MUST document indication for continuation in the progress noted or as an order by Post-op day 2

IF Urinary Catheter is removed:
* Document the Date and Time of removal
* Validate that the patient voids within 8 hrs
* IF no void within 8 hrs, refer to PC-181 (Note: MD order is required for in-dwelling catheter re-insertion)
**Screening, Brief Intervention and Referral to Treatment (SBIRT) Policy (for Alcohol abuse)**

**Policy statement:** The primary goal of SBIRT is to identify and intervene in patients who are a moderate or high risk for psychosocial or health care problems related to their alcohol abuse. Providing SBIRT in trauma centers has documented positive effects on patient outcomes such as reductions in alcohol consumption, successful referral to and participation in alcohol treatment programs, and reduction in repeat injuries and injury hospitalizations.

**Scope:** Only social workers (SW), case managers (CM), nurse practitioners (NP), critical care nurse clinicians (CCNC), staff nurses and physicians who have completed the proper training, will perform SBIRT.

Only SW, CM, NP, CCNC, staff nurses or physicians who have completed the proper training, will perform AUDIT.

**Definitions:**
- **SBIRT-** Screening, brief intervention and referral to treatment
- **Screening** quickly assesses the severity of alcohol use and identifies the appropriate level of treatment.
- **Brief intervention** focuses on increasing insight and awareness regarding alcohol use and motivation toward behavioral change. BI should include:
  - Clear information about their use based on their risk assessment score
  - Advice and encouragement to decrease or stop alcohol intake
  - Teaching behavior skills that will reduce alcohol use and limit negative consequences
- **Referral to treatment** consists of encouraging the patient to stop or decrease alcohol consumption. The patient will be given information for local resources that may assist in voluntary in-patient or outpatient alcohol rehabilitation as these patients have been identified as needing more extensive care. The patient may explore these options independently or with the help of the SW or CM.
- **AUDIT-** Alcohol Use Disorders Identification Test (developed by the World health Organization [WHO]).

**Procedure:** SW, CM, NP, CCNC, staff nurses and physicians who have completed the proper training, will perform the “screening” part of SBIRT using the Erlanger Alcohol Screening Tool (formatted from the WHO, AUDIT scale; after asking a single “Consumption” question).

Only those who have completed certification in an approved course in SBIRT will execute the “brief intervention and referral to treatment” part of SBIRT.

All trauma patients will be screened using the Erlanger Screening Tool.

In the absence of life threatening injuries or severely altered mental status, the screening will take place as soon as possible; ideally in the Emergency Department (ED).

A prescreening question, “Do you sometimes drink beer, wine or other alcoholic beverages?” will be asked to all trauma patients. If the answer is “No” the screening is complete. If the answer is “Yes” the AUDIT should be completed.

The screen will continue by asking the patient the first 3 questions of the AUDIT questionnaire. The trained personnel will administer the questions.

- If the patient answers “Yes” to question #1, continue through question #3 or (if time allows), through question #10; recording the corresponding values on the test.
- It may be helpful to explain to the patient that 12 oz. of beer, 9 oz. of malt liquor, 5 oz. of wine and 1.5 oz of hard liquor have equal value and are considered a single drink.

Any male patient UNDER age 66 who scores 8 or above, or a male OVER 66 years of age or ANY female who scores 7 or above on the AUDIT is considered positive for moderate to severe alcohol behavior and will have a brief intervention (BI) and referral to treatment (RT) at some point during their admission. Should the patient be discharged without a BI and/or RT, every effort will be made to contact the patient by phone to ensure its completion.

Trauma patients who are discharged from the ED will be screened prior to dismissal and will have a brief intervention with referral to treatment performed at that time by the certified personnel.
Trauma patients who are unable to participate in the SBIRT due to injuries and/or medical problems may be excluded from the process; such as those the TBI, intubated or dementia. However, should their medical condition improve, SBIRT should be performed.

**Documentation:**
- The values of questions 1-3 or 1-10 will be totaled and document it on the trauma flow sheet.
- A patient sticker will be placed on the AUDIT tool and give to the Trauma NP or CCNC.
- AUDIT results will be kept in the Trauma Registry.
- The AUDIT score sheets will not be included in the patient’s chart but will be kept by the Trauma NPs to ensure completion and proper follow up.
- A daily report will be managed by the Trauma NPs to identify the patients who need completion of SBIRT.

---

**SBIRT flowchart**

Trauma patient arrives in the ED

Primary and secondary assessment are completed

Is the patient alert?

No. Defer SBIRT to another time.

Yes. Proceed with “alcohol consumption” question.

NO. SBIRT is complete
Fill out form w/ sticker.

YES. Complete AUDIT.

Is the score ≥ 8 for male under age 66 or ≥ 7 for male over 66 or any female?

NO. Patient is unlikely to be at risk for alcohol-related related problems. Fill out form w/ sticker.

YES. Patient may be at risk for alcohol-related problems. Fill out form with sticker.

Trauma NP or SW will perform BI and/or RT as indicated.

---

Ensure that the Trauma NP receives the Erlanger Alcohol Screening Tool.

The Erlanger Alcohol Screening Tool is not part of the patient’s chart.

Trauma NP will keep all paperwork/data and ensure that completed AUDIT score will be given to the trauma registrars.
**ERLANGER Alcohol Screening Tool**

**PATIENT:** Because alcohol use can affect your health and can interfere with certain medications and treatments, it is important that we ask you some questions about your use of alcohol. We need to know ALL of your medical history. Please be honest as this is part of your medical history and will be held to the utmost standards of privacy.

**REMEMBER:** 12 oz. of beer, 9 oz. of malt liquor, 5 oz. of wine and 1.5 oz of hard liquor have equal value and care considered a single drink.

For each question in the charts below, plan an X in one box that best describes your answer:

A.) Do you sometimes drink beer, wine or other alcoholic beverages? □ No? □ Yes? Screening is complete Please complete AUDIT

### AUDIT

<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>2-4 times a month</td>
<td>2-3 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?</td>
<td>1-2</td>
<td>3-4</td>
<td>5-6</td>
<td>7-9</td>
<td>10 or more</td>
</tr>
<tr>
<td>3. How often do you have 5 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 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 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 drink in the morning to “get yourself going?”</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 felt guilty 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 in the last year have you been unable to remember what happened the night before 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>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 and suggested that 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>

**TOTAL**

*NOTE: This questionnaire has been formatted from the AUDIT tool as defined by the World Health Organization.*
Sepsis Protocol
# 7135.218

**Scope:** All patients admitted to Erlanger Medical Center to the Adult Trauma Service or the Acute Care Surgery Service (ACS).

**Definitions:**
Sepsis- suspected or proven infection + systemic inflammatory response syndrome.
Severe sepsis- sepsis with organ dysfunction.
Septic shock- sepsis with hypotension despite adequate fluid resuscitation.
Mortality associated with severe sepsis - 25-30%.
Mortality associated with septic shock – 40-70%

**Procedure/Screening:**
- Known or suspected infection
  - SIRS criteria (two or more)
    - Temp >38 or <36
    - HR>90
    - RR>20 or PaCO2<32
    - WBC >12,000 or <4,000 or >10% bands
    - Severe sepsis
    - Lactate ≥ 4
    - Organ dysfunction
  - Metabolic acidosis- pH <7.31 or base deficit >4.9 or plasma lactate >

**Laboratory tests:**
- Blood cultures (one percutaneous and one from each vascular access device in place for 48 hours)
- UA, C&S
- CXR, EKG
- CBC
- Type and screen
- BMP
- Lactate
- Glucose
- LFTs
- Coags
- ABG
- Sputum culture. ? BAL

**Management/Treatment Goals:**
- **Initial resuscitation**
  - Initiate severe sepsis protocol
  - Place central line (CVP or SVO2 monitoring)
  - Institute broad spectrum antibiotics
  - Supplemental oxygen or mechanical ventilation as indicated
- **Resuscitation goals**
  - CVP 8-12
  - MAP ≥ 65
  - UOP ≥ 0.05 mL/kg/hr
  - Central venous oxygen saturation ≥ 70%
• Early goal-directed therapy
  o Measure CVP
    ▪ Initiate initial IV fluid (crystalloid) bolus of 30 mls/kg
    ▪ If < 8, then 500mL crystalloid bolus until CVP 8-12
    ▪ ? Consider colloid if CVP <4
  o Measure MAP
    ▪ If < 65 start pressors
    ▪ Norepinephrine gtt @ 5 mcg/min and titrate
    ▪ Phenylephrine 40mcg/min and titrate
    ▪ If continued hypotension
    ▪ Consider low dose vasopression (0.04 units/min) and do not titrate.
    ▪ Consider steroids if on pressors > 6 hours (No RANDOM Cortisol or STEM test)
  o Measure SVO2
    ▪ If > 70% and HR < 120, early goals achieved
    ▪ Recheck lactate if last level > 2 within 6 hrs of the first lactate draw
    ▪ If <70% and Hb < 8, consider transfusion
    ▪ Transthoracic Echo (TTE) to evaluate cardiac function

Continuing therapy:
• Adrenal function- (If pressor required > 6 hrs with escalation or if no improvement)
  o Consider hydrocortisone 100 mg IV q 8hr
• Blood glucose control- blood glucose protocol
• Lung protective strategies
• Sedation/analgesia
• Stress ulcer prophylaxis
• DVT prophylaxis
• Nutrition- begin support within the first 24 hrs
Sepsis, Septic Shock and Severe Sepsis Criteria

Does patient have two or more SIRS criteria?
Temp >38 or <36
HR > 90
RR > 20 or PaCO2 < 32
WBC >12,000 or > 10% bands

NO
Reassess

YES

Known or suspected infection?

