

Shock Trauma Survival Guide

Thirteenth Edition
2019
Version B

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
(Thirteenth Edition, 2019, Version B)

Editors

Jammie A. Dill, RN, MSN, ACNP-BC, FNP-BC
Chief Editor

Trauma Services Nurse Practitioner
Erlanger Health System

Kayla Whiteaker, MSN, RN, TCRN, CEN

Clinical Administrator
Trauma, Orthopedics & General Surgery
Erlanger Health System

Stephanie Spain, RN, TCRN, CCRN

Trauma Process Improvement Coordinator
Erlanger Health System

Acknowledgements

Phillip Burns, MD, FACS

Chairman, Dept. of Surgery
Erlanger Health System

Philip Smith, MD, FACS

Associate Professor –
UT College of Medicine - Chattanooga, Department of Surgery
Medical Director – Trauma Resuscitation Team
Erlanger Health System

Contributing Authors

Donald E. Barker MD, FACS

Professor Surgery –
UT College of Medicine - Chattanooga, Department of Surgery
Medical Director – LifeForce, Erlanger Health System

Benjamin Dart, MD, FACS

Associate Professor –
UT College of Medicine - Chattanooga, Department of Surgery
Chief of Surgery
Erlanger Health System

Robert Maxwell, MD, FACS

Director – Critical Care Fellowship;
Professor – UT College of Medicine - Chattanooga, Department of Surgery
Medical Director – Shock-Trauma ICU, Neuro-Trauma ICU, Surgical ICU
Erlanger Health System

Darren, J. Hunt, MD, FACS

Assistant Professor –
UT College of Medicine - Chattanooga, Department of Surgery
Erlanger Health System

Vicente Mejia, MD, FACS

Associate Professor –
UT College of Medicine - Chattanooga, Department of Surgery
Erlanger Health System

Philip Smith, MD, FACS

Associate Professor –
UT College of Medicine - Chattanooga, Department of Surgery
Medical Director – Trauma Resuscitation Team
Erlanger Health System

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TRAUMA/SURGICAL CRITICAL CARE GENERAL INFORMATION

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, orthopedic traumatologists, 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, intensive care recovery 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:

Name	Contact Information
Donald Barker, M.D.	Pager: 514-2072
Benjamin Dart, M.D.	Pager: 490-1025
Darren Hunt, MD	Pager: 2121 --- 5400
Robert Maxwell, M.D.	Pager: 514-7939
Vincent Mejia, M.D.	Pager: 490-1063
Philip Smith, M.D.	Pager: 490-1760
Angela Basham-Saif, BSN, RN, TCRN Associate Chief Nursing Officer	Ext: 7229 Cell: 423-779-2166
Kayla Whiteaker, MSN, RN, TCRN, CEN Adult Trauma Program Director	Ext: 6705 Cell: 309-252-1096
Mollie Triplett, BSN, RN Pediatric Trauma Program Director	Ext: 8396 Cell: 316-253-2701
Pat Lewis, RN, CCRC Trauma Research Coordinator	Phone: 423-757-0824
Regena Young, BSN, RN Outreach/Injury Prevention Coordinator	Ext: 5620 Cell: 423-847-5208
Jammie Dill, MSN, ACNP-BC, FNP-BC Trauma Nurse Practitioner	Pager: 1589, Ext: 6707 Cell: 423-802-6271
Tim Bethune, RN Trauma Nurse Navigator	Ext: 6707 Cell: 423-486-3754
Trauma PI Coordinators:	Ext: 8390
Stephanie Spain, RN, TCRN, CCRN	Cell: 423-309-7685
Adrienne Chamberland, BSN, RN Trauma Nurse "Red Shirt"	Cell: 620-381-3222 Pager: 1891, Ext: 6742
Trauma Registrars:	
Angie Scissom	Ext: 6709
Aidren Pryor	Ext: 8480
Derrick Stephens	Ext: 8614
Heather Kelly	Ext: 2332
Michelle McGraw	Ext: 1796
Sierra Hartshorn, RHIT	Ext: 8105
Stephanie Kinsey	Ext: 6027

Resident Pager List		
6 th year		2121+
Nadine Gates		7243
Cathryn McGill Johnson		7564
Tyler Koestner		7255
Larry (Andrew) May		7562
Veronica Patterson Zachry		7569
Evon Zoog		7286
5 th year		
Jake Lloyd		4054
John Woody Major		4055
Olivia Morin		4056
Bobby Rampp		4057
4 th year		
Laurel Barnes		4060
Sean Forrest		7290
Kevin Harrell		7293
William Lee		7303
Hunter Rooks		7346
Richie Tanner		7365
3 rd year		
Walter Capote		7271
Luke Couch		7282
Victoria Miles		7490
J. Brent Moss		7092
Jillian Scott		7091
Dresden Soderstrom		7089
2 nd year		
Hayley Everett		7480
Kevin Friedrich		7481
William Hunt		7482
Michael Hurst		7183
John Pickering		7484
1 st year		
Eric Briscoe		7184
Nadia Froehling		7185
Austin Gilchrist		7186
Chace Hicks		7187
Mitch Parker		7188
Derek Deshaies (P)		7189
Austin Evans (P)		7190
David Walker (P)		7191
Others		
Brandon Chapman	C&R	7129
David Thompson	URO	7193
Mary Kathryn Huddleston	V Fel 2	7349
Korsica Lassiter Mebane	V Fel 1	7194
Miscellaneous		
TRAUMA intern		4900
ORTHO intern		6291
Neurosurgery	Phone: 423-265-2233	
Surgery Clinic	Phone: 423-757-0880	
USA Office	Phone: 423-267-0466	
Skills Lab	Extension: 2960	

Critical Care Nurse Clinicians
(aka "Red/Grey Shirts")

Pager: 1891

Office extension: 6742

Red Shirt phone: 423-805-8411

Grey Shirt phone: 423-805-8308

Team Members:

Jessica Holladay, BSN, RN, CEN, TCRN
Clinical Staff Leader

Courtney Gross, RN, TCRN

Aubrey Hamilton, BSN, RN

Katie Johnston, BSN, RN, TCRN, CEN

Laura Kirk, BSN, RN, CCRN, CFRN,
TCRN

Nathan Koestner, BSN, RN, CEN, TCRN,
CFRN, CTRN, CCRN, EMT-B

Vanessa Korter, RN, AEMT, CFRN, TCRN

Renee Mills, RN, CEN

Jill Pitts, BSN, RN, TCRN

Jana Poulson, RN, AEMT, TCRN

Jared Weber, RN, TCRN

David Wolfkill, RN, TCRN

Trauma Nurse Practitioner
Jammie A. Dill, MSN, APN,
ACNP-BC, FNP-BC

Trauma Nurse Navigator
Tim Bethune, RN

Call for questions re: hospital
processes, trauma guidelines &
protocols and advanced procedures as
well as assistance coordinating,
planning and carrying out patient
discharges.

***Policies
and
Practice
Management
Guidelines (PMG)***

Trauma Alert Policy - # 7135.33A

Trauma Activation Criteria

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

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

Procedure:

I. A Level One Trauma Alert will be initiated by the Emergency Department Physician, Trauma Surgeon, Emergency Department Patient Flow Coordinator, or Emergency Department Clinical Staff Leader 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 Emergency Department Physician or Trauma Surgeon:

- GCS <9 with traumatic mechanism
- Confirmed Systolic BP <90 or
- Intubated patients transferred from the scene of trauma, OR
- Patients who have respiratory compromise or are in need of an emergent airway as follows:
 - Patients who have oxygen saturation < 90% on supplemental oxygen, rescue airway, or cricothyrotomy
 - Includes intubated patients who are transferred from another facility with ongoing respiratory compromise (Does not include patients intubated at another facility who are now stable from a respiratory standpoint)
- New onset Quadriplegia from trauma mechanism
- Any patient receiving blood transfusion or ongoing volume resuscitation to maintain vital signs
- Gunshot wounds to the head, neck, or torso

Level One Trauma Activation Alert Notification/Trauma Team Response:

***The following personnel will be alerted and are required to respond:**

- Trauma Attending
- Designated Trauma Chief or Senior Resident (PGY 4 or above)
- Designated Trauma Junior Resident
- Emergency Department Physician
- Critical Care Nurse Clinician
- Emergency Department Trauma Clinical Lead
- Emergency Department Clinical Staff Lead
- Emergency Department Technician
- Emergency Radiology Technician
- Respiratory Therapist
- Obstetrician-Gynecologist with any pregnancy greater than or equal to 20 weeks gestation
- Maternal Fetal Medicine (MFM)/OB/GYN with unstable pregnant patient

***The following personnel will be alerted and may respond:**

- Guest Representative and/or Chaplain
- Blood Bank
- Operating Room
- Anesthesia
- Security

Documentation, Labs, and Radiology:

- The Major Trauma History and Physical form will be completed in the patients Emergency Medical Record (EMR)
- The Trauma Narrator in the Electronic Medical Record (EMR) will be completed including Q5 minute vital signs until disposition is decided.
 - Once disposition is determined patient can be changed to ICU vital signs or floor vital signs

- ICU vital signs: every 15 minutes x 4, then every 30 minutes x2, and then every hour, unless starting/titrating vasopressors or patient becomes unstable. If this occurs vital signs should be every 5-15 minutes.

