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
(Seventh Edition, 2013 Version 1)

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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>
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<tbody>
<tr>
<td>Donald Barker, M.D.</td>
<td>514-2072</td>
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<tr>
<td>Benjamin Dart, M.D.</td>
<td>490-1025</td>
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<tr>
<td>Robert Maxwell, M.D.</td>
<td>514-7939</td>
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<tr>
<td>Vincent Mejia, M.D.</td>
<td>490-1063</td>
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<tr>
<td>Philip Smith, M.D.</td>
<td>490-1760</td>
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<tr>
<td>Pat Lewis, RN, Research Nurse</td>
<td>Pager - 5186</td>
</tr>
<tr>
<td>Joy Longley, PharmD</td>
<td>Pager 800-636-5374; ext. 5063</td>
</tr>
<tr>
<td>Beth Jordan, RN, Trauma/Ortho Service Line Administrator</td>
<td>Pager – 4643, Ext. 6704</td>
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<tr>
<td>Kelly Phillips, RN, TPC</td>
<td>Pager-1136, Ext 7229</td>
</tr>
<tr>
<td>Marcia Thomas, Trauma. Registrar</td>
<td>Ext. 2332</td>
</tr>
<tr>
<td>Deb Shanton, Trauma Data Analyst</td>
<td>Ext. 6705</td>
</tr>
<tr>
<td>Cristina Ware, Asst. Registrar</td>
<td>Ext. 2274</td>
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<tr>
<td>Jammie A. Dill, NP</td>
<td>Pager – 1417, Ext. 6707</td>
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<tr>
<td>S. Lori Neal, NP</td>
<td>Pager – 1417, Ext. 6707</td>
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<tr>
<td>Jennifer O’Neal, NP</td>
<td>Pager – 1417, Ext. 6707</td>
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<tr>
<td>Trauma Nurse “Red Shirt”</td>
<td>Pager – 1891, Ext. 6742</td>
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</table>
### Critical Care Nurse Clinicians

(aka “Red Shirts”) are the nursing members of the Trauma Team and can be reached at pager #1891 or ext. 6742.

The team consists of the following members:
- Sarah Collins, RN
- Jana Jackson, RN
- Laura Kirk, RN
- Vanessa Korter, RN
- Renee Mills, RN
- Jared Weber, RN
- Sandy Wolfe, RN
- David Wolfkill, RN
- Heather Wilson, RN

### Trauma Nurse Practitioners

Are members of the Trauma Team and 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**
- **Jennifer O’Neal, MSN, FNP-BC**

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

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<td>Jacob Dowden</td>
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<td>Carlos Fernandez</td>
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<td>James Goodin</td>
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<td>Kyle Cunningham</td>
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<td>David Daniel</td>
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<td>Elizabeth Hartmann</td>
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<td>Josh Worthington</td>
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<td>Kristen Hinson</td>
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<td>Anna Royer</td>
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<td>Robert Vandewalle</td>
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<td>Nicholas Drahush</td>
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<td>Scott John</td>
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<td>Jessica Reynolds</td>
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<tr>
<td>Miss Hina (2P)</td>
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<td>Jonathan Lawrence (2P)</td>
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<td>Fernando Domingo</td>
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<tr>
<td>Mary Kathryn Huddleston</td>
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<tr>
<td>Brent Soder</td>
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<tr>
<td>Chris Bell (1P)</td>
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<td>Sathish Chandra (1P)</td>
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<td>Derek deGrijs (1P)</td>
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<td>Andrew Patton (1P)</td>
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<tr>
<td>Trey Perry (1P)</td>
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<td>Gavin Wilks (1P)</td>
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<td>Nathan Creel (SCC Fellow)</td>
<td>1621</td>
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<tr>
<td>Joshua Hagan (SCC Fellow)</td>
<td>1628</td>
</tr>
<tr>
<td>Eric Nelson (C&amp;R fellow)</td>
<td>7361</td>
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<tr>
<td>William Harris (Vas. Fellow)</td>
<td>7347</td>
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<td>Neelima Katragunta (Vas. Fel)</td>
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<td>Surgery Clinic</td>
<td>757-0880</td>
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<tr>
<td>Skills Lab</td>
<td>2960</td>
</tr>
<tr>
<td>Jammie Dill, NP</td>
<td>1589</td>
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<tr>
<td>S. Lori Neal, NP</td>
<td>1345</td>
</tr>
<tr>
<td>Jennifer O’Neal</td>
<td>1590</td>
</tr>
<tr>
<td>Red Shirt (CCNC)</td>
<td>1891</td>
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POLICIES
And
Protocols
TRAUMA ACTIVATION CRITERIA
Trauma Alert Policy #7135.33

**Level One Trauma Alert** will be initiated by the Emergency Department (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:

### Physiologic
- Traumatic arrest.
- Unsecured/Compromised Airway (ETT = secured)
- Confirmed systolic BP <90mmHg.

### Anatomic
- Gunshot wounds penetrating the abdomen, neck, or chest
- Flail chest or open chest wound with respiratory distress
- Major paralysis secondary to an acute neurological injury
- Major amputations (above the elbow, above mid calf)
- Major open chest, pleural cavity, or mediastinum

**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:

- Fall from twice the patients height with evidence of significant trauma
- Head Injury w/ GCS < 8 with mechanism attributed to trauma
- Combination of 2nd or 3rd degree burn>15% BSA and multiple trauma.
- Documented prolonged altered mental status after head trauma
- Pregnancy >24 weeks with suspected abdominal or pelvic injury (Initiate Pregnant Trauma Patient Guideline #7135.216).
- Suspected hemoRed Book Final.docx or pneumothorax w/chest trauma
- Stab wounds penetrating the neck, chest, or abdomen
- Unstable pelvic fracture and/or two or more proximal long bone fractures
- Major trauma with evidence of injury and signs of hemodynamic instability (SBP <100, HR>120)
- Unstable transfer requiring ongoing resuscitation

**Level Three Trauma Alert** will be obtained on patients who do not meet Level One or Level Two Alert criteria, but who after initial physician evaluation by the ED physician have injuries which require Trauma Service admission or further evaluation by a Trauma Surgeon. Trauma evaluation can occur anywhere in the hospital.

The ED Physician will page the Trauma Chief, the Trauma NP and the Critical Care Nurse Clinician (CCNC) “Red Shirt”, who will respond to the ED or designate someone to respond, to evaluate the patient within 1 (one) hour.

If the patient deteriorates after arrival to the ED, the status may be upgraded at any time.
Trauma Alert Policy
#7135.33

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

Scope: Trauma Services, Trauma Attending Physicians, Emergency Department Nursing and Support Staff, Trauma Committee Members, Trauma Nurse Practitioners, Critical Care Nurse Clinicians, Life Force, Surgery House Staff, Emergency Department Physicians, Operating Room, Anesthesiology, Radiology, Respiratory Therapy, Laboratory, Medical Affairs and Executive Management.

Definitions: We have developed a tiered trauma response based on American College of Surgeons COT guidelines in order to better match the resources of the \textbf{Level I Trauma Center} to the needs of the injured patient.

Procedure:

\textbf{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:

\textbf{Physiologic}
- Traumatic arrest.
- Unsecured/Compromised Airway (ETT = secured)
- Confirmed systolic BP <90mmHg.
- Major open chest, pleural cavity, or mediastinum

\textbf{Anatomic}
- Gunshot wounds penetrating the abdomen, neck, or chest
- Flail chest or open chest wound with respiratory distress
- Major paralysis secondary to an acute neurological injury
- Major amputations (above the elbow, above mid calf)
- Major open chest, pleural cavity, or mediastinum

\textbf{I. 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. E.D. Physician
5. Trauma NP
6. Critical Care Nurse Clinicians (Red Shirts)
7. Emergency Dept. Nurse
8. Emergency Dept. Technician
9. Emergency Radiology
10. Respiratory Therapist
11. E.D. charge nurse
12. Guest Representative and/or Chaplain
13. Registration
14. Blood Bank
15. Operating Room
16. Anesthesia
17. Security
18. Maternal Fetal Medicine (MFM) with unstable pregnant patient

**Documentation, Labs and Radiology:**

1. The Major Trauma History and Physical form will be completed
2. A Level One Trauma Panel will be collected to include:
   a. i-STAT 10
   b. ABG as indicated
   c. PT/PTT
   d. Platelet count
   e. Type and screen
   f. UA
   g. Urine pregnancy test on all females of childbearing age
3. Radiology test will include:
   a. Portable chest X-ray
   b. Portable pelvis
   c. Computerized Tomography Head, Neck, Thorax, Abdomen and Pelvis as needed
   d. Other radiographic tests may be ordered as indicated
4. 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:

- Fall from twice the patients height with evidence of significant trauma
- Combination of 2nd or 3rd degree burn>15% BSA and multiple trauma.
- Documented prolonged altered mental status after head trauma
- Pregnancy >24 weeks with suspected abdominal or pelvic injury (Initiate Pregnant Trauma Patient Guideline #7135.216).
- Suspected hemo or pneumothorax w/chest trauma
- Stab wounds penetrating the neck, chest, or abdomen
- Unstable pelvic fracture and/or two or more proximal long bone fractures
- Major trauma with evidence of injury and signs of hemodynamic instability (SBP <100, HR>120)
- Unstable transfer requiring ongoing resuscitation

**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. E.D. Physician
4. Critical Care Nurse Clinicians (Red Shirts)
5. Emergency Dept. Nurse
6. Emergency Dept. Technician
7. Emergency Radiology
8. Respiratory Therapist
9. E.D. charge nurse
10. Guest Representative and/or Chaplain
11. Registration
12. Security
13. Maternal Fetal Medicine (MFM) with pregnant patient
**Documentation, Labs and Radiology:**

1. The Standard Trauma History and Physical form will be completed
2. A Level Two Trauma Panel will be collected to include:
   a. i-STAT 10
   b. ABG as indicated
   c. PT/PTT
   d. Platelet count
   e. Type and screen
   f. UA
   g. Urine pregnancy test on all females of childbearing age
3. Radiology test will include:
   a. Portable chest X-ray
   b. Portable pelvis
   c. Computerized Tomography Head, Neck, Thorax, Abdomen and Pelvis as needed
   d. Other radiographic tests may be ordered as indicated
4. Other Tests will include:
   a. Electrocardiogram
   b. Others as ordered.