NO

YES

Laboratory Evaluation/ Tests
Blood Cultures (one percutaneous and one from each vascular access before ABX)
UA/ C&S
CXR/EKG
CBC
Type & screen
BMP
Lactate
Glucose
LFTs
INR, PT/PTT
ABG
Sputum culture (?BAL)
Other appropriate cultures

SBP < 90 after 30 mL/kg fluid bolus?

YES
SEPTIC SHOCK

NO

Lactate ≥ 2 or organ dysfunction?

YES
SEVERE SEPSIS

EARLY GOAL-DIRECTED THERAPY for patients with septic shock and severe sepsis
**EARLY GOAL-DIRECTED THERAPY**

**Resuscitation Goals**
- CVP 8-12
- MAP ≥ 65
- UOP ≥ 0.05 mL/kg/hr
- ScVO2 ≥ 70%
- Lactate <2.0

**Transfer patient to the ICU**
- Central Line Placement
- Arterial Line Placement
- Initiate Broad-spectrum Antibiotics within 3 Hrs
- Supplemental Oxygen or Mechanical Ventilation as Indicated

**CVP**
- CVP < 8 or clinical hypovolemia
  - 1. NS bolus at 30 mls/kg

**MAP**
- MAP < 65
  - 1. Norepinephrine gtt @ 5 mcg/min and titrate
  - 2. Phenylephrine 40mcg/min and titrate
  - If continued hypotension
    - Consider low dose vasopression (0.04 units/min) and do not titrate.
    - Consider TTE
    - Consider steroids if on pressors > 6 hours
- MAP > 65 and < 100
- SVO2
  - SVO2 > 70
- SVO2 < 70

**Hct**
- Hct < 24
  - Transfuse until Hct > 24
- Hct ≥ 24
  - 1. Dobutamine 2.5-20 mcg/min (if HR < 100 and SBP > 100)
  - 2. Dopamine 5-10 mcg/min if SBP <100
  - 3. Consider intubation/ mechanical ventilation
  - 4. Consider TTE

**EARLY GOALS ACHIEVED**
1. Recheck lactate if last > 2 within 6 hrs
2. Continuing Therapy (see below) and monitoring

**Continuing Therapy**
1. Adrenal function- hydrocortisone 100mg IV q 8 hours IF indicated
2. Tight blood glucose control: blood glucose protocol (order set 4147) for goal blood sugar 130-150
3. Lung protective strategies
4. Sedation/analgesia
5. Stress ulcer prophylaxis
6. DVT prophylaxis- heparin 5000 units subcu TID unless contraindicated. Screening as per protocol (order set 4540). SCDs.
7. Nutrition- begin support within the first 24 hours
Spine Assessment & Cord Injury
# 7135.207

**Policy statement:** Develop a regimented approach to screening and treatment for spinal injuries in the trauma patient.

**Definition:** Both penetrating and blunt trauma patients can be at risk for injury to the bony or ligamentous spine. Blunt patients fall into four categories: awake, awake with neck or back pain/tenderness, obtunded and patient with neurologic deficits. Penetrating spine patients make up the fifth category of traumatic spine. Each category requires a different workup.

1. **Awake blunt trauma patients** can undergo clearance of the spine by physical exam and active range of motion exercises (AROME) if they have no distracting injuries, are not intoxicated or do not have altered sensorium from traumatic brain injuries (TBI) etc.

2. **Patients with spine pain or tenderness** are at risk for spine injury and require radiological evaluation.

3. **Obtunded blunt trauma patients** are patients who may be intubated or are otherwise unable to communicate or interact with a physical exam or range of motion exercise, require computed tomography (CT) under a set of specific requirements of clearance of the spine.

4. Patients with neurological deficits have motor and/or sensory deficits corresponding to specific nerve roots resulting in paresis, paraplegia and/or sensory deficits not explained by TBI or cerebral infarct.

5. **Penetrating spine patients** have a ballistic wound that has proximity or trajectory involving the spine.

**Procedure:**

I. **Awake Blunt Trauma patients**—without distracting injuries or conditions or conditions can be cleared clinically without any need for imaging studies.
   a. The cervical, thoracic and lumbar spine are palpated.
      i. If the thoracic and lumbar spine are free of midline bony tenderness, then these areas are cleared clinically by palpation alone.
      ii. If the cervical spine is free of bony midline tenderness, an AROME is performed. Have the patient flex and extend the head forward and backward, and then turn head right and left, touching the chin to each shoulder.
      iii. If the AROME is completed without difficulty, the c-spine is cleared and the collar may be removed.
   b. If the patient has bony spine tenderness of fails the AROME, then proceed to “Patients with spine pain.”

II. **Patients with spine pain** require work up by CT scan of the area in question.
   a. Due to overlap of anatomic zones and the high number of bony injuries in the thoracolumbar area, patients with tenderness anywhere in the back should undergo CT scanning of the entire T & L spine.
   b. If bony spine tenderness is detected after the patient has undergone a CT scan of the thorax, abdomen and pelvis (TAP), a “bony spine” series can be reformatted from the CT-TAP.
   c. Patients with step-off deformities or bony back pain detected on secondary survey should undergo a dedicated T & L spine series
d. Awake patients with bony neck pain or fail cervical AROME require a CT scan of the cervical spine and a two-view active flexion-extension plain film series of the cervical spine.
   i. Patients sit upright in a wheelchair.
   ii. The cervical collar is removed.
   iii. The patients flexes their head forward until neck pain limits motion or the chin touches the chest and an x-ray is taken.
   iv. The patient then extends the head backwards until the patient experiences pain or the occipital skull touch the upper back and a second film is taken.
   v. The collar is then replaced until the official x-ray report demonstrates stability.
   vi. Patients who do not have visualization of the C7/T1 disc space or at least 30 degrees range of motion, should have the case reviewed with the trauma Attending and may require an MRI of the cervical spine.
III. **Obtunded blunt trauma patients** present a management dilemma in that patients with TBI can have prolonged periods of AMS and cannot undergo AROME. Performing MRI of the cervical spine as a screening tool on this large group of patients is not cost efficacious. Leaving cervical collars on for extended periods of time can result in skin care problems and decubitus ulcers.
   a. A recent meta-analysis states that a high quality cervical spine CT as defined by $< 3$ mm axila cuts, can be used as a screening tool to clear the cervical spine in Obtunded patients without further testing.
   b. The 16 and 64 slice scanners on the first floor of EMC have the capability of performing 2.5 mm axial cuts and these machines therefore have the resolution necessary to meet criteria specific to this technique.
   c. CT scans of the cervical spine from outside facilities that have axial slice listed on the study as $< 3.0$ mm, are sufficient for this purpose but should have an over-read by an EMC radiologist.
   d. Outside CT scans that do not state the axial slice size and do not contain sagittal and coronal recons do not suffice to clear the obtunded patient’s spine.

IV. **Patients with neurologic deficit** should receive a thorough neurologic exam documenting level of sensory and motor deficit on the right and left sides.
   a. Motor score scale is described as follows:
      i. 0—no contraction
      ii. 1—flicker of contraction
      iii. 2—active movement but can’t resist gravity
      iv. 3—active movement against gravity
      v. 4—active movement against resistance
      vi. 5—normal strength
   b. Sensory exam should be recorded according to dermatone level.
   c. A CT scan of the entire spine looking for the injury causing the neurological deficit and any other concomitant spine injury, should be obtained.
   d. One the level of the SCI is determined, an MRI may be considered.
   e. Neurosurgical service should be consulted on an URGENT basis in the case of an acute SCI.