- Floor vital signs: Every 4 hours

- A level One Trauma Panel will be collected to include:
 - I-Stat 10
 - ABG (optional)
 - Fibrinogen
 - PT/PTT
 - Platelet Count
 - Type and Screen
 - Serum Pregnancy test on all females of childbearing age
- Radiology test will include:
 - Portable Chest X-Ray
 - Others as ordered
 - Computerized Tomography Head, Neck, Thorax, Abdomen, and Pelvis as needed
- Other tests will include:
 - Electrocardiogram
 - FAST exam (unless deferred by physician)
 - Others as needed

II. A Level Two Trauma Alert will be initiated by the Emergency Department physician, Trauma Surgeon, Emergency Department Patient Flow Coordinator, or Emergency Department Clinical Staff Leader 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 Emergency Department Physician or Trauma Surgeon:

- Stab wound to the head, neck, chest, or torso
- GSW proximal to the elbow or knee
- HR>120 **SUSTAINED**
- New onset hemiplegia or paraplegia from trauma mechanism
- Two or more **proximal** long bone fractures (Humerus/Femur)
- Signs of significant blunt torso trauma including, but not limited to:
 - Absent breath sounds, chest wall instability, or deformity
 - Suspected hemothorax/pneumothorax requiring pre-hospital chest decompression (Does not include stable facility transfers with chest tube in place)
 - Abdominal seatbelt sign
- GCS 9-13 with mechanism attributed to trauma
- Crushed, degloved, mangled, amputated, or pulseless extremity **proximal** to the elbow or ankles
- Pregnancy >20 weeks with injury or significant MOI
- Hemodynamically stable intubated patients that are transferred from another facility

Level Two Trauma Activation Alert Notification/Trauma Team Response:

***The following personnel will be alerted and are required to respond:**

- Trauma Attending (Not required for initial response but are available in-house)
- Designated Trauma Chief or Senior Resident (PGY 4 or above)
- Designated Trauma Junior Resident
- Emergency Department Physician
- Critical Care Nurse Clinician
- Emergency Department Trauma Clinical Lead
- Emergency Department Clinical Staff Lead
- Emergency Department Technician
- Emergency Radiology
- Respiratory Therapist
- Obstetrics and gynecology with any pregnant patient greater than or equal to 20 weeks gestation (Mandatory Response)
- Maternal Fetal Medicine (MFM) with unstable pregnant patient (Mandatory Response)
- Guest Representative and/or Chaplain
- Registration

***The following personnel will be alerted and may respond:**

- Blood Bank
- Operating Room
- Anesthesia

- Security
- Guest Representative and/or Chaplain
- Registration

Documentation, Labs, and Radiology:

- The Major Trauma History and Physical form will be completed in the patients Emergency Medical Record (EMR)
- The Trauma Narrator in the Electronic Medical Record (EMR) will be completed including Q5 minute vital signs until disposition is decided.
 - Once disposition is determined patient can be changed to ICU vital signs or floor vital signs
 - ICU vital signs: every 15 minutes x 4, then every 30 minutes x2, and then every hour, unless starting/titrating vasopressors or patient becomes unstable. If this occurs, vital signs should be every 5-15 minutes.
 - Floor vital signs: every 4 hours
- A level Two Trauma Panel will be collected to include:
 - I-Stat 10
 - ABG (optional)
 - PT/PTT
 - Platelet Count
 - Type and Screen
 - Serum Pregnancy test on all females of childbearing age
- Radiology test will include:
 - Portable Chest X-Ray
 - Others as ordered
 - Computerized Tomography Head, Neck, Thorax, Abdomen, and Pelvis as needed
- Other tests will include:
 - Electrocardiogram
 - FAST exam (unless deferred by physician)
 - Others as needed

III. A Level Three Trauma Alert will be initiated by the Emergency Department Physician, Emergency Department Patient Flow Coordinator, or Emergency Department Clinical Staff Leader within 15 minutes prior to arrival of trauma patients who do not meet the Level One or Two Trauma Alert criteria but do meet one or more of the following criteria; or who after arrival are found to meet one or more of the following criteria after examination by the Emergency Department Physician:

- Fall from any height on anticoagulant medication **with** signs of head trauma
- Fall > than 20 feet **with** obvious signs of trauma
- Trauma with altered mental status:
 - Amnesic to events
 - GCS 14
 - Positive LOC
- Questionable chest and/or abdominal injury from trauma
- Diminished pulses in an extremity with signs of trauma
- Auto vs. Pedestrian/Bicyclist thrown, run over, or with significant (>20 MPH) impact
- MVC with ejection
- Transfers not meeting Level 1 or 2 activation criteria
- Trauma in the Elderly Population (age >60 years) **with** one or both of the following:
 - SBP <110 (may represent shock after age 65)
 - Patients with significant cardio or respiratory comorbidities

Level Three Trauma Alert Activation/ Trauma Team Response- the following personnel will be alerted to respond to the patient's bedside for evaluation and treatment immediately upon patient's arrival. The Emergency Department Physician should be at the bedside no less than 30 minutes after the patient's arrival:

- Emergency Department Physician
- Emergency Department Trauma Clinical Lead
- Critical Care Nurse Clinician as a facilitator of care when available for initial evaluation
- Emergency Department Technician
- Emergency Radiology

Documentation, Labs, and Radiology:

- The Standard History and Physical will be documented in the Electronic Medical Record (EMR), a documented consult will be completed as appropriate along with standard Emergency Department documentation.

- The Trauma Narrator in the Electronic Medical Record (EMR) will be completed including Vital signs every 5 minutes x 30 minutes then every 30 minutes until disposition is decided.
 - Once disposition is determined patient can be changed to ICU vital signs or floor vital signs
 - ICU vital signs: every 15 minutes x 4, then every 30 minutes x2, and then every hour, unless starting/titrating vasopressors or patient becomes unstable. If this occurs, vital signs should be every 5-15 minutes.
 - Floor vital signs: every 4 hours
- A level Three Trauma Panel will be collected to include:
 - I-Stat 10
 - ABG (optional)
 - PT/PTT
 - Platelet Count
 - Type and Screen
 - Serum Pregnancy test on all females of childbearing age
- Radiology test will include:
 - Portable Chest X-Ray
 - Others as ordered
 - Computerized Tomography Head, Neck, Thorax, Abdomen, and Pelvis as

needed

- Other tests will include:
 - Electrocardiogram
 - FAST exam can be considered.
(Level three trauma activations with a positive FAST should be upgraded to level two status due to the possible need for immediate surgical intervention.)
 - Others as needed

****The Trauma Attending or Emergency Room Attending Physician may activate/downgrade/upgrade at their discretion**

****If the Critical Care Nurse Clinician (Red Shirt) feels a patient should be upgraded based on criteria, they will call the Trauma Attending.**

****All pregnant patients greater than or equal to 24 weeks gestation with trauma mechanism should receive OB consult and fetal monitoring**