**III. Trauma Evaluation/Consult (Level 3)** 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 page the Trauma Chief, the Trauma NP and the (“Red Shirt”), who will respond to the ED 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 Chief
2. Trauma NP
3. Critical Care Nurse Clinicians “Red Shirts”

**DOCUMENTATION, LABS AND RADIOLOGY:**

1. The Standard 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
   b. PT/PTT
   c. Platelet count
   d. Type and screen as indicated
   e. UA
   f. Urine Pregnancy test on all females of childbearing age.
3. Radiology test will include:
   a. Portable Chest X-ray
   b. Portable Pelvis
   c. 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:

a. Age > 55  
b. Cardiac Disease  
c. Respiratory Disease  
d. Insulin-dependent Diabetes  
e. Cirrhosis  
f. Pregnancy  
g. Immunosuppression  
h. Bleeding disorders  
i. Anticoagulants

NOTIFICATION

In the event the pre-hospital information or initial examinations (for cases that arrive without prior notification) indicate a need for a Trauma Alert Activation, the Emergency Department Physician should initiate the appropriate Trauma Team response.

To alert personnel for a Level one or Level two Trauma Alert the Emergency Department 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
- Trauma Activation Criteria met to warrant trauma activation.
- Mechanism of Injury (MVC, Fall, GSW etc.; If penetrating state location of injury)
- Age
- Sex
- Vital signs – Stable or Unstable
- Intubated – Yes/No
- Estimated time of arrival (ETA) in minutes (now if patient is in ED)
- Emergency Department room number
- Transport by Ground EMS or Air-medical

The notification process will be as follows:

1.) Emergency Department Charge Nurse (or whoever carries the radio) notifies:
   - Emergency Department Physician – Responsible for determining if patient meets criteria for Major Trauma Activation
   - Registered Nurse – 1 (ED RN assigned to perform the appropriate documentation for the trauma team)
   - Emergency Department Clerk
   - Emergency Department Patient Representative
   - Emergency Department Care Technicians

2.) Emergency Department Clerk:
   - Activates Trauma Pager as directed by the ED Physician
   - Notifies Registration
   - Calls anesthesia (if requested)

3.) Trauma Service Chief Resident notifies:
   - Operating Room (if applicable)
   - Appropriate Sub-Specialists (if applicable)
SCOPE: Trauma Services, Emergency Department 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)
#7135.117

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:

1. 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 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:

A. 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.

B. 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.

C. 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.

D. 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.

E. 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 02 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 lumbosacral spine. If tenderness is present, assume the spine to be unstable.
5. Examine for areas of increased kyphosis or spinous process stepoff.
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.
2. 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

a. Vital signs including a manual blood pressure, heart rate, respiratory rate, oxygen saturation, and temperature.

b. 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

Address the patient’s pain level using the 0-10 scale and administer analgesics to control pain. Consider family presence to calm and reassure the patient.

Examples:

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 and surgical history and 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 mechanism of injury.

2. Head-to-Toe Assessment

   Head and Face
   1. Inspect for contusions, abrasions, deformities, lacerations, puncture wounds, ecchymosis, and 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. Paradoxical chest wall movement.
4. Lacerations, abrasions, contusions, avulsions, puncture wounds, air or bony 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, etc.
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 Protocol
# 7135.220

**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 programs should be scheduled according to urine outputs. Intermittent catheterization 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:

1. Urological supplies (5 reusable catheters, back up foley kit if indicated).
2. Gloves.
3. 1 sterile IC kit for sterile specimen if needed.
4. Back up foley tray if indicated.
5. 1 10 ml and 1 60 ml syringe.
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 bulbocavernosus 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:

a. Type of neurogenic bowel or dysfunction.
b. Pre-injury history of bowel habits.
c. Emotional, physical and functional status of patient.
d. Willingness for patient and/or caregiver to participate.
e. Funding available for needed equipment and supplies.
f. Skin integrity.
g. Discharge plans/life factors.
   1. Amount of assist available.
   2. Home accessibility.

II. Nursing and the physician should perform a comprehensive bowel/GI/abdominal assessment QD. Assessment should include last bowel movement.

   1. 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.

   a. Ensure adequate fluid intake 2000 ml per day unless contraindicated.
   b. 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.
   c. 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. Refexic 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 gastrocolic 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.

2. 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.

V. 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.

a. 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.
b. 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.

VI. The patient should be assured a prompt response with any noted problems with the prescribed bowel management program.

VII. 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.

VIII. The nurse should complete education with the patient and/or the caregiver regarding the patients 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 # 7135.33A

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

Screening Modality:
• 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.
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 can not 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.
Chest Tube Management

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

1. 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.

2. 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.

3. 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. Then cut the suture when everything else 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 and **immediately** apply the occlusive dressing to the thoracostomy wound. Patients on a ventilator should have the chest tube pulled during the inspiratory phase of their ventilatory cycle.

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

5. 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.
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 16 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 >35°C (95°F).
5. Absence of hypotension (Blood pressure above 90 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. No response to bright light.
      2. Size: mid-position (4 mm) to dilated (9 mm)
   ii. **Ocular movement**
      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).
   iii. **Facial sensation and facial motor response**
      1. No corneal reflex to touch with a throat swab (no corneal reflex).
      2. No jaw reflex
      3. No grimacing to deep pressure on nail bed, supraorbital ridge, or temporomandibular joint.
   iv. **Pharyngeal and tracheal reflexes.**
      1. No response after stimulation of posterior pharynx (no gag).
      2. No cough response to bronchial suctioning.
   v. **Apnea testing** is performed as follows:
      1. Core temperature >35°C or 95°F
      2. Systolic blood pressure >90 mm/Hg.
      3. Euvolemia – An option is a positive fluid balance in the previous six (6) hours.
      5. Normal PO₂ Option: pre-oxygenation to obtain arterial PO₂>299 mm/Hg.
      6. Connect to pulse oximeter and disconnect from ventilator.
      7. Deliver 100% O₂ into trachea (use cannula or T-tube).
      8. Look closely for respiratory movement (abdominal or chest).
      9. Measure arterial PO₂, PCO₂, and pH after approximately 8 minutes and reconnect the ventilator.
10. If during testing, the systolic BP becomes < 90 mm/Hg, or the pulse oximeter indicates significant O\textsubscript{2} desaturation, or cardiac arrhythmias are present, immediately reconnect to ventilator, draw an arterial blood sample and analyze arterial blood gas.

11. If respiratory movements are absent and arterial PCO\textsubscript{2} is > 60 mm/Hg (Option: 20mm/Hg increase in PCO\textsubscript{2} over baseline), the apnea test result is positive (supporting diagnosis of brain death).

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

3. Confirmatory Tests
   A confirmatory test is mandatory in patients for whom specific components of clinical testing cannot be reliably performed or evaluated. The following confirmatory test findings are:
   ii. Conventional angiography – no intracerebral filling at the level of carotid bifurcation or Circle of Willis.
   iii. Electroencephalography – no electrical activity during at least 30 minutes of recording.

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 CO\textsubscript{2}.

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 CESSION
   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).

BRAIN FUNCTION CESSION (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 the following:
   1. Etiology and irreversibility of condition.
   3. Absence of brainstem reflexes.
   4. Results of the apnea test. (Absence of respiration with \( \text{PCO}_2 \geq 60 \text{ mm/Hg} \)).
   5. Results of a confirmatory test or a repeat neurologic examination.

E. Notification will be made to the Organ Donor Program as stated in Organ/Tissue Recovery policy. If at all possible, notification will be made prior to declaration of death.

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.

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.

**DETERMINATION OF DEATH: PEDIATRICS**

**POPULATION** – In term newborns (>38 weeks gestation), the criteria are applicable 7 days after birth. The criteria are not applicable to premature infants.

I. **History**
   The critical initial assessment is the clinical history and examination. The most important factor is determination of the proximate cause of coma to ensure absence of remedial or reversible conditions. Especially important are detection of toxic and metabolic disorders, sedative-hypnotic drugs, paralytic drugs, hypothermia, hypotension, and surgically remediable conditions. The physician examination is necessary to determine the failure of brain function. The diagnosis of brain death requires unequivocal clinical examinations consistent with brain death.

II. **Physician Examination Criteria**
   Applications of these criteria are entrusted to physicians who are competent, judicious, and experienced. If the criteria are met and there is no evidence of continuing brain function, the patient may be declared dead. Such declaration must be made by two physicians on the medical staff, at least one of whom should be the physician primarily responsible for the patient’s care. Members of organ retrieval teams or transplant teams shall not be involved in declaration of brain death.

III. **Physical Examination Criteria**
   a. Coma and apnea must coexist. The patient must exhibit loss of consciousness, vocalization, and volitional activity.
   b. Absence of brain stem function as defined by:
      i. Mid-position or fully dilated pupils, which do not respond to light. (Drugs may influence and invalidate papillary assessment).
ii. Absence of spontaneous eye movements and those induced by oculocephalic and caloric (oculovestibular) testing.

iii. Absence of movement of bulbar musculature including facial and oropharyngeal muscles. The corneal, gag, cough, sucking and rooting reflexes are absent.

iv. Respiratory movements are absent with the patient off the respirator. Apnea testing using standardized methods can be performed, but is done after other criteria are met.

v. The patient must not be significantly hypothermic or hypotensive for age.

vi. Flaccid tone and absence of spontaneous or induced movement, excluding spinal cord events such as reflex withdrawal or spinal myoclonus, should exist.

vii. The examination should remain consistent with brain death throughout the observation and testing period.

IV. Observation Periods According to Age

The recommended observation period depends on the age of the patient and the laboratory tests utilized.

A. Seven (7) days to two (2) months:
   Two examinations and electroencephalograms (EEGs) separated by at least 48 hours.

B. Two (2) months to one (1) year:
   Two examinations and EEGs separated by at least 24 hours. A repeat examination and EEG are not necessary if a concomitant radionuclide angiographic (CRAG) study demonstrates no visualization of cerebral arteries.

C. Over one (1) year:
   When an irreversible cause exists, laboratory testing is not required, and the recommended observation period is at least 12 hours. There are conditions, particularly hypoxic-ischemic encephalopathy, in which it is difficult to assess the extent and reversibility of brain damage. This is particularly true if the first examination is performed soon after the acute event. Therefore, in this situation, a more prolonged period of at least 24 hours of observation is recommended. The observation period may be reduced if the EEG demonstrates electrocerebral silence or the CRAG does not visualize cerebral arteries.

V. Laboratory Testing

A. Drug intoxication- In cases of drug intoxication, drug levels must be done and shown to be therapeutic. In cases involving barbiturates, levels should not exceed those considered therapeutic for seizure control. Barbiturate levels consistent with “burst suppression”, e.g., barbiturate coma, are not consistent with brain death diagnosis.