V. **Penetrating spine patients** – The trajectory on the bullet should be considered (including entrance and exit wounds) and the location of the bullet(s) on plain films.
   a. A thorough neurologic exam should be performed assessing for any evidence of motor or sensory deficit.
   b. A CT scan of the appropriate anatomic area determined by bullet trajectory analysis should be obtained.
   c. Spine immobilization should be maintained until the patient is evaluated by neurosurgery.
Resuscitative Thoracotomy

# 7135.211

A. Background
Resuscitative thoracotomy (RT) has been widely used for a variety of causes of death since its introduction during the 1960’s. While clearly being the most effective means of delivering CPR, most indications have fallen from favor except for exsanguination resulting from major trauma or other intraabdominal catastrophe. Outcome remains so dismal that selective application has been adopted even for traumatic arrest. Inappropriate use wastes precious resources and places healthcare providers at risk for exposure to blood borne pathogens. However, we expect you to perform enough to become proficient while on the service.

B. Statistics
All comers with blunt or penetrating trauma receiving RT demonstrate a survival rate of 7.8% with 15% having severe neurologic impairment. Survival for those with penetrating cardiac injury is 30%, which decreases to 11.2% for noncardiac penetrating thoracic injury. Blunt arrest has the lowest survival at 1.6%.

C. Recommendations
The following guidelines were derived from recommendations developed by The American College of Surgeons Committee on Trauma to meet our institutional practice patterns. RT is only indicated for patients who are pulseless. THE LIVING DO NOT RECEIVE A RESUSCITATIVE THORACOTOMY. Patients unstable from exsanguination, but with measurable vitals, need an expedited trip to the OR for appropriate treatment.

Heretofore, in route shall imply that the patient has been intubated with CPR and appropriate ATLS protocol in progress. It is imperative that you query the transporting EMS about down times, signs of life upon arrival, length of CPR, code meds, etc. prior to making a decision about opening the chest. The reliability of the responses is up to the interpretation of the team leader.

1. Patients sustaining blunt trauma only undergo RT for witnessed arrest at the hospital or in route with down time < 10 minutes.
2. Patients sustaining penetrating cardiac injuries who have witnessed arrest or signs of life (presence of carotid pulse, extremity movement, pupillary activity or cardiac electrical activity) at the scene with short transport times (i.e. less than 10 minutes) are good candidates for RT and should undergo aggressive treatment.
3. Death from noncardiac penetrating thoracic injury (i.e. great vessels, aorta, pulmonary, hilum) has relatively poor survival but RT may be necessary for diagnosis if trajectory is unclear and protocol (2) should be followed in these cases.
4. Patients sustaining exsanguinating abdominal hemorrhage from blunt or penetrating mechanisms, or peripheral vascular injuries, have the poorest of survival and RT is only indicated when arrest occurs within the hospital or in route with downtimes < 10 minutes.
5. Patients with CPR in progress > 20 minutes without any intervening signs of life are generally not candidates for RT although thoracostomy, central access, and a round of code meds may be administered at the discretion of the team leader.
6. Patients with unknown downtimes prior to EMS arrival (i.e. pulseless with first assessment) and CPR in progress > 15 minutes from any mechanism are generally not candidates for RT.
SCOPE: Trauma physicians, surgery residents, Adult Emergency Department, LifeForce, Med. Comm., Transfer Center

PROCEDURE:

Acceptance of trauma patients from Referring Hospitals

Erlanger has an auto-accept and no-divert policy for trauma patients. The surgery resident who is the Trauma Chief on call will be the contact person and the physician contacted by the Transfer Center for notification of a pending transfer. If the transferring physician requests to speak with the Trauma Chief and the chief decides to decline the patient, he/she must contact the Trauma Attending surgeon first to discuss the patient and the reason for the refusal.

The Trauma Chief has the authority to accept trauma patients on the behalf of the trauma attending. However, the referring physician will make the decision regarding the mode of transport utilizing established protocols, the condition and needs of the patient at their facility and in consultation with the accepting physician.

As a courtesy, the Trauma Chief will notify the ED physician on duty of the incoming trauma admission. In the event the ED physician accepts the incoming trauma patient prior to approval of the Trauma Chief, the ED physician will notify the Trauma Chief of the new trauma admission.
SCOPE: Trauma Surgeons, Orthopedic Surgeons, Surgery residents and orthopedic residents.

POLICY: Transferring trauma patients from the general trauma service to the orthopedic trauma service.

PROCEDURE:
It is often difficult to reliably determine the patients’ injuries prior to transfer to Erlanger Health System (EHS). Therefore, patients can be transferred from the general trauma service to the orthopedic trauma service when:
1. General trauma issues are resolved and
2. Isolated orthopedic injuries require continued hospitalization.
3. Trauma attending deems patient cleared and ready for transfer to orthopedic service.

Note: Admission of patients with orthopedic injuries should adhere to the following recommendations:

- Trauma patients who have been evaluated by an Erlanger ED Physician and found to have orthopedic injuries without significant additional injuries do not require further evaluation or admission by the Trauma Surgery Service. These patients should be admitted by the appropriate Orthopedic Service.

- Trauma patients who have been evaluated by the Trauma Surgery Service and found to have orthopedic injuries without significant additional traumatic injuries should be admitted by the appropriate Orthopedic Service.

- If significant non-orthopedic related injuries or problems are identified during the course of evaluation and treatment by the admitting Orthopedic Service, consultation by the Trauma Surgery Service is appropriate and should be requested.

- Pelvic fractures and acetabular fractures resulting from high-energy blunt trauma that require admission for at least 24 hours will be admitted to the Trauma Service. If patient’s condition remains stable but they require ongoing hospitalization for pain control or rehab evaluation, then transfer to the orthopedic attending of record.
Scope: All trauma patients admitted or consulted to the Trauma Service.

Definitions:
Traumatic brain injury is a major cause of disability, death, and economic cost to our society. Research has shown that all neurological damage does not occur at the moment of insult, but evolves over the ensuing hours and days. Therefore, developing better monitoring and treatment methods as well as new pharmaceuticals will greatly improve the outcome for patients with severe head injury.

Definition of Traumatic Brain Injury Patient:
  a. Any patient who has sustained recent head trauma with:
     1. Glasgow Coma Score (GCS) < 8
     2. Focal neurologic deficit(s)
        i. unequal pupillary function
        ii. seizure activity
        iii. lateralizing extremity weakness
        iv. unable to follow commands

Guideline:
Brain injury often is adversely affected by secondary insults. Management of traumatic brain injury focuses on stabilization of the patient and prevention of secondary injury. The presence of hypoxia in addition to hypotension is associated with a mortality of approximately 75%. Therefore, it is imperative that cardiopulmonary stabilization be achieved rapidly in patients with severe head injury. Several studies have reported substantial lowering in mortality after ICP monitoring and control was introduced.

Goal:
Maintain ICP < 20 mmHg
Maintain CPP > 70 mmHg
Maintain MAP > 90 mmHg

1. Assessment and management:
   a. Airway and Breathing.
      i. The most important aspect of immediately managing these patients is early endotracheal intubation with 100% Fio2. Intervention for blunt chest trauma should be addressed at this time. **Hypoxia and hypotension are the greatest threat to functional outcome in brain injury patient.**
      ii. Frequent reevaluation/ABGs
      iii. Patients should be kept sedated to prevent coughing or Valsalva maneuvers from fighting the ventilator, as these increase intracranial pressure.

   b. Circulation:
      i. Maintain normal blood volume with LR, NS or PRBC as needed. Hypotension and hypoxia are the principal causes of deterioration in the head injury patient. Assess and treat any severe blood loss issues.
      ii. Do not treat ^ blood pressure, but maintain CPP.
      iii. Mortality increases approximately 20% for each 10mmHg loss of CPP.

   c. Neurologic:
      i. Glasgow Coma Scale
         Eye opening
         Motor response
         Verbal response
      ii. Pupillary light reaction
      iii. Oculocephalic (Doll’s eyes)
      iv. Oculovestibular (caloric)
v. Neuro exams should be completed on patient arrival, after any intervention and frequently. Document all changes and report to physician.

d. Neurosurgery Consult: See Policy #7135.draft Neurosurgical Consults

**Trauma Surgeon** or **Trauma Chief** to consult Neurosurgery for:

i. Abnormal CT of the brain with normal GCS and no focality.
ii. Normal CT Head and persistent GCS ≤12.
iii. History of recent head trauma with normal studies but evidence of focal findings on exam.
iv. At Trauma Surgeon’s request.