**** For patients on anticoagulants with suspected head injury; CT of the head should be obtained immediately. Time to CT should not exceed 30 minutes from the patient's arrival to the Emergency Department**

****Any traumatic burns should follow activation criteria listed above**

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

****The Emergency Department Physician will call the Trauma Chief, who will respond to the Emergency Department 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:

- Trauma Attending (not required for initial response)
- Designated Trauma Chief or Resident (PGY 4 or above)
- Additional support personnel and/or Critical Care Nurse Clinician optional – by request of Trauma Chief/Resident

Documentation, Labs, and Radiology:

- The Standard History and Physical will be documented in the Electronic Medical Record (EMR), a documented consult will be completed as appropriate along with standard Emergency Department documentation.
- A Trauma Panel will be collected to include:
 - I-stat 10
 - ABG (optional)
 - PT/PTT
 - Platelet Count
 - Urine Pregnancy test on all females of childbearing age
- Radiology test will include:
 - Portable Chest X-Ray
 - Computerized Tomography Head, Neck, Thorax, Abdomen, and Pelvis as needed

- Other tests will include:
 - Electrocardiogram as needed
 - Others as ordered

Notification:

In the event the pre-hospital information or initial examination (for cases that arrive without prior notification) indicates a need for a Trauma Alert, the Emergency Department Physician should initiate the appropriate Trauma Team Activation. To alert personnel for a Level one or Level two trauma activation the Emergency Department will page via wireless office for Trauma BEH. To alert personnel for Level 3 trauma activation, the Emergency Department will page via wireless office for Trauma-Level 3. Regardless of any level, the following information will be given in the page:

- Level of Trauma Activation:
 - Level of Trauma Activation: (Level 1, Level 2, or Level 3)
- 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)
- Mode of Arrival – Air/Ground
- Emergency Department room number

The notification process will be as follows:

- Emergency Department Patient Flow Coordinator or Clinical Staff Leader notifies:
 - Activates Trauma Pager
 - Emergency Department Physician
 - Emergency Department Trauma Nurse Lead or Trauma Clinical Lead
 - Emergency Department Clerk
 - Emergency Department Patient Representative
 - Emergency Department Care Technicians
- Trauma Service Chief Resident Notifies:
 - Operating Room (if applicable)
 - Appropriate Sub-Specialists (if applicable)

Erlanger Trauma Services

1

- GCS <9 with trauma mechanism
- Confirmed Systolic BP <90
- Intubated patients transferred from the scene of trauma, **-OR-**
- Patients who have respiratory compromise or are in need of an emergent airway as follows:
 - Patients with Oxygen saturation < 90% on supplemental oxygen, rescue airway, or cricothyrotomy
 - Includes intubated patients who are transferred from another facility with ongoing respiratory compromise (Does not include patients intubated at another facility who are now stable from a respiratory standpoint)
- New onset Quadriplegia from trauma mechanism
- Any patient receiving blood transfusions or ongoing volume resuscitation to maintain vital signs
- Gunshot wounds to the head, neck, or torso

If injury falls into any of the above category, Fire Level 1 Trauma Alert

If Not



2

- Stab wounds to the head, neck, torso
- GSW to the extremities proximal to the elbow or knee
- HR > 120 **SUSTAINED**
- New onset hemiplegia or paraplegia from trauma mechanism
- Two or more **proximal** long bone fractures (Humerus/Femur)
- Signs of significant blunt torso trauma including but not limited to:
 - Absent breath sounds, chest wall instability, or deformity
 - Suspected hemothorax/pneumothorax requiring pre-hospital chest decompression (Does not include stable facility transfers with chest tube in place)
 - Abdominal seatbelt sign
- GCS 9-13 with mechanism attributed to trauma
- Crushed, degloved, mangled, amputated or pulseless extremity **proximal** to the elbow or ankles
- Pregnancy ≥ 20 weeks with injury or significant MOI
- Hemodynamically stable intubated patients that are transferred from another facility

If injury falls into any of the above category, Fire Level 2 Trauma Alert

If Not



3

- Fall from any height on anticoagulant medication **with** signs of head trauma
- Fall > 20 feet **with** obvious signs of trauma
- Trauma with altered mental status:
 - Amnesic to events
 - GCS 14
 - Positive LOC
- Questionable chest and/or abdominal injury from trauma
- Diminished pulses in an extremity with signs of trauma
- MVC with ejection
- Auto vs. Pedestrian/bicyclist thrown, run over, or with significant (>20 MPH) impact
- Transfers not meeting Level 1 or 2 activation criteria
- Trauma in Elderly Population (age >60 years) **with** one or both of the following:
 - SBP < 110 (may represent shock after age 65)
 - Patients with significant cardio or respiratory comorbidities

If injury falls into any of the above category, Fire Level 3 Trauma Alert

Level:	1	2	3	LOC: _____ + _____ - _____	GCS: _____
Age/Sex: _____ /	M	F	U	Intubated: Y	N
MOI: _____	ETA: _____				
Injuries: _____	ER Room: _____				
Vitals: BP: _____ HR: _____ RR: _____	O2 Sat: _____				
Reason for Fire: (Circle Above) _____					
Name of Staff Person Firing: _____			HMD Discretion: _____		
Upgraded: Upgrade to:	1	2	Reason: _____		

*Any traumatic burns should follow activation criteria listed above
 *All pregnant patients ≥ 24 weeks should receive OB consult and fetal monitoring
 Trauma Attending Physician/ ED Attending Physician may activate/downgrade/upgrade at their discretion

Patient Sticker
 Revised 03/2018

Admitting Trauma Patients with Burns PMG - # 7135.504

Policy statement: The purpose of this policy is to establish guidelines for when it is acceptable for Trauma Services to admit trauma patients with burn injuries. These guidelines are set forth and agreed upon by both the Trauma and Plastic Surgery Services.

Scope: Trauma Attending, Trauma Residents, Plastics Attending, Plastics Residents

Procedure: The Plastic surgery services will be consulted prior to admission of any trauma patient with burns to assist with management and disposition. Burn injuries that should be considered for referral to a burn center include the following:

- Partial-thickness burns of greater than 10 percent of the total body surface area.
- Burns that involve the face, hands, feet, genitalia, perineum, or major joints.
- Third-degree burns in any age group.
- Electrical burns, including lightning injury.
- Chemical burns.
- Inhalation injury.
- Burn injury in patients with preexisting medical disorders that could complicate management, prolong recovery, or affect mortality.
- Burns and concomitant trauma (such as fractures) when the burn injury poses the greatest risk of morbidity or mortality. If the trauma poses the greater immediate risk, the patient's condition may be stabilized initially in a trauma center before transfer to a burn center. Physician judgment will be necessary in such situations and should be in concert with the regional medical control plan and triage protocols.
- Burn injury in patients who will require special social, emotional, or rehabilitative intervention.

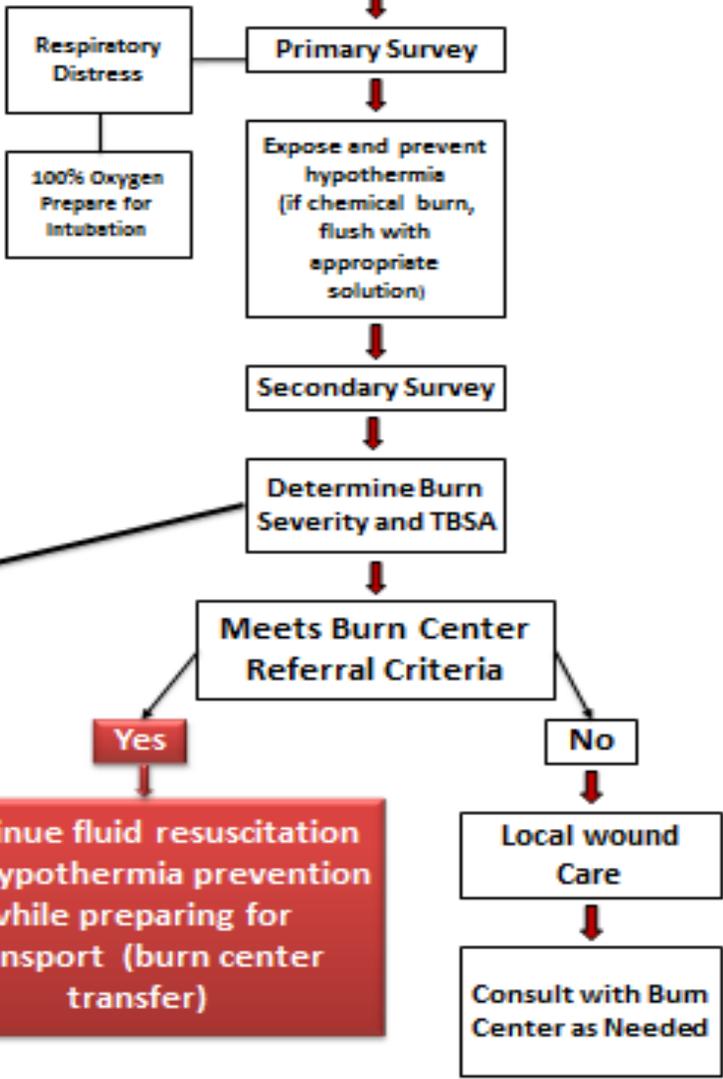
Transfer to referred burn centers will occur within the first four hours after the patient's arrival or when the medical staff determines the patient is medically stable for transport.