B. Electroencephalography (EEG)- EEG to document electrocerebral silence should, if performed, be done over a 30-minute period using standardized techniques for brain death determinations. In small children it may not be possible to meet the standard requirement for 10cm electrode separation. The interelectrode distance should be decreased proportional to the patient’s head size. Drug concentrations should be insufficient to suppress EEG activity.

C. Angiography- A cerebral radionuclide angiogram (CRAG) confirms cerebral death by demonstrating the lack of visualization of the cerebral circulation. A technically satisfactory CRAG that demonstrates arrest of carotid circulation at the base of the skull and absence of intracranial arterial circulation can be considered confirmatory of brain death, even though there may be some visualization of the intracranial venous sinuses. The value of this study in infants under two (2) months is uncertain. Contract angiography can document lack of effective blood flow to the brain.

D. Declaration of Brain Death- An apnea test should be performed if all other clinical criteria indicate brain death, and there has been an appropriate observation period, and there is an irreversible and unremedial cause of brain death. The patient should be pre-oxygenated with 100% O₂ for five (5) minutes on ventilator with the rate adjusted to give a
PCO$_2$ > 35-40mmHg. Turn the ventilator rate off or remove from ventilator, leaving continuous flow of 100% O$_2$ via ETT to begin test. Determine arterial blood gases at the end of five (5) minutes or at the end of the test period if longer than five (5) minutes. If respirations or cyanosis occur or if heart rate or BP change by > 10%, return to ventilator support and obtain ABG. The apnea test is considered positive if there is no spontaneous respiration after a period of 5-10 minutes with a documented PCO$_2$ of >60mmHg. Two members of the medical staff who are knowledgeable of the accepted neurological standards for brain death and who arrive at their decisions acting independently are necessary to declare brain death. One physician should be the attending physician.
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:

I. Physician’s order will be obtained prior to starting neurogenic bowel program.

II. 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.

III. 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 needed bowel program equipment as per OT and PT.

IV. 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 dilute 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. Prophylaxis stratification

1. Any patient with at least one risk factor, either minor or major, should have Sequential Compression Devices (SCD’s) in place while in bed. 23-hour observation patients may be excluded. If converted to regular admits, patients should then be placed into regular risk stratification.

2. Patients with two or more minor or one major risk factor should have SCD’s and be started on low Unfractionated heparin (UH) provided there are no contraindications to prophylactic anticoagulation.

D. 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. Hepranoids 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 pharmacoprophylaxis 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.**
E. **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
   - Pelvic fracture
   - Laparotomy
   - Thoracic or Lumbar Spine fracture
   - SCI with Neurologic Deficit
   - Femur fracture
   - Hip dislocation
   - Thoracotomy
   - Bedrest

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
   - Bed rest not otherwise specified (NOS)
   - Neuro patient with intracerebral bleed
   - Cerebral aneurysm or Brain tumor
   - Chest trauma
   - 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*
#4192) 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

**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, >100lbs 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)

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

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**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.

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**23˚ Observation**
- **No Treatment**

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**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

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*Venous Thromboembolism Guideline 7135.202*
Enteral Feeding: Pre-Operative Guidelines for Patients with Protected Airway
7135.16A

Description for EHS Intranet: Enteral Feeding, Pre-Op Feeding, Trauma Guidelines

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 accucheck 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 accucheck 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 accucheck 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.
Calculate Nutrient Needs

Is the gut functional or impaired?

**Functional**
- Standard Formula
  - Fiber Modification Needed?
    - No Fiber Formula
      - Isotonic
        - Osmolite
        - ARDS
          - Oxepa
            - Only for vent pts w/ ARDS, ALI, and Sepsis
          - Promote
    - Fiber Formula
      - High Protein
        - 1.0 Kcal
          - Fluid restriction
          - High Protein
          - Highest Protein
          - Immune Enhancing
          - Optimental
          - Vital 1.5
          - Vital AF
          - Peptamen Bariatric
          - Impact Peptide 1.5

**Impaired**
- Elemental Formula
  - Promote
    - Standard Formula with moderate fiber content
      - Jevity 1.2
    - Hi-Protein formula for wound healing
      - Glucerna 1.2
      - Lower CHO formula
    - Fluid Restricted Hi-Cal
      - Jevity
    - Renal Specific, Hi-protein/ON dialysis
      - Nepro
    - Renal specific Low-protein /NOT on dialysis
      - Suplena
    - Immune Enhancing
      - Pivot 1.5

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

**ASPN 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
Is the patient Critically Ill?

YES?

Is the Injury Severity Score (ISS) > 16

yes

Use an Immune Enhancing Formula

Elemental Impact Peptide 1.5

STANDARD Pivot 1.5

no

Use Standard Formula

Promote (NO Fiber)

See Page # 47

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.
Extremity Vascular Trauma

# 7135.217

**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
# 7135.207-2

Preliminary

- When order received in X-ray department for flex-ex C-spine films, the Radiology Main Department Supervisor will collect previously performed CT cervical spine which includes axial reconstructions, deliver them to the radiologist on duty and notify the appropriate individual to perform study:
  1. From hours of 7:00 a.m. to 4:00 p.m. Radiology Nurse on duty - call Special Procedures
  2. From 4:00 p.m. to 11:00 Critical Care Nurse Clinicians “Red Shirts” on duty pager 778-2121 #1891

- If CT of cervical spine missing, have CT to reprint radiology reads.

Patient Mental Status

- Patient should be oriented to person and place and easily arousable by voice. If not, then notify surgery chief resident on call; patient may need to return to floor without undergoing procedure.

Patients on stretchers

- Place patient supine on x-ray table and remove collar.
- Flex head forward (may place bolster behind head)
- Have radiology tech obtain hard copy in this position.
- If flexion successfully completed, place bolster transversely beneath shoulders.
- Have radiology tech obtain hard copy in this position.

Patients in Wheelchairs

- Position patient upright in WC and remove collar.
- Have patient actively flex head forward toward chest
- Obtain hard copy at maximal flexion
- Have patient return head to neutral position and then extend head backwards.
- When study complete, reapply collar and send patient back to hospital room or next local.

Pain

- At any point in procedure, if patient develops increasing pain during positioning, stabilize head and obtain hard copy in that position, reapply collar and notify radiologist.
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 GRV 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
- Restart TF at 10-20ml/hr
- Increase TF by 20ml every 4 hours until target reached
- Continue to check GRV every 4 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)
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
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 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.
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 multiple 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 6 units
   c. Platelets one platelet pheresis, five pack of pooled platelets or an acrodose platelet unit
   d. Cryoprecipitate 10 units

   NOTE: Close communication with blood bank personnel is essential to ensure effective use of products with minimal wastage.

   NOTE: The blood-product runner courier should bring blood products to the bedside in a timely manner to maintain a 1:1:1 ratio.

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 or the intranet.

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 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, one person in the ED or ICU will be designated as 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 ED/ICU 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, five (5) pack of pooled platelets or an acrodose platelet unit, 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, five (5) pack of pooled platelets or an acrodose platelet unit and (10) units of cryoprecipitate.

a. Administration Schedule:
   i. Cycle 1 – 6 PRBC, 6 FFP, one (1) platelet pheresis, five (5) pack of pooled platelets or an acrodose platelet unit and 10 units cryoprecipitate.
   ii. Cycle 2 – 6 PRBC, 6 FFP and draw H&H, PT, PTT & Platelet count.
   iii. Cycle 3 – 6 PRBC, 6 FFP, one (1) platelet pheresis, five (5) pack of pooled platelets or an acrodose platelet unit and 10 units cryoprecipitate.
   iv. Cycle 4 - 6 PRBC, 6 FFP and draw H&H, PT, PTT & Platelet count.
   v. Cycle 5 - 6 PRBC, 6 FFP, one (1) platelet pheresis, five (5) pack of pooled platelets or an acrodose platelet unit and 10 units cryoprecipitate.
   vi. Cycle 6 - PRBC, 6 FFP and draw H&H, PT, PTT & Platelet count.

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 ED/ICU will pick up the large 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. 100 mg of Calcium Chloride will be given for every three (3) units PRBC/FFP unless otherwise contraindicated or ordered.

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

N. 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.
O. CCNC, ED, ICU and/or Surgery are responsible for completing and returning any emergency blood request forms that have been issued with the blood. These are the Salmon colored sheets and MUST be returned to the blood bank.

P. 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 should go through extension #7606 or #7604 to reach the charge nurse directly.

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

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. 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.*

E. Upon activation of MBRP, the Charge Nurse will designate one person (tech) as the blood courier. The Charge Nurse of each respective department will be responsible for designating and assuring the blood courier knows he/she is aware that a MBRP has been activated and he/she is responsible for obtaining blood products.

F. The Blood Bank will notify the OR at ext #7606 or #7604 as soon as the first cooler of blood products is ready for pick up.

G. The blood courier from the OR will pick up the large 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
# 7135.31A

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. Urgent Neurosurgical Consultation – Office/Answering Service Number 265-2233.

   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 Injury with mass effect.

   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. Any patient deemed an immediate surgical candidate by the Trauma Attending or Chief Resident will be discussed directly with the Neurosurgical Attending.

2. 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. Non-urgent cases will be seen within 24 hours.
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. Maternal Fetal Medicine (MFM) will be consulted in Trauma resuscitation unit and become part of the Trauma resuscitation. To activate OB/Trauma call L&D at extension 7956. The L&D staff will contact the appropriate residents for delivery/evaluation. (If pre-hospital personnel call in an imminent delivery – then the ED should contact the NICU and L&D as usual).

3. An initial fetal ultrasound (U/S) will be performed by MFM service in the Trauma Resuscitation Unit (TRU)

4. The gravid trauma patient > 20 weeks gestational age will be placed in a 15° left lateral rotation. May be accomplished by tilting the backboard if necessary.

5. Intravenous fluids (LR or NS) will be given to maintain the hypervolemia of pregnancy. Liberal use of CVP or Swan-Ganz monitoring to monitor ongoing resuscitation is encouraged.

6. Doppler fetal heart tones will be taken as part of the initial vital signs and will be monitored throughout the resuscitation at the same frequency as the maternal vital signs. When ≥ 24 weeks gestational age continuous fetal monitor.

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

8. All x-rays required to adequately assess the patient will be taken. The fetus will be shielded whenever possible.

9. Focused Abdominal Sonography Trauma (F.A.S.T.) is procedure of choice. Diagnostic peritoneal lavage (DPL) is safe to perform in the pregnant patient. The procedure must employ an open technique with the incision made above the umbilicus.