**Neurosurgery Consult not necessary for Loss of Consciousness with GCS 13-15 and normal CT Head.**

e. Therapeutic agents:

   i. Mannitol- 0.5-1.0 g/kg IV bolus the 12.5gms -25gms every 4 hours as needed
   ii. Sedation- Fentanyl 0.5-3.0 mcg/kg/hr IV drip or Versed 1-6 mg IV every 1-2 hrs
   iii. Anticonvulsant- Phenytoin, Phenobarbital, Valium or Ativan

f. Diagnostic Tests:

   i. CT scan of Head (all patients)
   ii. Angiogram
   iii. Lab: ABG, CBC, CMP, PT/PTT

2. ICP monitoring:

   a. Indications for ICP Monitoring:
      
      i. Glasgow Coma Score 8 with motor response <4.
      ii. Abnormal CT scans, such as unilateral cerebral hemispheric edema with significant shift of midline, or diffuse brain lesion.

   b. Contraindication for ICP bolt:
      
      i. Motor response > 5
      ii. Coagulation issues: INR. 3-5.

   c. Complication:
      
      i. Infection - usually bacterial in origin.
      * Treatment is removal of ICP bolt and antibiotics.

3. Goals for severe head injury:

   a. Mean Arterial Pressure >90mmHG
   b. Maintain CPP < 70mmHg.
   c. Maintain ICP < 20 mmHg.
   d. PaCo2 = 35-40%.
   e. Central venous pressure = 8 to 14 cm H2O
   f. Normal PT, PTT, and platelet count
   g. Maintain a normal temperature.
4. Management of elevated ICP:
   a. Elevate HOB 30 degrees with negative T/L spine, otherwise reverse trendelenberg
   b. ICU monitoring including ECG, SP02, A-line, CVP, ICP and when appropriate a SV02 Swan.
   c. Maintain ETCO2 35-40
      If transient increase in ICP – hyperventilate to an ETCO2 of 30-35
   d. Fluid electrolytes balance including intake and output.
   e. Arterial blood gases every 4 hours
   f. Electrolytes, PT and PTT every 6 hours.
   g. Repeat CT of head within 24 hours.
   h. Begin nutritional supplementation within 48 hours of injury through enteral or parenteral route, if not contraindicated due to other injuries.
   i. Mannitol – 12.5-25g IV every 6 hours for ICP >24.
      * Mannitol administration requires CVP monitoring
   j. Avoid hypovolemia and hyperosmolality if Mannitol is used.
      ● Serum osmo every 6 hours – serum osmo maintained at <320 mOsm.
      ● If serum osmo >320 and/or serum Na+ >155 and/or serum Cl >120 – Contact MD.
   k. Monitor cardiac output and preload when using barbiturates
   l. Total Intake and Output for admission will be documented on the ICU flowsheet.

5. Management of Elevated Temperature:
   - Internal cooling techniques such as ice water gastric or rectal lavage, extracorporeal blood cooling, and peritoneal or thoracic lavage are effective but they are also difficult to manage and associated with complications.
   - External cooling techniques are usually easier to implement, well tolerated and effective.
      ● Conductive cooling techniques - direct application of cooling blanket, ice bath, or ice packs to neck, axillae and groin
      ● Convective techniques include removal of clothing and use of fans and air conditioning.
      ● Evaporative cooling can be accelerated by removing clothing and using a fan in conjunction with misting the skin with tepid water or applying a single layer wet sheet to bare skin.

6. Prognosis and Outcome:
   a. The outcome following severe traumatic brain injury strongly correlated with the initial GCS, pupil reactivity and size, age of patient, and the ability to rapidly assess, resuscitate and manage these patients.
   b. The availability of dedicated head injury rehabilitation facilities has greatly improved long-term outcome of these patients. Every effort should be made to transfer these patients to such a facility
All Trauma Patients with suspected brain injury

**Minimal TBI**
GCS 15
Neg LOC
Normal CT

DC Home w/CHI instructions

**Mild TBI**
GCS 14-15 and negative or questionable Loss of Consciousness

CT Head

- Normal
- Abnormal

- Admit 23 hr. Obs.
- Consult NSG
- Consider Repeat Head CT if neuro exam changes.

**Moderate TBI**
GCS 9-13
LOC > 5 min
Focal neuro deficit

CT Head

- Normal

**Severe TBI**
GCS < 9

Go To Page 2
Severe TBI – GCS <9

Emergency Diagnostic and/or Therapeutic Procedures as Indicated

ATLS Trauma Workup

Control Airway – ETT
Oxygenation Goal – PaO2 >60mmHg
Ventilation Goal – PaCO2 35-40 mmHg
IVF – LR (Keep SBP > 90mmHg)
Elevate HOB 30 degrees – Reverse Trendelenberg
Sedation and Pain Control – Fentanyl/Versed
Short Acting Pharmacologic Paralysis
Labs – CBC, Chemistry, Coag’s, UA

Clinical Signs of Herniation

No

Optimal Oxygenation – PaO2 >60mmHg
Normal Ventilation – PaCO2 35-40mmHg

CT Head

No

Admit to ICU

Measure ICP? Place ICP Bolt
Go To Page 3

Yes

NSG Consult
Seizure Prophylaxis x7days

Operating Room

Yes

Hyperventilation Goal – PaCO2 30-35mmHg
Mannitol 20% 0.25-1gm/Kg bolus if SBP >90mmHg

Resolution

No

ATLS Trauma Workup

Seizure Prophylaxis x7days
Severe TBI - GCS <9
Management of elevated ICP

Continue ABC’s and Initial ER workup, including sedation, pain control, hydration and ventilatory management.

ICP <20mmHg
- Continue Present Therapy

ICP >20mmHg

ICP >20mmHg
CPP > 70mmHg
- Mannitol 20%: 0.25-1gm/Kg q6hrs
- Plasma Osmolality <320
- Propofol Infusion

ICP >20mmHg
CPP <70mmHg
- 3% Hypertonic Saline (Na <155/Cl <120)

Euvolemic w/Persistent Hypotension and Elevated ICP

Vasopressors:
- Levophed w/HR <100/min
- Neosynephrine w/HR >100

Repeat CT Head
and Consider

- Ventriculostomy
- Decompression Craniotomy

Pentobarbital Coma
Traumatic Wound Closure

# 7135.212

A. Background
You will encounter a large variety of wounds while on the service and will manage the majority of these. Full thickness wounds involving the eyelid or associated with an extremity fracture usually necessitate consultation with the plastic or orthopedic service. Wounds of the forearm or hand involving tendon or joint space similarly require the consultation of the hand service.

B. Wound classification
We will use the Current Procedural Terminology (CPT) manual’s wound classification system to describe all wounds managed by the trauma service. All wound closures performed need a hand written as well as dictated procedure note.

1. Simple wounds
   These are generally linear or curved linear lacerations with minimal contamination that can be closed in one layer without debridement.

2. Intermediate wounds
   These are basically wounds that require two-layer closure that may either be a superficial fascia layer and skin layer or closure of subcutaneous fat and skin layers. There may be little or moderate contamination associated with these wounds but excisional or sharp debridement is not necessary.

3. Complex wounds
   Wounds that require three-layer closure of deep and superficial fascia or muscle layer or subcutaneous fat and skin are considered complex.
   a. Wounds with ongoing bleeding that require suture ligation of bleeding vessels are also classified as complex wounds, even if there is only one or two layer closure.
   b. Those wounds requiring excisional debridement of devitalized tissue with a scalpel or scissors also classify as complex wounds. If excisional debridement is necessary, please be certain to clearly state this in your procedure note.
   c. Avulsion wounds requiring tacking down of flaps created by trauma or those wounds which require mobilization of wound edges to permit closure also classify as complex wounds.

C. Anatomic location
Each classification has separate anatomic locations, that also needs to be specified in the procedure note.

1. Simple
   There are basically two anatomical locations for simple wounds:
   a. facial
   b. truncal
      o truncal wounds should be subclassified as follows:
      1) chest
      2) back
      3) abdomen
      4) flank
      5) upper extremity
      6) lower extremity
      7) foot
      8) hand

2. Intermediate
   Intermediate wounds have three general anatomic locations:
   a. scalp, axilla, extremities, chest, back, abdomen or flank.
   b. neck, hands, feet and/or external genitalia
   c. face, ears, eyelids, nose, lips and/or mucous membranes

3. Complex wounds
   Complex wounds have four anatomic areas
   a. trunk
b. scalp, arms, and/or legs

c. forehead, cheeks, chin, mouth, neck, axillae, genitalia, hands and/or feet

d. eyelids, nose, ears, and/or lips

D. Categorizing Wounds
The final way of categorizing wounds in addition to complexity and anatomic location is length. All wounds need to be measured and the total length of wound per anatomic location needs to be recorded per wound grade (e.g. all simple wounds in a certain anatomic location need to have the lengths totaled. All intermediate wounds per anatomic location need their lengths totaled as well as all complex wounds per each anatomic location.) Therefore, each procedure note should contain wound grade, anatomic location by grade and total length of each type of wound.