The disposition of non-trauma patients with minor burn injuries will be determined by plastics surgery services. Burn patients with traumatic injuries that are too unstable for transfer will be admitted to the trauma service.



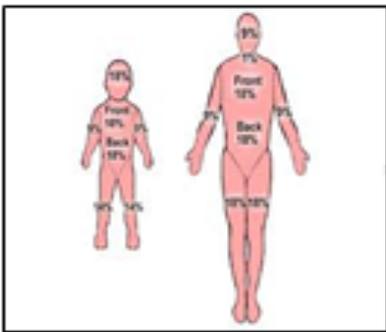
Trauma Burn Practice Management Guideline

If patient meets trauma activation criteria, fire pagers.



Severity:

- Superficial (1st Degree): Skin red, dry and painful. Do not include in TBSA.
- Partial thickness (2nd Degree): Skin red, blistered, weepy, swollen and painful.
- Full thickness (3rd Degree): Skin whitish, brown, charred, with severe to minimal pain.



Rule Of Nines

Vanderbilt Burn Center:
615-936-2876

Burn Key Points:

- Suspect airway injury if closed space burn
- Remove clothing and jewelry
- Hazmat concern, flush with tepid water
- Avoid hypothermia
- Use Rule of Nines to determine %TBSA
- Obtain ABG, lactate and COHb
- Fluid resuscitation formula:
 - Adults and older children (>14 yo) 2ml LR/kg/TBSA
 - Children (<14 yo) 3ml LR/kg/TBSA
 - Infants/young children (<=30kg) add d5LR
 - Electrical (all ages) 4ml LR/kg/TBSA
 - Infuse total volume over 16 hours; ½ in first 8 hours since injury; ½ in the remaining 8 hours
- Titrate fluid based on UOP:
 - Adult 0.5ml/kg/hr
 - Ped 1ml/kg/hr
- Avoid diuretics and fluid boluses
- Slowly adjust fluid rate to increase UOP
- May contact Poison Control for chemical burn and neutralizing solutions consultation
- Consider escharotomies

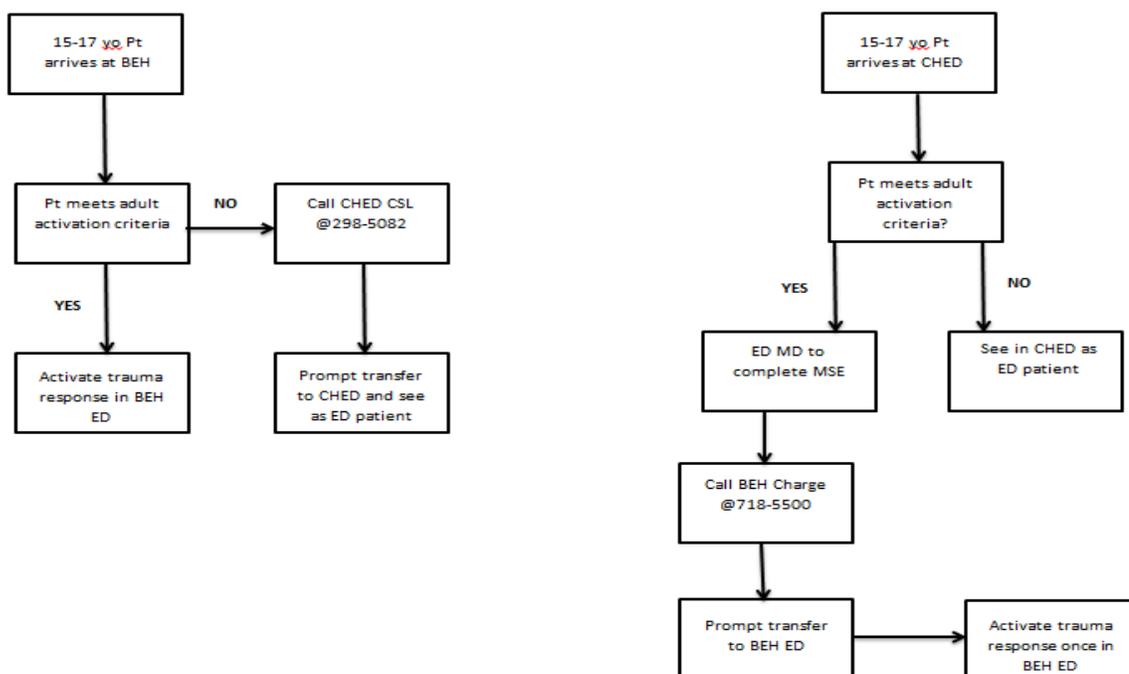
Burn Center Referral Criteria:

- Partial thickness burns > 10% TBSA
- Burns involving the hands, face, feet, genitalia, perineum, or major joints
- 3rd degree burns in any age group
- Electrical burns, including lightning
- Chemical burns
- Inhalation injuries
- Burn with preexisting medical conditions
- Burns with concomitant trauma
- Burned children in hospitals w/o qualified personnel or equipment
- Burn injuries requiring special social, emotional or rehabilitative interventions

Age Specific Trauma Patient Admission Policy - # 7135.1

1. **Policy Statement:** To provide a systematic approach to the care of the injured trauma patient.
2. **Scope:** Pediatric/Adult Trauma Services and Emergency Department staff
3. **Purpose:** To have traumatically injured patients arrive at the appropriate facility.
4. **Definitions:**
 - a. Adult Trauma Population: Injured patients ages 15 and older that meet the adult trauma activation criteria.
 - b. Pediatric Trauma Population: Injured patients ages 14 and below that meet the adult trauma activation criteria.
5. **Procedure:**
 - I. All trauma patients ≥ 18 years of age (regardless of activation status) should be treated at the Baroness Erlanger Emergency Department (BEH ED).
 - II. All trauma patients < 15 years of age (regardless of activation status) should be treated at the Children's at Erlanger Emergency Department (CHED)
 - III. All trauma patients 15-17 years of age should be treated at BEH ED if they meet Adult Trauma Services Activation Criteria.
 - IV. All trauma patients 15-17 years of age that are transferred from outlying facilities are to go to the BEH ED unless they are being transferred for isolated orthopedic injuries without vascular compromise.
 - V. If a patient arrives by private vehicle they should be directed to the appropriate emergency department based on the above statements. Prompt transfer is required.
 - VI. If transferred between emergency departments, family will be directed to the appropriate waiting area.
 - VII. If patient is to be transferred from CHED to BEH ED call the BEH Charge Nurse at 718-5500. If patient is to be transferred from BEH ED to CHED call the Clinical Staff Leader at 298-5082.
 - VIII. If patient is a trauma activation in the BEH ED and is age 15-17 years of age and is found to have no traumatic injury but requires admission the patient will be transferred to Children's at Erlanger to make decision on admission.