10. If a pregnant trauma patient shows signs of non-reassuring fetal testing, uterine contractions, decreased fetal movement (DFM), uterine tenderness, and/or uterine bleeding, a repeat fetal ultrasound will be obtained and intervention as appropriate for fetal resuscitation. This will be managed by the MFM.

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

12. The patient’s private obstetrician will be notified of patient’s arrival and injuries per MFM service.
Trauma Alert/Urgent Trauma Patient Alert

13. Pregnant patients that meet Level 1 major trauma activation (¹) or Level 2 activation criteria (²) and are ≥ 24 weeks gestational age will receive evaluation by MFM. MFM will be part of resuscitation.

14. When a Level 1 or Level 2 alert is activated the emergency department (ED) staff will call L & D at extension 7956 and the L&D staff will contact the appropriate senior resident, MFM attending and L&D charge nurse for delivery/evaluation.

15. After evaluation by MFM/senior resident, if EFM is deemed necessary, the OB nurse will respond to the ED and place the fetal monitor and will monitor fetal heart rate throughout the ED course.

**Continuous Fetal Monitoring (CFM) – To be done under the direction of the MFM trauma liaison.**

<table>
<thead>
<tr>
<th>Admission Status</th>
<th>Gestational Age</th>
<th>Initial EFM</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Injuries requiring Admission</td>
<td>≥ 24 wks</td>
<td>Minimum 23-hr. observation with EFM as directed. D-Dimer every 6 hours.</td>
</tr>
<tr>
<td>Admission to Trauma Service</td>
<td>≥24 wks</td>
<td>EFM at discretion of the MFM attending. D-Dimer every 6 hours.</td>
</tr>
<tr>
<td>Critical Care Admission</td>
<td>≥ 24 wks</td>
<td>EFM at discretion of MFM attending</td>
</tr>
</tbody>
</table>

¹Level One Trauma Activation

- Traumatic arrest.
- Unsecured/Compromised Airway
- Confirmed systolic BP <90mmHg.
- Gunshot wounds penetrating the abdomen, neck, or chest
- Flail chest or open chest with respiratory distress
- Major paralysis secondary to an acute neurological injury
- Major amputations (above the elbow, above mid calf)

²Level Two Activation

- Fall from twice the patients height with evidence of significant trauma
- Combination of 2nd or 3rd degree burn>15% BSA and multiple trauma.
- Documented prolonged altered mental status after head trauma
- Intubated trauma patient
- Pregnancy >24 weeks with suspected abdominal or pelvic injury.
- Suspected hemo or pneumothorax w/chest trauma
- Stab wounds penetrating the neck, chest, or abdomen
- Unstable pelvic fracture and/or two or more proximal long bone fractures
- Major trauma with evidence of injury and signs of hemodynamic instability (SBP <100, HR >120)
Maternal Trauma Patients Level 1 or 2 MTA

ATLS Resuscitation

Stable

FAST Exam
Chest/Pelvis X-ray
PT/PTT/Fibrinogen/D-Dimer
Check FHT

Traumagram w/shielding during CT Head and C-spine

Abnormal

Admit to TS
OB to follow
Continuous FHT
US
D-Dimer q 6 hours

Normal

Admit 23 hour observation to TS/OB
Check FHT
US
D-Dimer q 6 hours

Unstable

Full ATLS Resuscitation
FAST Exam
Chest/Pelvis X-ray
PT/PTT/Fibrinogen/D-Dimer
FHT Monitoring

Maternal Extremis

Emergent C-Section ER/OR/ICU

Trauma In Pregnancy Policy # 7135.216
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 FiO₂ to maintain a SpO₂ of > 92%.
- Set initial PEEP at 5-10 cm H₂O.
- Adjust VT and RR to achieve appropriate pH and Pplat 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: PaO₂ 60-70 mmHg or SpO₂ 90-95%

- If PEEP ≥ 18/FiO₂ 100%
- Reduce FiO₂ by 1% - 5%, at a time, until down to 60% (or as close to 60% as possible) then,
- Reduce or increase FiO₂ by 1% - 5%, to maintain SpO₂ ≥ 90%
- Reduce or increase PEEP by 1-2 cm H₂O 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 FiO₂ 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 PaCO₂ ≤ 30, patient needs NaHCO₃ (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 $P_{\text{plat}} \leq 30 \text{ cmH}_2\text{O}$ (-PEEP)
- If $P_{\text{plat}} \leq 30\text{ cmH}_2\text{O}$: $V_T < 6 \text{ ml/kg}$, may increase $V_T$ by 1 ml/kg until $P_{\text{plat}} > 30\text{ cmH}_2\text{O}$ or $V_T = 6 \text{ ml/kg}$
- If $P_{\text{plat}} > 30\text{ cmH}_2\text{O}$: 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 $P_{\text{plat}} < 20\text{ cmH}_2\text{O}$ & breath stacking occurs: may increase $V_T$ in 1 ml/kg increments (max 8 ml/kg), may decrease $T_{\text{Insp}}$ to achieve appropriate I:E ratio

**I:E Ratio goal:**

Maximum $T_{\text{Insp}} 1.2$ seconds; adjust $T_{\text{Time}}$ 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:
  
  o Hemodynamically stable
  o Spontaneous Respiratory Rate (RR) < 30
  o Spontaneous tidal volume > 6ml/kg (may adjust pressure support as needed)
  o Negative Inspiratory Force (NIF) < -20
  o 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 ALI/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 VT >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      |
| VT > 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)
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
- Cortisol level (? Stim test)
- Sputum culture. ? BAL

Management/Treatment Goals:
- Initial resuscitation
  - Initiate severe sepsis order set
  - Place central line (CVP or SVO2 monitoring)
  - Institute broad spectrum antibiotics (see order set)
  - 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%
Management/Treatment Goals:

- **Initial resuscitation**
  - Initiate severe sepsis order set
  - Place central line (CVP or SVO2 monitoring)
  - Institute broad spectrum antibiotics (see order set)
  - 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**
  - Measure CVP
    - If < 8, then 500mL crystalloid bolus until CVP 8-12
    - ? Consider colloid if CVP <4
  - 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 pulmonary artery catheter placement
        - If PA catheter placement contraindicated, central line mixed venous saturation.
      - Consider steroids if on pressors > 6 hours
  - Measure SVO2
    - If > 70% and HR < 120, early goals achieved
    - Recheck lactate if last level > 2
      - If <70% and Hb < 8, consider transfusion
      - If Hb > 8 and ScvO2 < 70
      - Recheck lactate if last level > 2
      - If <70% and Hb < 8, consider transfusion
      - If Hb > 8 and ScvO2 < 70
      - Dobutamine 2.5-20 mcg/min (if HR < 100 and SBP > 100)
      - Dopamine 5-10 mcg/min (if SBP <100)on/ mechanical vent
Continuing therapy:
- Adrenal function - obtain CST results (see below):
  - Nonresponders should receive hydrocortisone 100mg IV q 8 hours
- Activated protein C- see order sheet for indications
- Blood glucose control- blood glucose protocol
- Lung protective strategies
- Sedation/analgesia
- Stress ulcer prophylaxis
- DVT prophylaxis- heparin 5000 units subcu TID unless contraindicated. Screening as per protocol. SCDs.
- Nutrition- begin support within the first 24 hours

Corticotropin Stimulation Test (CST):
- Check baseline cortisol level
- Administer 250 mcg adrenal corticotropin hormone (ACTH)
- Recheck cortisol at 30 and 60 minutes
- Nonresponders- i.e. candidates for steroid replacement
  - Basal cortisol between 15 and 34 mcg and less than 9mcg response to ACTH
- Consider steroid replacement in patients who “respond” to the CST appropriately but remain hypotensive > 6 hours despite otherwise appropriate resuscitation and control of the source
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

Known or suspected infection?
- YES
- NO

Reassess

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

SBP < 90 after 20 mL/kg fluid bolus?
- YES
- NO

SEPTIC SHOCK

Lactate ≥ 4 or organ dysfunction?
- YES
- NO

SEVERE SEPSIS

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

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

CVP

CVP < 8
1. NS bolus 500 mL until CVP ≥ 8
2. Consider colloid if CVP <4

MAP

MAP < 65
1. Norepinephrine gtt @ 5 mcg/min and titrate
2. Phenylephrine 40mcg/min and titrate
   If continued hypotension
   1. Consider low dose vasopression (0.04 units/min) and do not titrate.
   2. Consider pulmonary artery catheter placement
   3. If PA catheter placement contraindicated, central line mixed venous saturation.
   4. Consider steroids if on pressors > 6 hours

SVO2

SVO2 > 70
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

SVO2 ≤ 70

Electrolytes

Hct

Hct < 24
Transfuse until Hct >24

Hct ≥ 24

1. Corticotropin Stimulation Test (CST)
   1) Check baseline serum cortisol level
   2) Administer 250 mcg Cosyntropin (ACTH)
   3) Recheck cortisol at 30 and 60 min
   4) Nonresponders- i.e. candidates for steroid replacement
      a. Basal cortisol between 15 and 34 mcg and less than 9mcg response to ACTH
      b. Consider steroid replacement in patients who “respond” to the CST appropriately but remain hypotensive > 6 hours despite otherwise appropriate resuscitation and control of the source

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

Continuing Therapy
1. Adrenal function- obtain CST results: nonresponders should receive hydrocortisone IV q 8 hours
2. Fill out activated protein C work sheet (order set 4109) and review indications with critical care attending before initiating
3. Tight blood glucose control: blood glucose protocol (order set 4147) for goal blood sugar 130-150
4. Lung protective strategies
5. Sedation/analgesia
6. Stress ulcer prophylaxis
7. DVT prophylaxis- heparin 5000 units subcu TID unless contraindicated. Screening as per protocol (order set 4540). SCDs.
8. Nutrition- begin support within the first 24 hours

Resuscitation Goals
CVP 8-12
MAP ≥ 65
UOP ≥ 0.05 mL/kg/hr
ScVO2 ≥ 70%
Lactate <2.0
Policy statement: Develop a regimented approach to screening and treatment for spinal injuries in the trauma patient.

Scope: All patients admitted to the Trauma Surgical Critical Care Service at the Baroness Erlanger Campus.

Procedure:

I. Spine Assessment and Cord Injury

   A. Background
   
   Dense bone or ligamentous injury of the cervical spine occurs in 2-6% of patients following blunt trauma and this risk may actually be doubled in patients sustaining closed head injury. Therefore, a very regimented approach is necessary in screening for cervical spine injuries. The difficulty in trauma is that many patients are unconscious or intoxicated (40-50% of our patients are intoxicated on presentation) thereby making their evaluation more difficult.