E. Contaminated wounds:
The solution to the pollution is dilution. Irrigation with pressurized saline either from syringes or perforated 1 liter saline bottles is essential. All particulate matter must be thoroughly cleansed free. A small amount of Betadine may be added to the solutions to help with decontamination. Large amounts of concentrated Betadine impairs wound healing. If wounds cannot adequately be cleansed due to pain or heavy soiling, these patients should be considered for transfer to the operating room. Deep wounds exposed to lake, river or pond water may also be considered for operative irrigation and debridement.

F. Antibiotics
The three factors that have been shown to contribute to wound infection following laceration closure are the length and depth of the wound and amount of contamination. Most contaminated wounds do not need antibiotic administration. Complex, deep contaminated wounds should have antibiotic administration discussed with the chief or attending on an individual basis and for appropriate coverage, if indicated. Wounds involving animal or human bites and/or contamination with lake or river water should also be considered for antibiotic coverage.

G. Instruments
Disposable laceration trays available in the ER are usually sufficient for most wounds. For complex lacerations and lacerations to the face, “plastic surgery trays” are available with finer instruments and retractors when necessary.

H. Suturing material
In the past, prolene has been used predominately for laceration closure. We are now looking at replacing this material with nylon and Ethylon (nylon) for skin closure due to cost. Nylon should give the same result for most closures as prolene. For the eyelid, lip, and genitalia, one may want to consider chromic or plain gut suture to alleviate the need for suture removal. The following is a list of suture material that should be stocked in the ER for suturing trauma patients. Please avoid special requests not on this list.

(The physician closing the wound should dictate AND write an Operative note as directed by the Trauma Attending Surgeon.)
Policy Statement: It is the policy of Erlanger Health System that all healthcare providers follow the recommendation outlined in the following policy.

Scope: Erlanger clinical staff and Licensed Independent Practitioners (LIPs) who manage adult patients that require urine cultures.

Procedure:
A. Testing Method:
   1. Hematology performs a urine macroscopic exam is automatically if standard criteria are met. Specimen is handled using aseptic technique through testing procedure to prevent contamination.
   2. Urine culture will only be performed as outlined in the protocol

B. Collection Guidelines:
   1. Collect urine specimens for urinalysis and culture from Foley catheters from sampling port using aseptic technique. Do not collect from the Foley bag or urine meter
   2. Voided specimens for urinalysis and culture are to be collected mid-stream after perineal area is prepped
   3. Transport urine specimens to the laboratory within 30 minutes or less after collected.

![Urine Culture Reflex Procedure Flowchart]
APPENDIX A

Medications

(Common Narcotics, Anti-Seizure Prophylaxis, and Common gtts)

This list is meant to be a “quick reference,”
and is not to be considered all inclusive.
# Common Narcotics

<table>
<thead>
<tr>
<th>DRUG</th>
<th>GENERIC</th>
<th>COMMON ROUTES</th>
<th>COMMON DOSAGES</th>
<th>HALF-LIFE</th>
<th>SCHEDULE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demerol</td>
<td>meperidine</td>
<td>IV/IM</td>
<td>25-50 mg</td>
<td>3-5 hr</td>
<td>II</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PO</td>
<td>50 mg</td>
<td>3-5 hr</td>
<td>II</td>
</tr>
<tr>
<td>Dilaudid</td>
<td>hydromorphone</td>
<td>SC/IM</td>
<td>1-2 mg</td>
<td>2-3 hr</td>
<td>II</td>
</tr>
<tr>
<td></td>
<td></td>
<td>IV</td>
<td>0.5-1 mg q/hr</td>
<td>2-3 hr</td>
<td>II</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PO</td>
<td>2-4 mg q 4-6 hr</td>
<td>2-3 hr</td>
<td>II</td>
</tr>
<tr>
<td>Lortab</td>
<td>hydrocodone/acetaminophen</td>
<td>PO</td>
<td>2.5/325 - 10/325 mg</td>
<td>~ 4 hr</td>
<td>III</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(may give up to 15-20 mg/650)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Methadose</td>
<td>methadone</td>
<td>PO</td>
<td>2.5-40 mg q day</td>
<td>8-59 hr</td>
<td>II</td>
</tr>
<tr>
<td>MS Contin</td>
<td>morphine</td>
<td>PO</td>
<td>5-30 mg q 4 hr</td>
<td>1.5-4.5 hr</td>
<td>II</td>
</tr>
<tr>
<td></td>
<td></td>
<td>IV/IM</td>
<td>5-15 mg q 4 hr</td>
<td>1.5-4.5 hr</td>
<td>II</td>
</tr>
<tr>
<td>NUCYNTA</td>
<td>tapentadol</td>
<td>PO</td>
<td>50-100 mg q 6 hr</td>
<td>4</td>
<td>II</td>
</tr>
<tr>
<td>Percocet</td>
<td>oxycodone/acetaminophen</td>
<td>PO</td>
<td>2.5/325 - 10/325 mg</td>
<td>3-4.5 hr</td>
<td>II</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(may give up to 15-20 mg/650)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Opana</td>
<td>oxymorphone</td>
<td>PO</td>
<td>5-20 mg q 4 hr</td>
<td>7-9 hr</td>
<td>II</td>
</tr>
<tr>
<td>OxyContin</td>
<td>oxycodone</td>
<td>PO</td>
<td>5-30 mg q 6 hr</td>
<td>2-4 hr</td>
<td>II</td>
</tr>
<tr>
<td>Sublimaze</td>
<td>fentanyl</td>
<td>IV/IM</td>
<td>1-2 mcg/kg q 30-60 min</td>
<td>2-4 hr</td>
<td>II</td>
</tr>
<tr>
<td>Tylenol #3</td>
<td>codeine/acetaminophen</td>
<td>PO</td>
<td>15-30/300 q 4 hr</td>
<td>3HR</td>
<td>III</td>
</tr>
<tr>
<td>Ultram</td>
<td>tramadol</td>
<td>PO</td>
<td>50-100 mg q 6 hr</td>
<td>~6 hr</td>
<td>IV</td>
</tr>
</tbody>
</table>

***this list is by no means, all inclusive

***Maximum dose of Acetomenophen in a 24-hr period is 3 Grams

---

**ANTI-Seizure Prophylaxis**

- Not recommended for late posttraumatic seizure
- Recommended for early posttraumatic seizure (7days duration)
- Indications
  - SDH
  - EDH
  - ICH
  - Penetrating head wound
  - Seizure within 24 hr of injury
<table>
<thead>
<tr>
<th>DRUG</th>
<th>INDICATION</th>
<th>DOSE / ROUTE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alcohol gtt (10% ethanol in 1000ml D5W)</td>
<td>DT prophylaxis</td>
<td>0.5 ml/kg/hr IV D5E5 at 125ml/hr = 1 beer/hr</td>
</tr>
<tr>
<td>acetylcysteine (Mucomyst)</td>
<td>Renal protection with CT</td>
<td>1200 mg PO Q12H X 48H Start 24H prior to CT if possible – may give 1\textsuperscript{st} dose IV 1200mg</td>
</tr>
<tr>
<td>Cosyntropin</td>
<td>Cortisol stimulation test</td>
<td>Check cortisol level before test Give 0.25 mg IV over 2 min. Check cortisol level again at 30 and 60 mins. after drug administration</td>
</tr>
<tr>
<td>Cordarone (amiodarone)</td>
<td>Ventricular dysrhythmias</td>
<td>LD 150 mg (100ml) IV over first 10 minutes (3ml/100ml D5W) 360 mg (200ml) IV over next 6 hours (mix 18ml/500ml D5W) 540 mg (300ml) IV over next 18 hours After 1\textsuperscript{st} 24 hours 0.5 mg/minute IV</td>
</tr>
<tr>
<td>DDAVP (desmopressin)</td>
<td>Diabetes Insipidus (DI)</td>
<td>2-3mcg/day in 2 divided doses IV or SC</td>
</tr>
<tr>
<td></td>
<td>Coagulopathy</td>
<td>0.3 mcg/kg in 250 ml of NS IV over 30 minutes to augment release of Factor 12 from the endothelium.</td>
</tr>
<tr>
<td>Diltizaem (Cardizem)</td>
<td>Atrial fibrillation</td>
<td>Initial bolus of 0.25mg/kg of actual body weight over 2 minutes. Initial infusion of 10mg/kg rate may be increased in 5mg/hr up to 15mg/hr.</td>
</tr>
<tr>
<td>Dopamine</td>
<td>Hypotension</td>
<td>1-5mcg/kg/min up to 20mcg/kg/min</td>
</tr>
<tr>
<td>Dobutamine</td>
<td>Inatrope</td>
<td>2.5-20mcg/kg/min – max 40mcg/kg/min</td>
</tr>
<tr>
<td>Epinephrine</td>
<td>Hypotension</td>
<td>Initially 1mcg/min (range 1-10mcg/min)</td>
</tr>
<tr>
<td>Esmolol (Bevibloc)</td>
<td>SVT</td>
<td>50-200mcg/kg/min – average dose 100mcg/kg/min</td>
</tr>
<tr>
<td>Dopamine</td>
<td>Hypotension</td>
<td>Start 1-5mcg/kg/min upto 20mcg/kg/min</td>
</tr>
<tr>
<td>Factor VII</td>
<td>Hemorrhage</td>
<td>90 mcg/kg IV now, then Q2H until bleed stops (Give in 4.8mcg increments – do not split a vial)</td>
</tr>
<tr>
<td>fenoldopam (Corlopam)</td>
<td>Renal impairment</td>
<td>0.03 mcg/kg/min - 0.1 mcg/kg/min BP dose: start at 0.1 mcg/kg/min</td>
</tr>
<tr>
<td>Ferrlecit (IV Iron)</td>
<td>Iron deficiency</td>
<td>125 mg IV QW X 8 doses – Test doses of 50 mg Give 125 mg over 1 hour</td>
</tr>
<tr>
<td>Furosemide gtt</td>
<td>Fluid overload</td>
<td>20 mg and then continuous infusion of 4-10 mg/hr</td>
</tr>
<tr>
<td>Meduri Steroid Rescue</td>
<td>MOSF</td>
<td>Methylprednisolone (Solumedrol) 200 mg IV bolus then 2-3 mg/kg/day every 6 hours until extubation or 6 weeks</td>
</tr>
</tbody>
</table>
## Trauma Medication Use List