Age Specific Trauma Admission Schematic



Guideline for Reversal of Anticoagulation and Antiplatelet Therapy - # PC.243

PMG Purpose statement: To provide guidelines for the reversal or management of bleeding with anticoagulants. The following guidelines have been developed by the Pharmacy and Nutrition Committee Work Group and promote the evidence based reversal of anticoagulants placing patients at risk for bleeding complications. For assistance or additional information, please consult the Pharmacy Anticoagulation Service.

Disclaimer: The information provided in this document is intended to serve as a guide to the physician and should not replace clinical judgment.

Recommendations for reversal by anticoagulant:

Low Molecular Weight Heparin		
Reversal Urgency	Intervention(s) to consider	Monitoring
Non-urgent surgery/procedure	Last dose should be given \geq 24 hours before procedure	
Urgent-bleeding or immediate surgery	<ul style="list-style-type: none"> ▪ Delay surgery 24 hours if possible ▪ Consider protamine for high bleeding risk (neutralizes approximately 60% of LMWH anti-Xa activity) ▪ LMWH administered \leq 8 hrs: 1 mg protamine per 1 mg (100 units) of LMWH ▪ LMWH administered \geq 8 hours: 0.5 mg protamine per 1 mg (100 units) of LMWH <p><i>Maximum protamine IV infusion rate is 5 mg/min to prevent hypotension and bradycardia</i></p>	<p>aPTT, CBC</p> <p>TEG: Prolonged R time; To evaluate effect of other anticoagulants: Add heparinase to TEG to negate the effect of heparin</p> <p>Monitor for hypotension, anaphylaxis/hypersensitivity reactions in patients with a fish allergy or with prior exposure to protamine.</p> <p><i>May premedicate with corticosteroids and antihistamines if at risk for protamine allergy: hydrocortisone 50-100 mg IV x1 over 15 minutes and diphenhydramine 50 mg IV/PO x1</i></p>

Unfractionated Heparin		
Reversal Urgency	Intervention(s) to consider	Monitoring
Non-urgent surgery/procedure	<ul style="list-style-type: none"> ▪ Infusion: Stop infusion 2-6 hours prior ▪ SubQ: Holding evening dose prior to procedure 	<p>aPTT, CBC</p> <p>TEG: To evaluate effect of other anticoagulants: Add heparinase to TEG to negate the effect of heparin</p>
Urgent-bleeding or immediate surgery	<p>Protamine 1 mg for every 100 units of heparin given in previous 3 hrs (max single dose 50 mg)</p> <p><i>Maximum IV infusion rate is 5 mg/min to prevent hypotension and bradycardia</i></p> <p><i>Onset of reversal effect is seen approximately 5 minutes after protamine administration.</i></p> <p><i>Duration of reversal activity of approx. 2 hours.</i></p>	<p>Monitor for hypersensitivity reactions, including anaphylaxis, in patients with a fish allergy or with prior exposure to protamine.</p> <p><i>May premedicate with corticosteroids and antihistamines if at risk for protamine allergy: hydrocortisone 50 100mg IV x1 over 15 minutes and diphenhydramine 50mg IV/PO x1</i></p>

Antiplatelets: Aspirin, Clopidogrel, Prasugrel, Ticagrelor

No specific reversal agent exists and treatment of bleeding involves general hemostatic measures. Discontinuation of antiplatelets due to a bleeding event should be weighed against the patient's risk for arterial thrombosis.

Antiplatelet Agent	Half-Life	Intervention Non-Urgent Procedure	Intervention Urgent-bleeding or immediate surgery	Monitoring
Aspirin	Antiplatelet effect may last 7-10 days	<ul style="list-style-type: none"> If patient at high risk of bleeding: Consider holding 7 days prior to procedure If patient at high risk of cardiovascular complications in absence of antiplatelet agent: consider continuing aspirin 	Primary treatment: Consider platelet transfusion* Adjunct: Consider DDAVP 0.3 mcg/kg IV over 30 minutes**	For aspirin/ Dipyridamol, prasugrel, ticagrelor, clopidogrel: consider TEG: if Platelet mapping MA – ADP < 50 give platelets
Aspirin/dipyridamole (Aggrenox®)	Antiplatelet effect may last 7-10 days			
Prasugrel (Effient®)	7 h	Hold 7 days prior to procedure	*caution in patients with cardiac stents	
Ticagrelor (Brilinta®)	7 h	Hold 5 days prior to procedure	*abrupt discontinuation can increase risk of acute stent thrombosis	
Clopidogrel (Plavix®)	8 h			

• *Platelet infusions may be considered for severe critical bleeds or for prevention of bleeding before an emergent surgery but it may confer a risk of arterial thrombosis
 • **DDAVP may increase risk of arterial vasospasm
 Ortel TL.Blood. 2012.120(24):4699-705.

Vitamin K Antagonists (Warfarin)

INR	Bleeding	Intervention(s) to consider	Monitoring
<4.5	No	Hold warfarin until INR in therapeutic range	Recheck INR in 24 hours
	Yes/Rapid reversal required	Hold warfarin, Consider vitamin K 2.5 mg po*	
4.5-10	No	Lower or omit next warfarin dose, reduce subsequent doses	TEG: Warfarin may cause prolonged R & K time
	Yes/Rapid reversal required	Hold warfarin and Consider vitamin K 2.5 mg po*	
≥10	No	Vitamin K 2.5-5 mg PO* Omit next warfarin dose; reduce subsequent doses	
Non-urgent surgery/procedure	N/A	<ul style="list-style-type: none"> Stop warfarin 5 days prior to procedure If INR > 1.5 24-48 h before procedure, give Vitamin K 1.25-2.5 mg PO x1 <i>Consider bridging w/LMWH in high risk patients</i> 	Check INR 1-2 days prior to procedure Resume warfarin 24-48 h after procedure
Urgent non-life threatening major bleed -OR- surgery/procedure		<ul style="list-style-type: none"> If procedure can be delayed 6-24 hrs: Vitamin K 5-10 mg PO/IV* If procedure cannot be delayed or for life-threatening bleeding: FFP -OR- Kcentra® + Vitamin K 5-10mg IV* see KCentra® order set: OS 10236 (See Table 8 for KCentra® dosing) 	Recheck INR 30 minutes after Kcentra® administration. Check INR q6hr for 24 hours due to short half-life of KCentra®**
Serious, life threatening bleed at any INR		Vitamin K 10mg IV + KCentra® see KCentra® order set: OS 10236 (See Table 8 for KCentra® dosing)	TEG: Warfarin may cause prolonged R & K time

COMMENTS:

* Subcutaneous administration of Vitamin K not recommended due to variable, erratic absorption
 ** Rebound anticoagulation effect could occur if high concentrations of warfarin are present (eg, acute renal insufficiency, renal failure, overdose). Consider longer duration of aPTT monitoring and repeated dosing of vitamin K if necessary.
 ▪ Kcentra[®] contains heparin and is contraindicated in patients with heparin allergy
 ▪ Consider prothrombotic risk with administration of reversal agents

Oral Factor Xa Inhibitors: Rivaroxaban (Xarelto[®]), Apixaban (Eliquis[®]), Edoxaban (Savaysa[®])

There is no specific reversal agent or pharmacologic antidote, thus management of hemorrhagic complications is primarily supportive, rivaroxaban and apixaban are highly protein bound and not dialyzable. The following strategies may be considered based on available evidence.