   B. Awake, unimpaired patients

   1. Patients presenting in cervical immobilization who are awake, alert without mental status changes, not intoxicated, and have a Glasgow coma score of 15 with no neck pain or pain to active range of motion, no distracting injuries and no neurologic deficits may be considered to have stable cervical spines and need no radiologic studies before removing their collar. C-spines cleared by physical exam (PE) need a note in the chart documenting that the patient has no neurologic impairment with a GCS of 15, no boney cervical tenderness to palpation and no tenderness to active range of motion (flex/ex bilateral chin to shoulder).

   2. There are anecdotal reports of patients with no neck pain on presentation and no impairing conditions that have been found to have boney or ligamentous injuries, but they have not been associated with the development of neurologic injury in appropriately screened, asymptomatic patients. However, patients with delayed pain should have appropriate spinal precautions and spinal assessment.

   C. Unconscious/obtunded, intoxicated, sedated or patients with distracting injuries

   1. Patients with any mental status impairment and/or cervical pain should be initially evaluated with a high resolution CT of the cervical spine using 7mm cuts and axial reconstructions. **Any patient with a head injury that will receive a neurosurgery consult or is intubated should also have a CT of the cervical spine.** Flexion-extension films are the final step in clearing the spine of an obtunded patient. Intoxicated patients with nontender necks may be re-evaluated when sober and do not necessarily require CT’s or flex-ex films.

   2. Patients with midline boney cervical pain who have a normal CT scan of the cervical spine and, if performed, normal cervical spine films should be followed up with flexion-extension films. If these studies are negative and there is still considerable concern for cervical tenderness, an orthopedic/neurosurgical spine consultation may be obtained.

   3. Spinal assessment should not delay the ABC’s or management of other life threatening or higher priority care issues. For example, if a patient is suspected of having a severe closed head injury, they should not be burdened with complete plain films of the cervical, thoracic, and lumbar spine prior to having the initial CT scan of the head.
chest X-ray and pelvic film are the only films necessary prior to a Stat CT of the head in a patient with a GCS ≤ 10.

D. Flex-extension films

In unconscious patients, flexion-extension films can be performed with video fluoroscopy throughout a range of motion of the cervical spine. If there is any suspicion, while ranging, of spinal instability stop immediately and obtain a hard copy and reapply the collar. Hard copies should be obtained otherwise at maximum flexion and extension. In awake patients, flexion-extension may be performed under active range of motion with standard radiographs performed at maximum flexion and maximum extension. The original CT of the C-spine should be obtained and reviewed with the radiologist prior to doing flexion-extension to assure no occult injuries were overlooked initially. If active range of motion creates intense pain, or malalignment is identified, then the ranging should be stopped and film performed at that point and an spine consult obtained.

E. Patients with neurologic deficits secondary to spinal injury

1. Any patient with suspected cord injury or spinal fracture needs a thorough neurologic exam documented in the H & P. This should include sensory level, motor function with grade 0-5/5 in the lowest functioning motor group or throughout all extremities in the case of incomplete injuries (see below). A bulbocavernosus reflex should also be documented (check for anal wink on genital stimulation) on admission and then again at 24 hours. Absence again at 24 hours implies complete cord injury.

Central cord - sparing of lumbar and sacral fibers resulting in preservation of motor, pin and temperature sensation in the lower extremities with plegia and anesthesia of the upper extremities.

Brown Sequard – hemisection of cord resulting in plegia and loss of vibration, and proprioception ipsilateral to injury and contralateral loss of pain and temperature.

Anterior spinal artery - dense plegia and loss of pain and temperature sense with preservation of vibration and proprioception.

F. Thoracic, Lumbar, and Sacral Spine

Patients with boney spinal tenderness over these areas or who have significant mechanisms of injury (e.g. ejection, fall more than 8 feet) should generally undergo AP and lateral radiographs of the thoracic and lumbar spine. Any question of injury should be followed up with a CT scan one spinal level above and below the suspected level of injury. Patients with suspected sacral fractures on the plain pelvic film should undergo a bony CT scan of the pelvis.

G. Penetrating spinal injuries

In general, penetrating spinal injuries are considered stable. However, these patients should have the usual spinal precautions appropriate for level until they have had an adequate evaluation, including plain films and CT scans (one level above and below) the injury.

H. Procedures and collars

While performing subclavian or jugular central access or endotracheal intubation, remove the anterior portion of the cervical collar while an assistant(s) maintains in line cervical stabilization and total body restraint as necessary.
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 approximately20% 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
Traumatic Brain Injury
7135.218

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

**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

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

Yes

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

Resolution

No

NSG Consult
Seizure Prophylaxis x7days

Operating Room

Abnormal CT/
Surgical lesion

Yes

Measure ICP? Place ICP Bolt
Go To Page 3

Admit to ICU

No

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

CT Head
Severe TBI - GCS <9
Management of elevated ICP

ICP <20mmHg
Continue ABC’s and Initial ER workup, including sedation, pain control, hydration and ventilatory management.

ICP >20mmHg
Continue Present Therapy

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

ICP >20mmHg
CPP > 70mmHg

Repeat CT Head and Consider
Ventriculostomy
Decompression Craniotomy
Pentobarbital Coma

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
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 5) upper extremity
         2) back 6) lower extremity
         3) abdomen 7) foot
         4) flank 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 &/or write an Operative note as directed by the Trauma
Attending Surgeon.)
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>
</tbody>
</table>

(may give up to 15-20 mg/650)

| Methadose  | methadone                      | PO            | 2.5-40 mg q day | 8-59 hr  | II       |
| MS Contin  | morphine                       | PO            | 5-30 mg q 4 hr  | 1.5-4.5 hr | II     |
|            |                                | IV/IM         | 5-15 mg q 4 hr  | 1.5-4.5 hr | II     |
| NUCYNTA    | tapentadol                     | PO            | 50-100 mg q 6 hr| 4        | II      |
| Percocet   | oxycodone/acetaminophen        | PO            | 2.5/325 - 10/325 mg | 3-4 hr | II     |

(may give up to 15-20 mg/650)

| Opana      | oxymorphone                    | PO            | 5-20 mg q 4 hr  | 7-9 hr    | II       |
| OxyContin  | oxycodone                      | PO            | 5-30 mg q 6 hr  | 2-4 hr    | II       |
| Sublimaze  | fentanyl                       | IV/IM         | 1-2 mcg/kg q 30-60 min | 2-4 hr | II     |
| Tylenol #3 | codeine/acetaminophen          | PO            | 15-30/300 mg q 4 hr | 3HR | III    |
| Ultram     | tramadol                       | PO            | 50-100 mg q 6 hr| ~6 hr    | IV       |

***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 (7 days duration)
- Indications
  - GCS <10
  - Depressed skull fracture
  - SDH
  - 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</td>
<td>DT prophylaxis</td>
<td>0.5 ml/kg/hr IV D5E5 at 125ml/hr = 1 beer/hr</td>
</tr>
<tr>
<td>(10% ethanol in 1000ml D5W)</td>
<td></td>
<td></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 1st 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 1st 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/hg 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>Inotrope</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 upt to 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 4.8mg 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
# Trauma Medication Use List

<table>
<thead>
<tr>
<th>DRUG</th>
<th>INDICATION</th>
<th>DOSE / ROUTE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Micafungin (Mycamine)</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>Neosynephrine (phenylephrine)</td>
<td>Hypotension</td>
<td>100-180mcg/min initially – maintenance of 40-60mcg/min</td>
</tr>
<tr>
<td>Norepinephrine (Levophed)</td>
<td>Hypotension</td>
<td>0.5-1mcg/min titrate to response 8-30 mcg/min is usual range</td>
</tr>
<tr>
<td>Nicardipine (Cardene)</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 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 200 mg qhs may give up to 2400mg daily</td>
</tr>
<tr>
<td>Valproic Acid (Depakote)</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 Diabetes insipidus 5-10 units IV infusion 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

(GCS, Rapid Trauma Score, Los Ranchos & Injury Scales)
Glasgow Coma Score

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.
Revised Trauma Score

The Revised Trauma Score is a physiological scoring system, with high inter-rater reliability and demonstrated accuracy in predicting death. It is scored from the first set of data obtained on the patient, and consists of Glasgow Coma Scale, Systolic Blood Pressure and Respiratory Rate.

<table>
<thead>
<tr>
<th>Glasgow Coma Scale (GCS)</th>
<th>Systolic Blood Pressure (SBP)</th>
<th>Respiratory Rate (RR)</th>
<th>Coded Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>13-15</td>
<td>&gt;89</td>
<td>10-29</td>
<td>4</td>
</tr>
<tr>
<td>9-12</td>
<td>76-89</td>
<td>&gt;29</td>
<td>3</td>
</tr>
<tr>
<td>6-8</td>
<td>50-75</td>
<td>6-9</td>
<td>2</td>
</tr>
<tr>
<td>4-5</td>
<td>1-49</td>
<td>1-5</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

\[ \text{RTS} = 0.9368 \times \text{GCS} + 0.7326 \times \text{SBP} + 0.2908 \times \text{RR} \]

Values for the RTS are in the range 0 to 7.8408. The RTS is heavily weighted towards the Glasgow Coma Scale to compensate for major head injury without multi-system injury or major physiological changes.

The RTS correlates well with the probability of survival:

Champion HR et al, "A Revision of the Trauma Score", J Trauma 29:623-629,1989
Champion HR et al, "Trauma Score", Crit Care Med 9:672-676,1981
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.