<table>
<thead>
<tr>
<th>DRUG</th>
<th>INDICATION</th>
<th>DOSE / ROUTE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Micafungin</td>
<td>Antifungal</td>
<td>100mg IV daily</td>
</tr>
<tr>
<td>Neostigmine</td>
<td>GI motility</td>
<td>0.4-0.8 mg/hr over 24 hours or 2-2.5 mg IV bolus</td>
</tr>
<tr>
<td>Neosymphterine</td>
<td>Hypotension</td>
<td>100-180mcg/min initially – maintenance of 40-60mcg/min</td>
</tr>
<tr>
<td>Norepinephrine</td>
<td>Hypotension</td>
<td>0.5-1mcg/min titrate to response 8-30 mcg/min is usual range</td>
</tr>
<tr>
<td>Nicardipine</td>
<td>Hypertension</td>
<td>5mg/hr IV infusion. Increase by 2.5mg/hr Q 15 mins for a max of 15mg/hr</td>
</tr>
<tr>
<td>Pentobarbital gtt</td>
<td>Induced coma</td>
<td>3-5 mg/kg then 1-2 mg/kg/hr IV Patient to be placed on continuous EEG</td>
</tr>
<tr>
<td></td>
<td></td>
<td>monitoring for burst suppression. Neurology consult for EEG burst suppression is an option.</td>
</tr>
<tr>
<td>Propofol</td>
<td>Sedation</td>
<td>6-12 mg/kg/hr</td>
</tr>
<tr>
<td>Sandostatin</td>
<td>GI fistula/GI Bleed</td>
<td>100 mcg SQ tid</td>
</tr>
<tr>
<td>Seroquel</td>
<td>Psychosis</td>
<td>100 mg PO AM &amp; noon</td>
</tr>
<tr>
<td></td>
<td></td>
<td>200 mg qhs may give up to 2400mg daily</td>
</tr>
<tr>
<td>Valproic Acid</td>
<td>Psychosis (mania)</td>
<td>LD of 20 mg/kg IV then 750 mg/day in divided doses – check levels – desired range 50-125mcg/ml (Max recommended dose is 60mg/kg/day) – Toxic &gt;200mcg/ml</td>
</tr>
<tr>
<td>Vasopressin</td>
<td>Septic shock</td>
<td>0.04 u/min IV infusion</td>
</tr>
<tr>
<td></td>
<td>Diabetes insipidus</td>
<td>5-10 units bid to qid max 60 units/day</td>
</tr>
</tbody>
</table>

## Steroid Equivalence

<table>
<thead>
<tr>
<th>DRUG</th>
<th>DOSE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cortisone</td>
<td>25 mg</td>
</tr>
<tr>
<td>Hydrocortisone</td>
<td>20 mg</td>
</tr>
<tr>
<td>Prednisolone</td>
<td>5 mg</td>
</tr>
<tr>
<td>Methylprednisolone</td>
<td>4 mg</td>
</tr>
<tr>
<td>Tiamcinolone</td>
<td>4 mg</td>
</tr>
<tr>
<td>Dexamethasone</td>
<td>0.750 mg</td>
</tr>
<tr>
<td>Betamethasone</td>
<td>0.6 mg</td>
</tr>
</tbody>
</table>

## Post Splenectomy Vaccines

***Preferred: give just prior to DC, one QD (example: Suspect DC on Thursday, give Pneumococcal on Tues, give Meningococcal & H Flu on Weds in separate sites). If must administer all in one day, give in separate sites and syringes***

<table>
<thead>
<tr>
<th>VACCINE</th>
<th>DOSE / ROUTE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pneumococcal vaccine</td>
<td>0.5 ml IM</td>
</tr>
<tr>
<td>Meningococcal vaccine</td>
<td>0.5 ml IM</td>
</tr>
<tr>
<td>H Flu type b (Hib) vaccine</td>
<td>0.5 ml IM</td>
</tr>
</tbody>
</table>
APPENDIX B

Assessment and Injury Scales & Definitions

(GCS, Return to sports, Los Ranchos & Injury Scales, etc.)
**Glasgow Coma Score (GCS)**

The GCS is scored between 3 and 15, 3 being the worst, and 15 the best. It is composed of three parameters: Best Eye Response, Best Verbal Response, Best Motor Response, as given below:

**Best Eye Response. (4)**
1. No eye opening.
2. Eye opening to pain.
3. Eye opening to verbal command.
4. Eyes open spontaneously.

**Best Verbal Response. (5)**
1. No verbal response
2. Incomprehensible sounds.
3. Inappropriate words.
4. Confused
5. Orientated

**Best Motor Response. (6)**
1. No motor response.
2. Extension to pain.
3. Flexion to pain.
5. Localizing pain.
6. Obeys Commands.

Note that the phrase 'GCS of 11’ is essentially meaningless, and it is important to break the figure down into its components, such as E3, V3, M5 = GCS 11.

**GCS & Head Injury:**
- GCS of 13 or higher correlates with a mild brain injury
- GCS of 9 to 12 is a moderate injury
- GCS of 8 or less is a severe brain injury.

**NOTE:** The lowest GCS a patient can have is a “3.” Do not document a GCS of zero.

---

**Return to Sports after Concussion Guideline:**
(according to the American Academy of Neurology, 2013)

- Any athlete suspected of experiencing a concussion should immediately be removed from play
- There is no set timeline for safe return to play
- A high-school (or younger) athlete may take longer for symptoms and neuro-cognitive performance to improve than a college or adult athlete. They should be managed more conservatively in regard to return to play.
- Activities that do not worsen symptoms and do not pose a risk for repeat concussion may be part of concussion management.
- The first 10 days after a concussion appears to be the period of greatest risk for being diagnosed with another concussion.
- An athlete who has a history of 1 or more concussions is at greater risk for being diagnosed with another concussion.
- Licensed health professionals trained in treating concussion should look for ongoing symptoms (especially headache and fogginess) and should evaluate the athlete before returning to play.
Rancho Los Amigos Scale

I. **No Response**- A person at this level will not respond to sounds, sights, touch or movement.

II. **Generalized Response**- A person at this level will begin to respond to sounds, sights, touch or movement; respond slowly, inconsistently, or after a delay; respond in the same way to what he hears, sees or feels. Responses may include chewing, sweating, tachypnea, moaning, moving and/or increasing blood pressure.

III. **Localized Response**- A person at this level will be awake on and off during the day; make more movements than before; react more specifically to what he sees, hears or feels. For example, he may turn towards a sound, withdraw from pain, and attempt to watch a person move around the room. The person will react slowly and inconsistently but begin to recognize family and friends; follow some simple directions such as "look at me" or "squeeze my hand"; and begin to respond inconsistently to simple questions with "yes" or "no" head nods.

IV. **Confused-Agitated**- A person at this level will be very confused and frightened; not understand what he feels, or what is happening around him; overreact to what he sees, hears or feels by hitting, screaming, using abusive language, or thrashing about. Person must be restrained so he doesn't hurt himself; may not understand that people are trying to help him; may not pay attention or be able to concentrate for a few seconds; have difficulty following directions; recognize family/friends some of the time; and with help, be able to do simple routine activities such as feeding himself, dressing or talking.