Reversal Urgency	Intervention(s) to consider	Monitoring	Half-life
Mild Bleeding	Delay next dose or discontinue Factor Xa Inhibitor	▪ aPTT	rivaroxaban: 5-9 h (elderly 11-13 h)
Moderate Bleeding	<p>Consider any of the following based on bleeding severity:</p> <ul style="list-style-type: none"> ▪ Mechanical compression ▪ Fluid replacement & hemodynamic support ▪ Blood product transfusion ▪ Fresh frozen plasma (usual dose 15 mL/kg IV) ▪ Oral activated charcoal 50g po x 1 dose (if anticoagulant dose ingested within 2 hours) ▪ NOT DIALYZABLE, Vitamin K ineffective 	<p>▪ TEG: Oral Xa inhibitors can cause prolonged R and K time</p> <p><i>Rebound anticoagulation effect could occur if high concentrations of Factor Xa inhibitor are present (eg, acute renal insufficiency, renal failure, overdose)</i></p>	<p>apixaban: 12 h</p> <p>edoxaban: 10 –14 h</p>
Non-urgent surgery or procedure	<ul style="list-style-type: none"> ▪ Rivaroxaban (Xarelto[®]) <i>CrCl >90 ml/min: Hold ≥ 24 hours prior</i> <i>CrCl 30-90 ml/min: Hold 2-3 days prior</i> ▪ Apixaban (Eliquis[®]) <i>Procedure w/high bleed risk: Hold 48 hours prior</i> <i>Procedure w/low bleed risk: Hold 24 hours prior</i> <i>CrCl > 50 ml/min: Hold 2-3 days</i> <i>CrCl ≤ 50 ml/min: Hold 3-5 days</i> ▪ Edoxaban (Savaysa[®]) <i>Procedure w/high bleed risk: Hold 48 hours prior</i> <i>Procedure w/low bleed risk: Hold 24 hours prior</i> <i>CrCl > 50 ml/min: Hold 1-2 days</i> <i>CrCl ≤ 50 ml/min: Hold ≥ 3 days</i> 		

Urgent-severe/life threatening bleeding	No specific antidote, however KCentra [®] may be considered for reversal of any Factor Xa Inhibitor (see OS10236; Table 8 for KCentra[®] dosing)	<ul style="list-style-type: none"> ▪ aPTT ▪ To investigate potential cause of bleeding, obtain the following: serum creatinine, PT, aPTT, anti-Xa assay, CBC 	
-OR- Immediate surgery	<ul style="list-style-type: none"> ▪ If PT prolonged, consider Vitamin K 10 mg IV x 1 dose (if suspect presence of Vitamin K deficiency) ▪ NOT DIALYZABLE, Vitamin K ineffective 		

Eerenberg. *Circulation*. 2011. 124(14):1573-9.

Oral Direct Thrombin Inhibitors: Dabigatran (Pradaxa [®])			
Reversal Urgency	Intervention(s) to consider	Monitoring	Half-life
Minor bleeding (eg, epistaxis, uncomplicated soft tissue bleeding)	<ul style="list-style-type: none"> ▪ Delay next dose or discontinue dabigatran 	<ul style="list-style-type: none"> ▪ PT, aPTT 	14-17 hours with normal renal function
Moderate bleeding	<p><i>Consider any of the following based on bleeding severity:</i></p> <ul style="list-style-type: none"> ▪ Mechanical compression ▪ Surgical intervention ▪ Fluid replacement & hemodynamic support ▪ Blood product transfusion ▪ Oral activated charcoal 50 g po x 1 dose (if last dose ingested within 2 hours) 	<ul style="list-style-type: none"> ▪ TEG: Dabigatran may cause prolonged R & K time ▪ Decreased angle & MA 	
Non-urgent surgery/procedure	<ul style="list-style-type: none"> ▪ CrCl > 50 ml/min: Hold x 1-2 days ▪ CrCl ≤ 50 ml/min: Hold x 3-5 days 		
Life threatening major bleeding or emergent surgery/procedure requiring reversal	<p><i>Consider any of the following based on bleeding severity:</i></p> <ul style="list-style-type: none"> ▪ Idarucizimab (Praxbind[®]) Order set 10373 See Table 9 for dosing ▪ Hemodialysis (removes 60%) ▪ Blood product transfusion ▪ Surgical/endoscopic intervention if appropriate 	<ul style="list-style-type: none"> ▪ PT, aPTT 12 and 24 hours after Praxbind[®] administration* ▪ TEG: Dabigatran may cause prolonged R & K time, decreased angle & MA 	

Intravenous Direct Thrombin Inhibitors (DTI): Argatroban, Bivalirudin

Due to the short half-life of these agents, management of hemorrhagic complications is primarily supportive and interruption of treatment will be sufficient to reverse the anticoagulant effect. Management of intravenous DTI related bleeding is summarized below.

Bleeding	Intervention(s) to consider	Monitoring	Half-life
Mild	Delay next dose or discontinue DTI and continue monitoring of coagulation parameters	PT, aPTT, CBC	Argatroban: 60-90 min Bivalirudin: 25-45 min
Moderate	<i>Consider any of the following based on bleeding severity:</i> <ul style="list-style-type: none"> ▪ Mechanical compression ▪ Fluid replacement & hemodynamic support ▪ Blood product transfusion ▪ Fresh frozen plasma 	PT, aPTT, CBC	
Severe or life-threatening	<ul style="list-style-type: none"> ▪ KCentra® OS 10236 See Table 8 for KCentra® dosing ▪ Fluid replacement & hemodynamic support ▪ Blood product transfusion ▪ Fresh frozen plasma 	PT, aPTT, CBC	

COMMENTS:
 Argatroban not removed by hemodialysis
 Hemodialysis may reduce bivalirudin plasma concentration by approximately 25%

KCentra® Dosing

Bleeding induced by warfarin	Recommended dose
INR 2– 3.9	25 units/kg (max dose 2500 units)
INR 4 – 5.9	35 units/kg (max dose 3500 units)
INR ≥ 6	45 units/kg (max dose 4500 units)
Bleeding induced by Factor Xa Inhibitors (Xarelto, Eliquis, Edoxaban)	25 units/kg and assess response. May consider 50 units/kg if life-threatening bleed (limited clinical data) – MAX DOSE 5000 units

CAUTION:
 KCentra® contains heparin and is contraindicated in patients with heparin allergy or history of HIT.
 KCentra® may increase risk of thrombosis.
 With the correction of warfarin-induced bleeding in patients who have been given concomitant vitamin K, repeat dosing with KCentra® is usually not necessary, and not recommended due to increased risk of thrombosis

Praxbind® Dosing

2.5g IV x 2 doses, administered no more than 15 minutes apart.

If clinically relevant bleeding occurs, or if a second emergency surgery/urgent procedure is required and patient has elevated coagulation parameters, may consider re-dosing (limited clinical data to support)