VIII. 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>864.04 - 864.14</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>864.04 - 864.14</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Vascular Juxtahepatic venous injuries, i.e., retrohepatic vena cava/central major hepatic veins</td>
<td>864.04 - 864.14</td>
<td>5</td>
</tr>
<tr>
<td>VI</td>
<td>Vascular Hepatic avulsion</td>
<td>864.04 - 864.14</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>865.03 - 865.13</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Laceration &gt; 3 cm parenchymal depth</td>
<td>865.04 - 865.14</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>3</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></td>
<td>Vascular 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
Injury Scales

<table>
<thead>
<tr>
<th>AAST PANCREAS INJURY SCALE (1994 REVISION)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Grade</strong></td>
</tr>
<tr>
<td>I</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>II</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>III</td>
</tr>
<tr>
<td>IV</td>
</tr>
<tr>
<td>V</td>
</tr>
</tbody>
</table>

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

*Advance one grade for multiple injuries up to Grade III

<table>
<thead>
<tr>
<th>HEAD INJURY SCALE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Grade</strong></td>
</tr>
<tr>
<td>I</td>
</tr>
<tr>
<td>II</td>
</tr>
<tr>
<td>III</td>
</tr>
</tbody>
</table>
Definitions – ARDS and ALI

Acute Respiratory Distress Syndrome (ARDS)
- Asbaugh and Bigelow 1967
  - Severe hypoxemia refractory to O₂ Tx
  - Diffuse bilateral pulmonary infiltration
  - Reduced lung compliance
  - Normal cardiac filling pressures

<table>
<thead>
<tr>
<th>Acute Lung Injury (ALI)</th>
<th>ARDS</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Acute onset</td>
<td>• Acute onset</td>
</tr>
<tr>
<td>• PaO₂/FIO₂ &lt; 300 (regardless of PEEP level)</td>
<td>• PaO₂/FIO₂ &lt; 200</td>
</tr>
<tr>
<td>• Bilateral infiltrates on AP CXR</td>
<td>• Bilateral infiltrates on AP CXR</td>
</tr>
<tr>
<td>• PCWP &lt; 18 when measured or no evidence of left atrial HTN</td>
<td>• PCWP &lt; 18 when measured or no evidence of left atrial HTN</td>
</tr>
</tbody>
</table>

- Direct vs. Indirect ARDS
  - Direct ARDS – consolidation
  - Indirect ARDS – intestinal edema and alveolar collapse
  - Direct ARDS – consolidation – is not responsive to alveolar recruitment such as PEEP or prone positioning – predisposes patient to barotraumas secondary to regional hyperinflation
  - Indirect ARDS: Edema/alveolar collapse are responsive to recruitment and noncompliant CW reduces risk of barotraumas, but ↑ chances of HD instability
  - Indirect ARDS – early PEEP and prone position in critically injured patients

Acute Respiratory Distress Syndrome (ARDS)

- Spectrum of Injuries Preceding ARDS
  - Direct Lung Injury:
    - Pneumonia
    - Smoke inhalation
    - Mendleson's Syndrome
    - etc.
  - Indirect Lung Injury:
    - Hypertension
    - Shock
    - Sepsis
    - SIRS
    - Flail Chest
    - Pulmonary contusion
    - Burns

- TRAUMA
  - Early mortality
  - Frequent hospital morbidity
  - Long term disability
Definitions – Sepsis-Related Clinical Conditions

Systemic Inflammatory Response Syndrome (SIRS) – response to an insult or injury, independent of cause with more than one of the following manifestations:

- Temperature > 38°C or < 36°C (> 100.4°F or < 96.8°F)
- Heart rate > 90 beats/min
- Tachypnea as manifested by a respiratory rate > 20 breaths/min or PaCO2 < 32 torr (4.3kPa)
- White blood cell (WBC) count >12,000 cells/mm³, < 4000 cells/mm³ or >10% immature neutrophils.

Sepsis – SIRS resulting from infection (bacteria, viral, fungal or parasitic).

Severe Sepsis – Sepsis associated with signs of at least one acute organ dysfunction, hypoperfusion, or hypotension.

Shock – Sepsis-induced hypotension persisting despite adequate fluid resuscitation.

MODS – Multiple Organ Dysfunction Syndrome. Presence of altered function of two or more organs in an acutely ill patient such that homeostasis cannot be maintained without intervention.

Screening Patients for Severe Sepsis

A patient who meeting the following 3 criteria has a positive screen suggestive of severe sepsis:

1. Infection – One or more of the following:
   - Documented – Does the patient have positive culture results from blood, sputum, urine, etc?
   - Anti-Infective Therapy – Is the patient receiving antibiotic, antifungal, or other anti-infective therapy?
   - Pneumonia – Is there documentation of pneumonia (x-ray, ultrasound, etc.)?
   - WBC’s – Have WBC’s been found in normally sterile fluid (urine, CSF, etc.)?
   - Perforated Viscus – Does the patient have a perforated organ (bowel)?

2. SIRS – Two or more of the following:
   - Temperature – Is the patient’s temperature > 38°C or < 36°C (> 100.4°F or < 96.8°F)?
   - Heart Rate – Is the patient’s heart rate >90 bpm?
   - Respiratory Rate – Is the patient’s respiratory rate > 20 breaths per minute?
   - WBC Count – Is the patient’s WBC count >12,000 cells/mm³, < 4000 cells/mm³ or are there >10% immature neutrophils (left shift)?

3. Acute Organ Dysfunction – One or more of the following:
   - Respiratory – Does the patient require mechanical ventilation (PF ratio <250, PEEP >7.5)?
   - Cardiovascular – Does the patient require vasopressor support? (Systolic BP <90 or Mean Arterial Pressure ≤ 70mm Hg for 1 hour despite fluid bolus)
   - Renal – Does the patient have low urine output (< 0.5 mL/kg/hr), increased Creatinine (>50% increase from baseline) or require acute dialysis?
   - Hematologic – Does the patient have a low platelet count (<1000,000/mm³ or PT/PTT > upper limit of normal?
   - Metabolic – Does the patient have a low pH with high lactate (pH <7.30) and plasma lactate > upper limit of normal?
   - CNS – Does the patient have altered consciousness or a reduced GCS?
APPENDIX C

Ordersets

&

Orderset “quick-list”
**Enteral Nutrition Orderset # 10144**

**Please Use Ball Point Pen! PHYSICIANS MUST SIGN, Date and Time ALL ORDERS Please Use Ball Point Pen!**

<table>
<thead>
<tr>
<th>DATE/TIME</th>
<th>CHK’D BY</th>
<th>PHYSICIAN ORDER SHEET</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Enteral Nutrition</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Orderset # 10144</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Consult Dietician for Nutrition Assessment</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>ROUTE OF FEEDING:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gastric: ☐ NGT ☐ OGT ☐ DHT ☐ Post Pyloric ☐ Other:_________</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Formula Type:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>STANDARD: ☐ Jevity 1.2 ☐ Jevity 1.5 ☐ Promote ☐ Promote w/ Fiber</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LOW CHO: ☐ Glucerna 1.2 ☐ Glucernal 1.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ELEMENTAL: ☐ Vital 1.0 ☐ Vital 1.2AF ☐ Vital 1.5 ☐ Peptamen Bariatric</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RENAL: ☐ Nepro ☐ Suplena</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ISOTONIC: ☐ Osmolite</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IMMUNE-ENHANCING: ☐ Pivot 1.5 ☐ Impact Peptide 1.5 (also elemental)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>METHOD OF FEEDING:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>☐ Continuous feeding: Begin at _______ ml/hr and advance to a goal of _______ml/hr</td>
<td></td>
<td></td>
</tr>
<tr>
<td>☐ Bolus feeding: _______ml every _______ hours (Gastric feeding only)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>☐ Cycle feeding: Infuse at _______ml/hr x _______ hours</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Start at _______ (am/pm) and ending at _______ (am/pm)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>MODULAR PROTEIN:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>☐ Flush _______ pack(s) Benaprotein _______ BID _______ TID _______ QID</td>
<td></td>
<td></td>
</tr>
<tr>
<td>☐ Flush _______ pack(s) Glutamine per day</td>
<td></td>
<td></td>
</tr>
<tr>
<td>☐ Flush 1 pack Juven BID (Wound Healing)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>FREE WATER FLUSH:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>☐ Flush tube with _______ ml every _______ hrs (Excluding J-Tube)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>GASTRIC RESIDUALS:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Check residuals every 4 hours (for GASTRIC feeding only)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>If GRV is 400 ml or less, return all aspirate to pt. If GRV is greater than 400 ml, return $) ml tp pt And discard remaining amount. If GRV is 400 mls or greater on 2 consecutive checks, hold feeding For 2 hours and then recheck. If GRV remains &gt; 400 mls, continue to hold feeding and contact MD. Flush feeding tube with 30 mls of water after every GRV check</td>
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<tr>
<td><strong>KEEP HEAD OF BED ELEVATED 30-45 DEGREES AT ALL TIMES UNLESS CONTRAINDICATED</strong></td>
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<td><strong>PROKINETIC AGENTS:</strong></td>
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<tr>
<td>☐ Reglan (Metoclopramide) 10 mg ever 6 hrs IV (limit 10 days)</td>
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<tr>
<td>☐ Erythromycin: (Limit 3 days)</td>
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<tr>
<td>☐ PO 125 mg or ☐ 250 mg every 6 hrs</td>
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<td>☐ IV 250 mg BID</td>
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<td><strong>LABS:</strong></td>
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<td>☐ Check PAB ☐ MONDAY ☐ THURSDAY</td>
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<td>☐ Other ________________________________</td>
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Page 1 of 1

Revised: May 2012 Physicians’s Signature:

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**Factor VII Criteria Orderset #4059**

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**Factor VII a (Novoseven®) Criteria for BEH**

**Pharmacy**

**Order Set No. 4059**

- Allergies:  
- Reactions:  
- Allergies:  
- Reactions:  
- Admitting M.D./DO/DDS
- Attending M.D./DO/DDS
- Referring M.D./DO/DDS

- Inpatient Admission  
- Outpatient  
- Observation  
- Extended Stay

**Diagnosis:**

Factor VII a is ONLY an adjunct therapy to standard of care for acute bleeding with anticipated further large transfusion requirements and it does NOT replace current practice such as the use of standard surgical therapy, topical hemostatic agents or interventional radiology. Hemorrhage induced hypotension in a critical patient has been associated with a high mortality. Factor VIIa is approved by the FDA for the treatment of bleeding episodes in hemophilia A or G pts with inhibitors to Factor VII or IX.