V. **Confused-Inappropriate, Non-Agitated**- A person at this level will be able to pay attention for only a few minutes; be confused and have difficulty making sense of things outside himself; not know the date, where he is or why he is in the hospital; not be able to start or complete everyday activities, such as brushing his teeth, even when physically able; become overloaded and restless when tired or when there are too many people around; try to fill in gaps in memory by making things up; may get stuck on an idea or activity (perseveration) and need help switching to the next part of the activity; focus on basic needs such as eating, relieving pain, going back to bed, going to the bathroom, or going home.

VI. **Confused-Appropriate**- A person at this level will be somewhat confused because of memory and thinking problems, he will remember the main points from a conversation, but forget and confuse the details. follow a schedule with some assistance, but becomes confused by changes in the routine; know the month and year, unless there is a serious memory problem; pay attention for about 30 minutes, but has trouble concentrating when it is noisy or when the activity involves many steps. brush his teeth, get dressed, feed himself with help; know when he needs to use the bathroom; do or say things too fast, without thinking first; know that he is hospitalized because of an injury, but will not understand all the problems he is having; be more aware of physical problems than thinking problems; and associate his problems with being in the hospital and think he will be fine as soon as he goes home.

VII. **Automatic-Appropriate**- A person at this level will follow a set schedule and be able to do routine self care without help, if physically able; have problems planning, starting, and following through with activities; have trouble paying attention in distracting or stressful situations. not realize how his thinking and memory problems may affect future plans and goals; continue to need supervision because of decreased safety awareness and judgment. He still does not fully understand the impact of his physical or thinking problems; think slower in stressful situations; be inflexible or rigid, and he may be stubborn; and be able to talk about doing something, but will have problems actually doing it.

VII. **Purposeful-Appropriate**- A person at this level will realize that he has a problem in his thinking and memory; begin to compensate for his problems; be more flexible and less rigid in his thinking, be ready for driving or job training evaluation; be able to learn new things at a slower rate; still become overloaded with difficult, stressful or emergency situations; show poor judgment in new situations and may require assistance; need some guidance making decisions; have thinking problems that may not be noticeable to people who did not know the person before the injury.
# Injury Scales

## AAST Liver Injury Scale (1994 Revision)

<table>
<thead>
<tr>
<th>Grade</th>
<th>Injury Description</th>
<th>ICD-9</th>
<th>AIS90*</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Hematoma, Subcapsular, nonexpanding, &lt; 10% surface area</td>
<td>864.01 - 864.11</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Laceration, Capsular tear, nonbleeding, &lt; 1 cm parenchymal depth</td>
<td>864.02 - 864.12</td>
<td>2</td>
</tr>
<tr>
<td>II</td>
<td>Hematoma, Subcapsular, nonexpanding, 10 – 50% surface area; intraparenchymal &lt; 10 cm in diameter</td>
<td>864.01 - 864.11</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Laceration, Capsular tear, active bleeding; 1 - 3 cm parenchymal depth, &lt; 10 cm in length</td>
<td>864.03 - 864.13</td>
<td>2</td>
</tr>
<tr>
<td>III</td>
<td>Hematoma, Subcapsular, &gt; 50% surface area or expanding; ruptured subcapsular or parenchymal hematoma; intraparenchymal hematoma &gt; 10 cm or expanding</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Laceration, &gt; 3 cm parenchymal depth</td>
<td>864.04 - 864.14</td>
<td>3</td>
</tr>
<tr>
<td>IV</td>
<td>Laceration, Parenchymal disruption involving 25 – 75% of hepatic lobe or 1-3 Couinaud's segments within a single lobe</td>
<td>864.04 - 864.14</td>
<td>4</td>
</tr>
<tr>
<td>V</td>
<td>Laceration, Parenchymal disruption involving &gt; 75% of hepatic lobe or &gt; 3 Couinaud's segments within a single lobe</td>
<td></td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Vascular, Juxtahepatic venous injuries, i.e., retrohepatic vena cava/central major hepatic veins</td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>VI</td>
<td>Vascular, Hepatic avulsion</td>
<td></td>
<td>6</td>
</tr>
</tbody>
</table>

*Advance one grade for multiple injuries, up to Grade III

## AAST Spleen Injury Scale (1994 Revision)

<table>
<thead>
<tr>
<th>Grade</th>
<th>Injury Description</th>
<th>ICD-9</th>
<th>AIS90*</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Hematoma, Subcapsular, nonexpanding, &lt; 10% surface area</td>
<td>865.01 - 865.11</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Laceration, Capsular tear, nonbleeding, &lt; 1 cm parenchymal depth</td>
<td>865.02 - 865.12</td>
<td>2</td>
</tr>
<tr>
<td>II</td>
<td>Hematoma, Subcapsular, nonexpanding, 10 – 50% surface area; intraparenchymal, &lt; 5 cm in diameter</td>
<td>865.01 - 865.11</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Laceration, Capsular tear, active bleeding; 1 - 3 cm parenchymal depth, which does not involve a trabecular vessel</td>
<td>865.02 - 865.12</td>
<td>2</td>
</tr>
<tr>
<td>III</td>
<td>Hematoma, Subcapsular, &gt; 50% surface area or expanding; ruptured subcapsular or parenchymal hematoma with active bleeding; intraparenchymal hematoma &gt; 5 cm or expanding</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Laceration, &gt; 3 cm parenchymal depth</td>
<td>865.03 - 865.13</td>
<td>3</td>
</tr>
<tr>
<td>IV</td>
<td>Laceration, Laceration involving segmental or hilar vessels producing major devascularization (&gt; 25% of spleen)</td>
<td>865.04 - 865.14</td>
<td>4</td>
</tr>
<tr>
<td>V</td>
<td>Laceration, Completely shattered spleen</td>
<td>865.04 - 865.14</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Vascular, Hilar vascular injury which devascularizes spleen</td>
<td>865.04 - 865.14</td>
<td>5</td>
</tr>
</tbody>
</table>

*Advance one grade for multiple injuries up to Grade III

## AAST Duodenum Injury Scale (1994 Revision)

<table>
<thead>
<tr>
<th>Grade</th>
<th>Injury Description</th>
<th>ICD-9</th>
<th>AIS90*</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Hematoma, Involving single portion of duodenum</td>
<td>863.21</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Laceration, Partial thickness, no perforation</td>
<td>863.21</td>
<td>2</td>
</tr>
<tr>
<td>II</td>
<td>Hematoma, Involving more than one portion</td>
<td>863.21</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Laceration, Disruption &lt; 50% of circumference</td>
<td>863.31</td>
<td>4</td>
</tr>
<tr>
<td>III</td>
<td>Laceration, Disruption 50 – 75% circumference of D2</td>
<td>863.31</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Laceration, Disruption 50 – 100% circumference of D1, D3, D4</td>
<td>863.31</td>
<td>4</td>
</tr>
<tr>
<td>IV</td>
<td>Laceration, Disruption &gt; 75% circumference of D2</td>
<td>863.31</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Laceration, Massive disruption of duodenopancreatic complex</td>
<td>863.31</td>
<td>5</td>
</tr>
<tr>
<td>V</td>
<td>Laceration, Devascularization of duodenum</td>
<td>863.31</td>
<td>5</td>
</tr>
</tbody>
</table>

D1 = first portion of duodenum; D2 = second portion; D3 = third portion; D4 = fourth portion

*Advance one grade for multiple injuries up to Grade III
### AAST PANCREAS INJURY SCALE (1994 REVISION)

<table>
<thead>
<tr>
<th>Grade</th>
<th>Injury Description</th>
<th>ICD-9</th>
<th>AIS90*</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Hematoma Minor contusion without duct injury</td>
<td>863.81 - 863.84</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Laceration Superficial laceration without duct injury</td>
<td>863.81 - 863.84</td>
<td>2</td>
</tr>
<tr>
<td>II</td>
<td>Hematoma Major contusion without duct injury or tissue loss</td>
<td>863.81 - 863.84</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Laceration Major laceration without duct injury or tissue loss</td>
<td>863.81 - 863.84</td>
<td>3</td>
</tr>
<tr>
<td>III</td>
<td>Laceration Distal transection or parenchymal injury with duct injury</td>
<td>863.92 - 863.94</td>
<td>3</td>
</tr>
<tr>
<td>IV</td>
<td>Laceration Proximal (to patient’s right of superior mesenteric vein) transection or parenchymal injury involving ampulla</td>
<td>863.91</td>
<td>4</td>
</tr>
<tr>
<td>V</td>
<td>Laceration Massive disruption of pancreatic head</td>
<td>863.91</td>
<td>5</td>
</tr>
</tbody>
</table>