Anticoagulant & Antiplatelet Reversal and Surgical Management Recommendations*			
Reference Policy XXXX for more detailed recommendations			
Drug Class	Non-urgent surgery/procedure	Urgent-bleeding or immediate surgery	Comment
			TEG
Vitamin K Antagonist			
Warfarin	<ul style="list-style-type: none"> Stop 5 days prior to procedure Check INR 1-2 days prior <ul style="list-style-type: none"> > If INR >1.5, give Vitamin K 1.25 - 2.5 mg PO Consider bridging w/ LMWH in high risk patients 	<ul style="list-style-type: none"> If procedure can be delayed 6-24 hrs, Vitamin K 5-10 mg PO/IV* If procedure cannot be delayed or for life-threatening bleeding: <ul style="list-style-type: none"> > FFP > Kcentra® + Vitamin K 5-10 mg IV* *Subcutaneous Vitamin K is NOT recommended 	<ul style="list-style-type: none"> Kcentra® dosing (Order Set 10236) INR 2-3.9 → 25 units/kg (max 2500) INR 4-5.9 → 35 units/kg (max 3500) INR ≥ 6 → 45 units/kg (max 4500) CAUTION: Kcentra® contains heparin (CI in pts w/ HIT); risk of thrombosis
Factor Xa Inhibitors			
Xarelto® (Rivaroxaban)	<ul style="list-style-type: none"> CrCl >90 mL/min: Hold for at least 24 hrs prior to procedure CrCl 30-90 mL/min: Hold for 2-3 days prior to procedure 	<ul style="list-style-type: none"> No specific antidote/not dialyzable Vitamin K not effective Kcentra®- 25 units/kg and assess response Consider 50 units/kg if life-threatening bleed (limited clinical data) – max dose: 5000 units 	<ul style="list-style-type: none"> PT can be used to rule out substantial residual effect. Normal value may rule out clinically relevant residual anticoagulant effect. PT not intended to be used for dosage adjustment.
Eliquis® (Aptxaban)	<ul style="list-style-type: none"> Procedure w/ high bleed risk: Hold 48 hrs Procedure w/ low bleed risk: Hold 24 hrs CrCl >50 mL/min hold 2-3 days CrCl ≤50 mL/min hold 3 or more days 		
Savaysa® (Edoxaban)	<ul style="list-style-type: none"> Procedure w/ high bleed risk: Hold 48 hrs Procedure w/ low bleed risk: Hold 24 hrs CrCl >50 mL/min: Hold 1-2 days CrCl ≤50 mL/min: Hold ≥ 3 days 		
Thrombin Inhibitor			
Pradaxa® (Dabigatran)	<ul style="list-style-type: none"> CrCl > 50 mL/min: Hold for 1-2 days CrCl ≤50 mL/min: Hold for 3-5 days 	<ul style="list-style-type: none"> Praxbind® (Idarucizumab) 2.5 gm IV x 2 doses admin no more than 15 min apart Hemodialysis 	<ul style="list-style-type: none"> Thrombin time (preferred) or aPTT can be used to rule out substantial residual effect
Anti-platelet Agents			
Plavix® (clopidogrel)	<ul style="list-style-type: none"> Hold 5 days prior to procedure 	<ul style="list-style-type: none"> Consider platelet transfusion 	<ul style="list-style-type: none"> Caution advised in patients with cardiac stents Abrupt discontinuation can increase risk of acute stent thrombosis
Brilinta® (ticagrelor)			
Effient® (prasugrel)	<ul style="list-style-type: none"> Hold 7 days prior to procedure 		
Aggrenox® (ASA/dipyrida mole)			
Heparins			
Unfractionated Heparin	<ul style="list-style-type: none"> Infusion: Stop infusion 2-6 hrs prior SQ: Hold evening dose prior 	<ul style="list-style-type: none"> Protamine 1 mg for every 100 units of heparin given in previous 3 hrs (max dose: 50 mg single dose or 100 mg in 2 hrs) 	<ul style="list-style-type: none"> aPTT can be used to determine degree of anticoagulation
Low Molecular Weight Heparins (enoxaparin, dalteparin, tinzaparin)	<ul style="list-style-type: none"> Last dose should be given 24 hrs before procedure 	<ul style="list-style-type: none"> Wait 24 hrs if possible Consider protamine for high bleeding risk (only partially reverses LMWH) <ul style="list-style-type: none"> > LMWH administered ≤ 8 hrs: 1 mg protamine per 1 mg LMWH > LMWH administered >8 hrs: 0.5 mg protamine per 1 mg LMWH 	<ul style="list-style-type: none"> Elimination can be further delayed in patients with renal failure Anti-Xa assay can be used to assess degree of anticoagulation
Coagulopathies Not Associated with Anticoagulants			
Uremic bleeding	<ul style="list-style-type: none"> Dialysis Desmopressin 0.3 mcg/kg over 30 min 	<ul style="list-style-type: none"> Desmopressin 0.4 mcg/kg over 10 min 	<ul style="list-style-type: none"> For persistent bleeding unresponsive to other therapies: Conjugated estrogen 0.6 mg/kg IV daily x 5 days
Acute Fibrinolysis		<ul style="list-style-type: none"> Post-traumatic hemorrhage within 3 hrs of injury + lysis >3% on TEG <ul style="list-style-type: none"> > Tranexamic acid 1 gm IV over 10 minutes followed by 1 gm infusion over 8 hrs 	<ul style="list-style-type: none"> Tranexamic acid should NOT be given in DIC
* This is intended to provide the clinician with possible strategies for patient management & should not replace physician judgment. Consider risk of thrombosis when using reversal agents.			
Reviewed by Pharmacy Anticoagulation Service and Surgical Critical Care			
Last updated: 4/2016			

Bladder Scanning Process - # PC.221

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

Scope: Nursing Personnel, Medical Staff and Allied Health Professionals

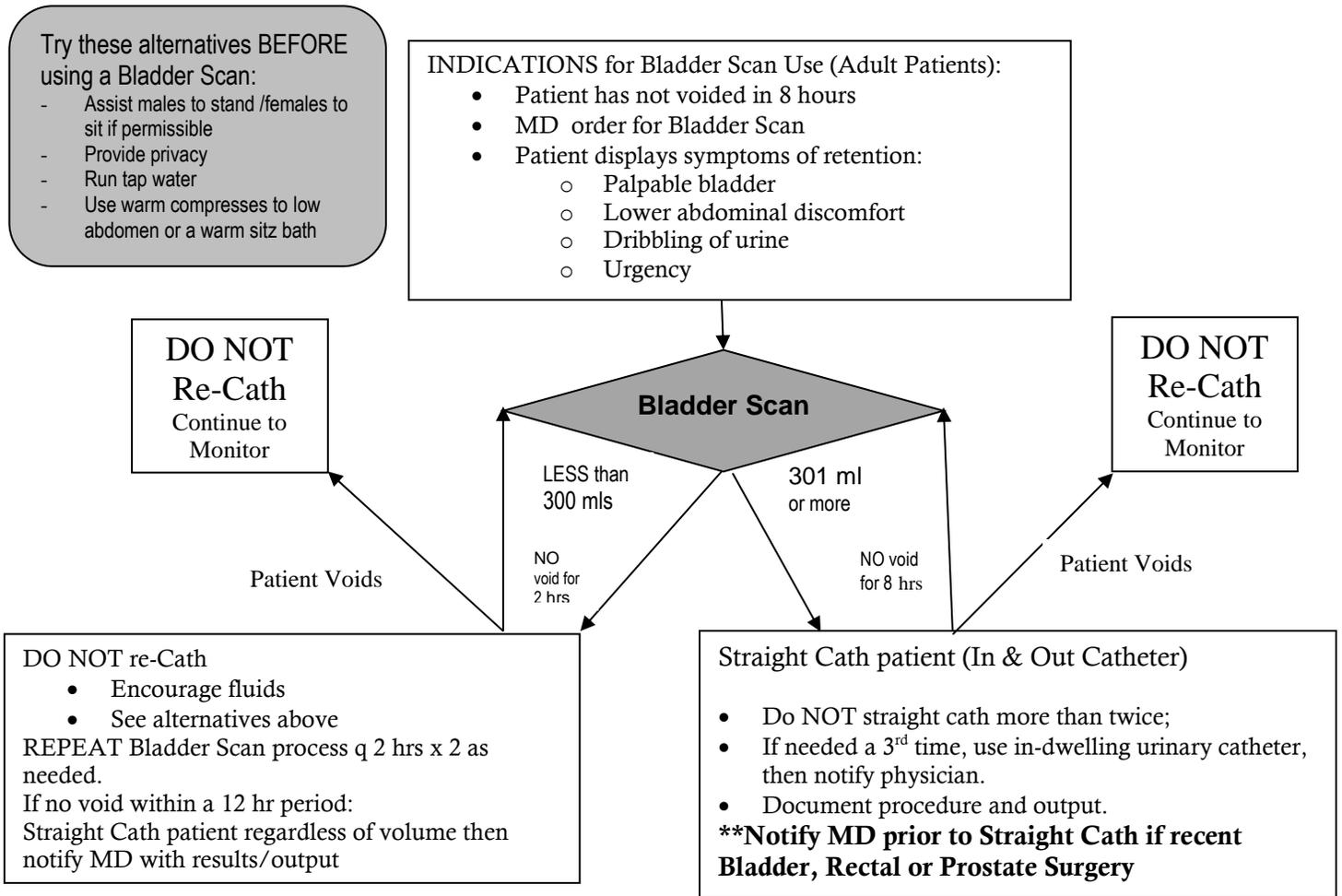
Procedure:

Cleaning and Disinfection of the Probe and Scanner

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

See attached Algorithm:

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



*New admissions: Nursing should NOT place an indwelling catheter without an **Attending Physician or Chief/Fellow's** authorization*

Bladder PMG (for Paraplegia & Quadriplegia) – # 7135.220

Process Guideline 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. AND
- b. Functionally able to participate and/or has family available and willing for training. AND
- c. Catheter-free. A Physician should assess and order the removal of the catheter and initiation of the bladder program. AND
- d. Medically appropriate per a trauma physician.