Please check as appropriate:

1. Patients temperature must be ≥ 35.5°C
2. Expected survival greater than 6 months
3. All surgical interventions, liquid sealants and/or conventional methods of hemostasis should be utilized as indicated.

   a) Factor VII a should be considered only if the following criteria are met (all must be checked):
   
   - Total amount of Cryoprecipitate given: ≥ 20 units.
   - Total amount of Platelet Concentrates given: ≥ 12 units
   - Total amount of Fresh Frozen Plasma given: units

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*PO2300*

PO2300

Physician Orders
Factor VII a (Novoseven®) Criteria for BEH

Order Set No. 4059

Allergies: Reactions:

1) Patient weight > 50 kg
   Minimum of 10 units of FFP in < 6 hours
2) Patient weight < 50 kg
   Minimum of 20 mL/kg of FFP in < 6 hours

b) Indication (one must be checked)
   - Acute bleeding in a hemophilia patient
   - Prophylaxis in a hemophilia requiring surgery
   - Refractory hemorrhage and coagulopathy in surgical patients status post aggressive resuscitation
   - Acute central nervous system hemorrhage with associated refractory coagulopathy

2. The following information should be obtained prior to Administration
   a) Patient currently on any anti-platelet or anticoagulant medication?
      If yes, please list:
   b) Most recent DIC screen panel results.
      (i) PT: ________
      (ii) PTT: ________
      (iii) Fibrinogen: __________
      (iv) Fibrin Split Products: __________
      (v) INR: ________ (must be ≥ 2.5)
   c) Recent Platelet count: ________________
   d) Estimated volume of blood loss: ________________
   e) Platelet function test ________________

3. Factor VII a Dosing Guidelines: Weight:
   a) Initial dose 90 mcg/kg x ______ wt (kg)= dose ______ mcg
      (rounded to the nearest 2 mg vial)

Reviewed: January 27, 2010

Physician’s Signature

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Revised: 12/2007

ERLANGER Health System
Chattanooga, Tennessee

PHYSICIAN’S ORDER SHEET
THE PHARMACY IS AUTHORIZED TO DISPENSE DRUGS FOR ADMINISTRATION OF ANOTHER GENERICALLY EQUIVALENT BRAND, IDENTICAL IN STRENGTH, DOSAGE FORM, AND CONTENT OF ACTIVE THERAPEUTIC INGREDIENT(S).

*PO2300*
Factor VII a (NovoSeven®) Criteria for BEH

Allergies: 
Reactions: 

b) If necessary repeat dose 2 hours after initial dose at 90 mcg/kg 
   x_________wt (kg)= dose _________mcg (rounded to the nearest 2 mg 
   vial) 

c) Repeat PT/INR and platelets 1 hour after dose to evaluate effect 
   before administration of 2nd dose. Do not administer 2nd dose if 
   coags are approaching normal limits.

4. Contraindications/Precautions/Warnings: 

a) Contraindications: 
   (i) Hypersensitivity to NovoSeven® or any of its components 
   (ii) Hypersensitivity to mouse, hamster, or bovine proteins 
   (iii) Expected survival of < 6 months 

b) Precautions: 
   (i) Monitor for s/sx of thrombosis; if present dose may 
      have to be reduced or treatment stopped 
   (ii) Prolonged dosing after hemostasis 
   (iii) Pregnancy and lactation 

c) Warnings: 
   (i) Risk or thrombotic events is unknown, but is considered 
      to be low. 
   (ii) Certain patients have higher risk for thrombotic 
      events due to circulating tissue factor or 
      predisposing coagulopathy. 
      1) DIC 
      2) Advanced atherosclerotic disease 
      3) Crush Injury 
      4) Septicemia 
      5) Age > 60 
      6) TBI 

Phok112010tjh Page 3 of 3 
Reviewed: January 27, 2010 
Physician’s Signature 

**PO2300**

PO2300 
Physician Orders
# Mandible Fracture Orderset # 10195

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Orderset # 10195

Allergies:  
Reactions:  

Allergies:  
Reactions:  
Admitting M.D., D.O.?DDS  

☐ Inpatient Admission  ☐ Outpatient  ☐ Observation

Diagnosis:  

**ALL MANDIBLE FRACTURES**

PERIDEX MOUTH WASH po Q 4 hours  

☐ Closed Fractures (Condylar, Subcondylar, Ramus): NO ANTIBIOTICS  

☐ Open Fractures: (including fractures involving tooth bearing mandible segments)  

☐ Other facial Fractures: (see below)

**PRE-Op:**

☐ Ampicillin/Sulbactam (UNASYN) 3 gm IV Q6 hours  

☐ Moxifloxacin (Avelox) 400 mg IV Q24 hours, or  

☐ Clindamycin 600 mg IV Q8 hours AND  

☐ Gentamycin 5 mg/kg Q24 hours  

☐ Cefazolin (Ancef) 1 gm IV Q6 hours  

(if Patient > 80 kg give cefazolin)

**POST-Op:**

Oral antibiotics for 5 days. **(If unable to take oral then continue the same pre-op antibiotic per protocol above x 5 days post-op)**

☐ Ampicillin/clavulanate (Augmentin) 875 mg po BID  

☐ Clindamycin 300 mg po Q 6 hrs  

☐ Moxifloxacin (Avelox) 400 mg po Q day

**MID/UPPER FACE FRACTURES:**

☐ Closed. No communication w/ Frontal or maxillary sinus: NONE  

☐ Open, Communication w/ Frontal or Maxillary sinus: (Abx X 48 hours, unless involvement of dura in posterior frontal sinus fracute, then same as for open man fxs)

--please check “Other Fracture” box above and give abx

**HEAD/NECK WOUNDS:**

☐ Clean Wounds:  

☐ Cephalexin (keflex) 500 mg po TID x 48 hours  

☐ Trimethoprim/Sulfamethazole (Bactrim DS) 1 po BID x 48 hours

☐ Contaminated wounds/ Dog Bites: (Duration 7 days)

☐ Ampicillin/clavulanate (Augmentin) 875 mg po BID  

☐ Clindamycin 300 mg po Q 6 hrs  

☐ Moxifloxacin (Avelox) 400 mg po Q day

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Revised: August 2012  
Physician’s Signature:

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Meduri Steroid Rescue Protocol -- Orderset #4258

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Order Set No. 4258

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Admitting M.D.:/DO/DDS

Attending M.D.:/DO/DDS

Referring M.D.:/DO/DDS

- Inpatient Admission
- Outpatient
- Observation
- Extended Stay

Diagnosis:

Inclusion Criteria

1. Diagnosis of ARDS
   a. Exclude Cardiogenic Source of Pulmonary Edema
      i. PAWP \(<\ 18\ OR\  OR\ \text{Absence of clinical evidence of Left Atrial Hypertension}
   b. PaO2/FiO2 Ratio \(<\ 200\)
   c. Bilateral Pulmonary Infiltrates on CXR
   d. Acute Onset of Respiratory Failure
   e. Total Static Lung Compliance of \(\leq 50\ \text{mL/cm H2O}\)

2. \(>\ 18\ \text{years old}\)

3. 7 days of mechanical ventilation with LIS \(\geq\ 2.5\ \text{AND less than a 1-point reduction since Day 1 of ARDS}\)

4. No evidence of untreated infection

5. Documented infections require at least 72 hours of treatment before initiation of steroids

Revised: August 2011

Physician’s Signature

Page 1 of 5

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ERLANGER Health System
Chattanooga, Tennessee

PHYSICIAN’S ORDER SHEET

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*PO2300*

PO2300
Physician Orders
Meduri Steroid Rescue Protocol

**Trauma/CC Surgery**

**Order Set No. 4258**

**Allergies:**

**Reactions:**

**Exclusion Criteria**

1. Extensive burns
2. Life expectancy of < 3 months due to terminal illness
3. Pregnancy
4. Major GI Bleed within last 3 months
5. Presence of current disease requiring MORE THAN 1 mg/kg/day of methylprednisolone equivalent

**Treatment Protocol**

1. Methylprednisolone
   a. Route
      i. Intravenous –
      ii. Oral (if tolerating) – 100% of total daily dose given daily
   b. Dosing Schedule –
      i. Loading dose – 1 mg/kg IV bolus over 1 hour
         infuse drip at 10ml/hr
      ii. Days 1 through 14 – 1 mg/kg/day in 240ml of NS
      iii. Days 15 through 21 – 0.5 mg/kg/day in 240mls of NS
      iv. Days 22 through 25 – 0.25 mg/kg/day in 240mls of NS
      v. Days 26 through 28 – 0.125 mg/kg/day in 240mls of NS
   c. If extubated Prior to day 14 – advance schedule to day 15 and
taper according to schedule
   d. If LIS does NOT improve by AT LEAST ONE POINT by day 10
      of treatment – begin steroid wean

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Revised: August 2011  Physician’s Signature

**Patient Identification**

*PO2300*

PO2300

Physician Orders
### Surveillance Standards and Definitions for Meduri Steroid Rescue Protocol for ARDS

1. **Sepsis Surveillance**
   a. Within 24 hours of Steroid Rescue Initiation – Pan Culture
      - including Bronchoscopy with bilateral bronchoalveolar lavage sent
      - for quantitative culture and gram stain, blood cultures from 2 sites
      - including invasive lines, if applicable (gram stain, aerobic culture, anaerobic culture, fungal culture), UA and urine culture (gram stain, aerobic culture, anaerobic culture, fungal culture)
      - i. Repeat every 7 days for duration of steroid treatment
   b. Daily monitoring for clinical signs of infection
   c. Search for septic source initiated if:
      - i. Febrile (Temperature > 100.5°F) OR
      - ii. > 0.10 immature neutrophils by peripheral WBC OR
      - iii. Unexplained Minute Ventilation INCREASE of 30%

2. **Diagnostic Protocol for Septic Source**
   a. Physical Examination
   b. Blood Culture from 2 separate sites
   c. Bronchoscopy with bilateral BAL
      - i. Repeat if other sources negative and previous BAL cultures non-diagnostic

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### Physician's Order Sheet

**Physician Orders**

**Patient Identification**

*PO2300*

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Physician Orders
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**PHYSICIAN'S ORDER SHEET**

**Meduri Steroid Rescue Protocol**

**Trauma/CC Surgery**

**Order Set No. 4258**

**Allergies:**

**Reactions:**

**Allergies:**

**Reactions:**

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**Reactions:**

3. **Murray Lung Injury Severity Score**

a. **Chest X-ray Score**

i. No Alveolar Consolidation = 0 points

ii. Alveolar Consolidation in 1 Quadrant = 1 point

iii. Alveolar Consolidation in 2 Quadrants = 2 points

iv. Alveolar Consolidation in 3 Quadrants = 3 points

v. Alveolar Consolidation in 4 Quadrants = 4 points

b. **Hypoxemia Score**

i. \( \frac{\text{PaO}_2}{\text{FiO}_2} \geq 300 \) = 0 points

ii. \( \frac{\text{PaO}_2}{\text{FiO}_2} \geq 225 \) = 1 point

iii. \( \frac{\text{PaO}_2}{\text{FiO}_2} \geq 175 \) = 2 points

iv. \( \frac{\text{PaO}_2}{\text{FiO}_2} \geq 100 \) = 3 points

v. \( \frac{\text{PaO}_2}{\text{FiO}_2} < 100 \) = 4 points

c. **Respiratory System Compliance Score (when on ventilator)**

i. \( \geq 80 \text{ mL/cm H}_2\text{O} \) = 0 points

ii. \( 60-79 \text{ mL/cm H}_2\text{O} \) = 1 point

iii. \( 40-59 \text{ mL/cm H}_2\text{O} \) = 2 points

iv. \( 20-39 \text{ mL/cm H}_2\text{O} \) = 3 points

v. \( < 20 \text{ mL/cm H}_2\text{O} \) = 4 points

d. **PEEP Score (when on ventilator)**

i. \( \leq 5 \text{ cmH}_2\text{O} \) = 0 points

ii. \( 6-8 \text{ cmH}_2\text{O} \) = 1 point

iii. \( 9-11 \text{ cmH}_2\text{O} \) = 2 points

iv. \( 12-14 \text{ cmH}_2\text{O} \) = 3 points

v. \( > 15 \text{ cmH}_2\text{O} \) = 4 points

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ERLANGER Health System
Chattanooga, Tennessee

PHYSICIAN'S ORDER SHEET

THE PHARMACY IS AUTHORIZED TO DISPENSE DRUGS FOR ADMINISTRATION OF ANOTHER GENERICALLY EQUIVALENT BRAND, IDENTICAL IN STRENGTH, DOSAGE FORM, AND CONTENT OF ACTIVE THERAPEUTIC INGREDIENT(S).