.81,.91 = head; .82,.92 = body; .83,.93 = tail

*Advance one grade for multiple injuries up to Grade III

### HEAD INJURY SCALE

<table>
<thead>
<tr>
<th>Grade</th>
<th>Injury Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>No changes on computerized tomography (CT)</td>
</tr>
<tr>
<td>II</td>
<td>Positive changes on CT</td>
</tr>
<tr>
<td>III</td>
<td>Nonsurvivable head injury</td>
</tr>
</tbody>
</table>

### AAST Kidney Injury Scale

<table>
<thead>
<tr>
<th>GRADE</th>
<th>Injury description</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Contusion Microscopic or gross hematuria, urologic studies normal</td>
</tr>
<tr>
<td></td>
<td>Hematoma Subcapsular, nonexpanding without parenchymal laceration</td>
</tr>
<tr>
<td>II</td>
<td>Hematoma Nonexpanding peri-renal hematoma confirmed to renal retroperitoneum</td>
</tr>
<tr>
<td></td>
<td>Laceration &lt; 1.0 cm parenchymal depth of renal cortex without urinary extravasation</td>
</tr>
<tr>
<td>III</td>
<td>Laceration &lt; 1.0 cm parenchymal depth of renal cortex without collecting system rupture or urinary extravasation</td>
</tr>
<tr>
<td>IV</td>
<td>Laceration Parenchymal laceration extending through the renal cortex, medulla and collecting system</td>
</tr>
<tr>
<td></td>
<td>Vascular Main renal artery or vein injury with contained hemorrhage</td>
</tr>
<tr>
<td>V</td>
<td>Laceration Completely shattered kidney</td>
</tr>
<tr>
<td></td>
<td>Vascular Avulsion of renal hilum which devascularizes the kidney</td>
</tr>
</tbody>
</table>

---

SOME...(not all) Hospital Complications as defined by the ACS National Trauma Data Standard (NTDS). These MUST be reported to the Attending and (possibly) to M & M

**Definitions:**

**Acute Kidney Injury (AKI):** (any one of the following)
- GFR criteria: Increase in Serum Creatinine (SCr) 3x or Increase in SCr to ≥ 4mg/dl
- GFR decrease > 75%
- Urine output criteria: UP < 0.3 ml/kg/hour x 24 hr OR Anuria x 12 hr
- Patient did not require chronic renal replacement therapy prior to injury and has had worsening renal dysfunction.
Adult Respiratory Distress Syndrome (ARDS):
- **Timing:** Within 1 week of known clinical insult or new/worsening respiratory symptoms
- **Chest imaging:** Bilateral opacities - not fully explained by effusions, lobar/lung collage or nodules
- **Origin of edema:** Respiratory failure not fully explained by cardiac failure of fluid overload. Need objective assessment (echo) to exclude hydrostatic edema if no risk factor present.
- **Oxygenation:** $200 < \text{PaO}_2/\text{FiO}_2 \leq 300$. With (at a minimum) PEEP or CPAP $\geq 5 \text{ cmH}_2\text{o}$

Cardiac arrest with CPR:
Cardiac arrest is the sudden cessation of cardiac activity after hospital arrival. The patient becomes unresponsive with no normal breathing and no signs of circulation. If corrective measures are not taken rapidly, this condition results in sudden death.

Catheter-associated Urinary Tract Infection (UTI):
- A UTI where an indwelling urinary catheter was in place for > 2 calendar days on the date of the event, with day of device placement being “Day 1” AND
- An indwelling catheter was in place on the date of event or the day before. If an indwelling urinary catheter was in place for > 2 calendar days and then removed, the date of even for the UTI must be the day of discontinuation or the next day for UTI to be “catheter-associated.”

Decubitus ulcer:
Any partial or full thickness loss of dermis resulting from pressure exerted by the patient’s weight against a surface. Deeper tissues may or may not be involved.

Deep Vein Thrombosis (DVT):
The formation, development, or existence of a blood clot or thrombus within the vascular system, which may be coupled with inflammation. This diagnosis may be confirmed by a venogram, ultrasound or CT. The patient must be treated with anticoagulation therapy and/or placement of a vena cava filter, or clipping of the vena cava.

Drug or alcohol withdrawl syndrome:
- A set of symptoms that may occur when a person who has been habitually drinking too much alcohol or habitually using certain drugs (narcotic, benzodiazepines, etc.) experienced physical symptoms upon sudden stop in consumption.
- Symptoms include:
  - activation syndrome (i.e. tremulous, agitation, rapid heartbeat and high blood pressure)
  - seizures
  - hallucinations or
  - delirium tremens (DTs)

Myocardial infarction (MI):
A new acute myocardial infarction occurring during hospitalization (within 30 days)

Pulmonary Embolism (PE):
A lodging of a blood clot in a pulmonary artery with subsequent obstruction of blood supply to the lung parenchyma. The blood clots usually originate from the deep leg veins or pelvic venous system. Consider the condition present if the patient has a V-Q scan interpreted as “high probability” of PE or a positive pulmonary arteriogram or positive CT angiogram.
Severe Sepsis:
- Sepsis and/or Severe Sepsis is defined as an obvious source of infection with bacteremia and TWO or more of the following:
  - Temp > 38° C or < 36° C
  - WBC count > 12,000/mm³, or >20% immature (source of infection)
  - Hypotension- (severe sepsis)
  - Evidence of hypo-perfusion (severe sepsis)
  - Anion gap or lactic acidosis or Oliguria or altered mental status

<table>
<thead>
<tr>
<th>CMS Sepsis CORE measures</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Severe Sepsis</strong></td>
</tr>
<tr>
<td><strong>Performed</strong></td>
</tr>
<tr>
<td><strong>BY Hour 3</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td><strong>Performed</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>
APPENDIX C

Orderset & Policy
"quick-list"
**ORDERSET & Policy “QUICK LIST”**

Admission Floor – Order set # 5166

Admission ICU – Order set # 5377

Admission IMCU – Order set # 5378

Albumin – Order set #10226

Alcohol Withdrawal (Floor) Protocol – Order set # 10348-FLOOR, #10349-ICU/IMCU

Authorization for Treatment/Invasive Procedures/ Blood Administration (form 15104)

Bladder Training Protocol—Orderset #10050

Blood Transfusion; Adults and Peds > 60kg—Order set 10334

Comfort Care—Order set #10299

Cortisol Treatment for Adrenal Insufficiency in Sepsis – Order set #10225 (*use 2016 updates version ONLY*)

CRRT—Order set #5168

Discharge Addendum – Order set # 5363

Discharge to Home – Order set # 5192

Discharge to SNF/Rehab Order set # 4982

Heparin Weight Based-adults – Order set #4192

Hypertonic Saline – Order set #10204

Insulin (Basic Sub-q) – Order set #10060

Insulin (Drip)—Order set #10061

Insulin (Sliding Scale) – Order set #10387

Intrapleural Catheter Placement (IPC) – Order set #10237

Interventional Radiology checklist-Abscess Drain Placement Pre/Post op—Order set #5114

Electrolyte Protocol -- Protocol #10087

Enteral Nutrition – Order set # 10144

Factor VII – Order set No. 4059

Hypertonic Saline—Order set #10204
Language Access for Deaf, Hard of Hearing or Limited English Proficiency—Policy # 8316-1075

Mandible Fracture – Order set #10195

Meduri Steroid Rescue Protocol – Order set #4258

Neurogenic Bowel Protocol – Order set # 10051

On-Q Pump—Order set #10165

PCA – Order set # 5396

PEG (Post-op PEG Tube Orders)—Order set #5380

Post Radiologic Procedure Medication Holding Protocol—Order set # 10052

Propofol (DIPRIVAN) Protocol—Order set #4090

Rectal Digital Stimulation—Policy #7135.222

Renal Protection protocol for Contrast—Order set #10015

Sedation Vacation Policy -- #8029.185

Subarachnoid Hemorrhage—Order set #10267

Surgical Critical Care Infection Workup – Order set # 10036

Thrombosis Prophylaxis -- Order set #4540

TPN (initial orders)—Order set #4303

Tranexamic Acid for Trauma—Order set #10233

Transfer from ICU to floor/IMCU—Order set #6102

Traumatic Brain Injury (TBI) Protocol -- Order set # 5108

Treatment of Hemorrhage with Elevated INR (KCentra).—Order set #10236

Treatment of Warfarin Induced Hemorrhage with Elevated INR (Profilnine)—Order set #10234

Urinary Catheter Standing Orders – Order set #10338

Vasospasm (Aneurysmal) Orders – Order set #5061