*PO2300*

PO2300

Physician Orders
Surgical Critical Care Infection Workup –Orderset # 10036

Please Use Ball Point Pen! PHYSICIANS MUST SIGN, Date and Time ALL ORDERS Please Use Ball Point Pen!

<table>
<thead>
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<tr>
<td>Surgical Critical Care Infection Management</td>
<td>Trauma Surgical Critical Care Order Set No. 10036</td>
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Allergies:  
Reactions:

Allergies:  
Reactions:

Admitting M.D./DO/DDS  
Referring M.D./DO/DDS

[ ] Inpatient Admission  
[ ] Observation  
[ ] Floor  
[ ] Remote Telemetry  
[ ] IMCU  
[ ] ICU

Diagnosis:  
Condition:  
Call Admitting M.D. with room number on arrival to floor

Indwelling Lines:

[ ] Central Venous Catheter; Days ____________ (new stick over wire)

[ ] Change indwelling line, indication_____________________________

[ ] Send Blood Cultures x 2 (one from suspected line and one from peripheral stick)

[ ] Arterial line  
[ ] Other____________________________

GU System:

[ ] Foley Catheter Present, Days______________

[ ] Evidence of infections(i.e. cloudy foul smelling urine)

[ ] Check urinalysis and send specimen for culture and sensitivities

Soft Tissue:

[ ] Site:____________________________________________________

[ ] Culture sent

Phok72011jml Page 1 of 3

Reviewed: August 2011  
Physician’s Signature

PROHIBITED: INSTEAD WRITE

MS, MgSO₄: magnesium sulfate  
Q.D. daily

MS, MSO₄: morphine sulfate  
QOD every other day

U units:  
.5 mg 0.5 mg – always use zero before decimal

IU international units:  
5.0 mg 5 mg – never use trailing zeroes

*PO2300*

PO2300  
Physician Orders

Chattanooga, Tennessee

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**Surgical Critical Care Infection Management**

**Trauma Surgical Critical Care**

**Order Set No. 10036**

**Allergies:**

**Reactions:**

**Airway Status:**
- □ Not intubated
- □ Intubated; number of days: ___________ days

**Serial Chest X-ray shows one of the following:**
- □ New or progressive infiltrate (or a single x-ray with infiltrate for patient without underlying cardiopulmonary disease)
- □ Consolidation
- □ Cavitation

**One of the following:**
- □ Fever >38°C or 100.4°F with no other cause
- □ Leukopenia/cytosis (WBC <4.0k or 12.0k)
- □ Mental status Δ’s in elderly > 70 without other cause

**Combine with two of the following:**
- □ New onset purulent sputum
- □ Increased respiratory secretions
- □ New onset or worsening cough
- □ Worsening gas exchange; (i.e. O2 de-saturation, increased O2 or ventilator requirements)
- □ Rales or bronchial breath sounds

**If pneumonia clinically suspected, proceed with bronchoscopy with BAL directed towards infiltrate on chest x-ray.**
- □ BAL performed, send specimen for quantitative BAL
  (If treatment indicated begin on page 3)
- □ Deep ET aspiration, send specimen for gram stain and culture

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**Physician Orders**

**Patient Identification**

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*PO2300*

PO2300

Physician Orders

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**Surgical Critical Care Infection Management**

**Trauma Surgical Critical Care**

**Order Set No. 10036**

**Physician's Signature**

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**Prohibited: Instead Write**

<table>
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<th>Drug</th>
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**Physician's Order Sheet**

**The Pharmacy is Authorized to Dispense Drugs for Administration of Another Generically Equivalent Brand, Identical in Strength, Dosage Form, and Content of Active Therapeutic Ingredient(s).**

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*PO2300*
# Traumatic Brain Injury Protocol – Orderset # 5108

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**Traumatic Brain Injury Management**

**Trauma Surgical Critical Care**

**Order Set No. 5108**

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<td>Outpatient</td>
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**Diagnosis:**

1. Target ICP <20mm/Hg
   *All patients with an ICP monitor should have a central line and an arterial line*
2. Target CPP > 60mm/Hg
3. Elevate Head
   - HOB 15-20 degrees
   - Maintain full spinal precaution – use reverse Trendelenburg
4. Ventilator Management
   - Keep Pa02 >60 mm/Hg
   - Normal ventilation – Goal PCO2 35-40
5. Sedation – Maintain MAAS 3
   - Fentanyl gtt – start at 50mcg/hr titrate to MAAS of 2-3
   - Lorazepam 1 mg IV every 2 hours PRN agitation. May increase to 2mg if no response.
   - May begin lorazepam gtt at 1 mg/hr PRN agitation (*refractory to intermittent administration*)
   - Propofol gtt – order set 4090
6. Paralysis
   - Norcuron® (vecuronium) gtt – start at 2mg/hr PRN persistent ICP elevation.
     - Titrate to 2 of 4 twitches
   - BIS Monitor at bed side – maintain between 40 and 60
7. Seizure Prophylaxis
   - Load with Cerebyx® (fosphenytoin) 15 mg/kg PE IV x 1 dose
   - Maintenance Cerebyx® (fosphenytoin)100 mg PE IV three times per day

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**PROHIBITED ABBREVIATIONS**

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**ERLANGER Health System**

**Chattanooga, Tennessee**

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*PO2300*

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8. Osmotic Diuretic

If no ICP monitor in place treat with:

- □ Mannitol 12.5 gm IV every 4-6 hours for cerebral edema
- □ Mannitol 25 gm IV every 4-6 hours for cerebral edema

**Alternate above with 3% NaCl 250 ml IV over 1 hr every 4 6 hrs**
(i.e., Mannitol at 8 am, 3% NaCl at 11a.m., Mannitol at 1 p.m., 3%NaCl at 3 p.m., and so on)

* Serum Osmo >320 - HOLD MANNITOL

** Na>155 or Cl>120 – HOLD 3% NaCl

If ICP monitor in place treat ICP > 20mmHg

- □ Mannitol 12.5 gm IV every 4 6 hours PRN increased ICP >20 mmHg
- □ Mannitol 25 gm IV every 4 6 hours PRN increased ICP >20mmHg

**Alternate above with 3% NaCl 250 ml IV over 1 hr every 4 6 hrs**
PRN increased ICP >20 mmHg
(i.e., Mannitol at 8 am, 3%NaCl at 11am, Mannitol at 1pm, 3%NaCl at 3pm, and so on)

* Serum Osmo >320 - HOLD MANNITOL

** Na>155 or Cl>120 – HOLD 3% NaCl

9. Vasopressors – Titrate to keep MAP >90mmHg and CPP >70mmHg

- □ Norepinephrine gtt if HR <100 – start at 2mcg/min
  **Call MD if dose exceeds >15mcg/min**
- □ Neosynephrine gtt if HR >100 – start at 10 mcg/min
  **Call MD if dose exceeds >150mcg/min**
- □ Notify critical care resident if vasopressors started

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**PHYSICIANS MUST SIGN, Date and Time ALL ORDERS**

### Traumatic Brain Injury Management
### Trauma Surgical Critical Care

**Order Set No. 5108**

**Allergies:**
**Reactions:**

10. **Fever - *Avoid Hyperthermia***
   - For Core temperature > 101
     - [ ] Tylenol (acetaminophen) 650 mg down NGT or PR every 8 hours PRN temp > 101 (maximum 3gm of acetaminophen daily)
     - [ ] Motrin (ibuprofen) 600 mg down NGT every 6 hours PRN temp > 101
     - [ ] Cooling blanket – set at 97 degrees F.
   - For Core Temperature > 102
     - [ ] Continue measures listed above for temp. > 101 and notify critical care resident

11. **Blood Glucose**
   - [ ] Target 120-150 mg/dl and < 180 mg/dl at all times (Orderset #10060 and 10061)
   - [ ] Accu Checks per Blood Glucose Protocol Orderset #10060, 10061

12. **Labs**
   - [ ] CBC, PT/PTT every ( ) hours
   - [ ] BMP, serum osmolality every ( ) hours

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**Page 3 of 3**

Reviewed: August, 2011

Physician’s Signature

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ORDERSET “QUICK LIST”

Admission Floor -- Orderset # 5166
Admission ICU -- Orderset # 5377
Admission IMCU -- Orderset # 5378
Alcohol Withdrawal Prevention Protocol -- Orderset # 5347
Authorization for Treatment/Invasive Procedures/ Blood Administration (form 15104)
Blood Glucose Protocol -- Orderset #10060, 10061
Discharge Addendum -- Orderset # 5363
Discharge to Home -- Orderset # 5192
Discharge to SNF/Rehab Orderset #Heparin Weight Based-adults -- Orderset #4192
Electrolyte Protocol -- Protocol #10087
Enteral Nutrition -- Orderset # 10144
Factor VII -- Orderset No. 4059
Mandible Fracture – Orderset #10195
Meduri Steroid Rescue Protocol -- Orderset #4258
Neurogenic Bowel Protocol -- Orderset # 10051
PCA – Orderset # 4184
Post Radiologic Procedure Medication Holding Protocol—Orderset # 10052
Surgical Critical Care Infection Workup -- Orderset # 10036
Traumatic Brain Injury Protocol -- Orderset # 5108