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

III. Intermittent catheterization (IC) programs should be scheduled according to urine outputs. IC procedure performed utilizing sterile technique.

- 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 < 3000 ml. per day when intermittent catheterization is used.
- e. Encourage 6-8 glasses of caffeine free fluids throughout the day. Best practice is to limit po fluids in the P.M.
- f. If patient has reflex voiding, condom caths may be used for males and Ditropan may be used for females.
- g. If patients are sensitive to catheterization, may use 2% xylocaine jelly with lubrication and apply to the tip of the catheter.
 - a. Following use, wash the xylocaine jelly tip with soap and water and dry and store with topical medications.
 - b. 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 should be washed using a bleach solution. Collecting devices should be washed with antimicrobial soap and water after each use. Catheters and collecting devices should be dried, and stored in a clean dry place. If traveling and needing to take supplies with the patient, they should be stored in a paper bag (not plastic).
 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. They should also be instructed on when to seek medical attention for a potential urinary tract infection.
- b. 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.
- c. The patient and caregiver should be educated regarding the importance of keeping a 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 Goose bumps, sweating, or red blotches above the level of injury,

hypertension (increase of 30-40mmhg systolic), stuffy nose, severe/pounding headache, and bradycardia. Any of these symptoms could be present, but not necessarily all of these symptoms. If noted and patient has a foley catheter, foley should be checked for kinks. When noted, raise the head of the bed, perform intermittent catheterization (if patient doesn't have foley present), and notify the physician.

Blood and Blood Product Administration Policy - # PC-179

Policy statement: The nurse performs blood and blood product administration to:

1. Provide volume replacement in the presence of massive hemorrhage
2. Improve the blood's oxygen-carrying capacity by increasing the circulating volume of hemoglobin
3. Replenish the blood with the constituents necessary for clotting to inhibit further bleeding
4. Provide granulocytes for the neutropenic patient with an infection

Scope: Licensed hospital personnel

Policy:

***See Elsevier Clinical Skills, "Blood Product Administration" for procedural reference.**

A. Obtaining Consent

1. The physician should explain the procedure and associated benefits and risks to the patient.
2. Explain the signs and symptoms of a transfusion reaction. The patient may be the first to recognize the signs and symptoms of a transfusion reaction.
3. Have the patient sign consent to receive blood and/or blood products and insure the form is completed **before** obtaining the crossmatch and **PRIOR** to beginning the transfusion.

B. Ordering

1. The patient should have a pre-transfusion hemoglobin level. In the outpatient area only, it is acceptable to use a pre-transfusion Hemoglobin (hgb) and Hematocrit (hct) level printed on a letterhead by an accredited laboratory. If this is not available, a hgb and hct will be performed by the hospital.
2. Verify physician order for transfusion therapy. Physician order should include name of the specific blood product and the rate of the infusion.
3. Verify that a current type and crossmatch is available in the blood bank. **Note:** Type and crossmatch specimens are only valid for 72 hours from date/time of collection.
4. If type and cross match is not current or present, obtain a blood specimen for type and crossmatch and send it to the blood bank (see PC-184).
 - If the patient's name changes after type and cross has been completed and the hospital arm band has been updated with the new name- a new crossmatch with a new blood bank armband **MUST** be collected to ensure proper identification with 2 positive identifiers. **A name update should not be performed on any actively bleeding patient (i.e.: DOE) until the bleed is considered under control. This process is to ensure there will not be a delay for any blood or blood products due to name change.**
5. If Rhogam is to be administered, it must be given by an **RN**, via IM injection. Rhogam should be given within 72 hours of delivery of a baby.

C. Obtaining the blood and/or blood products from the blood bank

1. Release the blood product in the EMR. This will print a requisition in the blood bank and on the patient's unit printer.
 - **Attach** a small alphanumeric sticker from the patient's blood bank armband to the requisition and write your phlebotomy code on the form. A completed form is required and must be presented when picking up blood products in the lab.
2. Both nursing personnel and bank personnel will visually and verbally verify all information on the blood issue form, the blood requisition and blood product(s) accurately match before the blood product(s) are released from the blood bank.

D. Verifying blood product(s) at the patient's bedside

An RN must initiate all blood product(s) administration. A second licensed person will serve as both a witness and a co-sign in the EMR following the review, verification and bar code scanning of the following data:

1. Scan unit number
2. Scan the donor ID number (volunteer donor number)
3. Scan the ABO group and Rh type
4. Scan the expiration date
5. Select the appropriate product code from the drop down box.
***Note:** All ED sites and Life Force, the second witness may be an EMT-P. In surgery, the witness may be nursing/surgery personnel.
6. **If there are any errors or inconsistencies in any of the reviewed or scanned data, do not administer the blood or blood product(s). Notify the blood bank immediately.**

E. Administration

1. Blood and/or blood products should be initiated within **30 minutes** of arrival on the nursing unit and should hang for a maximum of **4 hours**.
2. If blood components are obtained from blood bank and the order changes (**decide not to infuse**), the blood product **can only be returned to the blood bank within the first 30 minutes from the time it leaves the blood bank** (if not in an appropriate lab cooler).
3. Blood products must be stored in a validated blood bank cooler where temperature is maintained between 1 to 6° Celsius. **Never store blood or blood products in a nursing unit refrigerator or cooler which has not been validated by the blood bank.**
4. Return all unopened (unused) blood or blood products to the blood bank for disposal.

F. Documentation

1. Document flow rate and assessment of venipuncture site during the transfusion
2. Document vital signs before initiation, after 15 minutes and hourly
3. Document any reactions, interventions and results
4. All patient education
5. Update plan of care
6. Document total volume infused and the stop time in the I&O flow sheet
7. Document blood/blood product administration charge

G. Emergency Resuscitation

***Applies to the ED, OR, L&D**

****NICU (Neonatal ICU) will follow departmental policy**

1. In emergency resuscitative situations, patients can be given blood which is not crossmatched (Red Tag Blood).
2. Due to the national shortage of O negative blood, O positive is given to men >16 years of age and women >55 years of age or with a documented hysterectomy.
3. The physician who is in charge of the resuscitative efforts will order the O negative (O positive) Red Tag blood.
4. The un-crossmatched blood may be removed from the blood bank refrigerators located in the adult ED, children's ED, main OR, or L&D. The blood bank is to be notified **immediately** when Red Tag blood is administered.
5. The un-crossmatched blood is administered using appropriate procedures as outlined above.
6. The transfusion must be started by a RN utilizing the identification process as above.
7. Patient should be monitored for any reactions to the transfusion.
8. Documentation of the transfusion is the same as outlined above.
9. The "salmon sheet" which is attached to each unit of O negative/positive blood is completed by the RN administering the blood and is signed by the ordering physician in the appropriate area.
10. The "salmon sheet" is returned to the blood bank after the blood administration is complete.

H. Massive Transfusion

See 7135-215, Massive Blood Resuscitation Protocol

Blunt Cerebrovascular Injury and Treatment Protocol PMG – # 7135.8

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 -- an injury or injuries to the carotid or vertebral artery

Procedure:

A. 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

B. Risk factors for BCVI (Denver Criteria):

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

C. Screening Modality:

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

D. 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

E. 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 angio-interventional) **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

Blunt Liver Trauma PMG - # 7135.17

Statement: To develop and provide a systematic approach for the care of patients who have suffered blunt hepatic trauma.

A. Introduction to the care of blunt hepatic trauma:

1. Immediate Surgical Indications

Surgical management of blunt grade V hepatic trauma with retro-hepatic vena-cava (RHVC) injury (figures 1&2 on page 4) usually requires emergent operative exploration with an aggressive surgical exposure such as total hepatic isolation. Penetrating liver injuries associated with injury to other intraabdominal organs also require emergent exploration. Isolated right sided penetrating thoraco-abdominal injuries may be treated non-operatively with only a chest tube and/or interventional radiology if imaging reveals no likelihood of hollow viscus injury. The liver will typically buttress holes in the diaphragm obviating any need for surgical repair on the right side.

2. Interventional Radiology and Delayed Hemorrhage

Excluding the possibilities mentioned above, most of hepatic trauma is usually managed non-operatively (~85% in most series) or minimally invasively with angioembolization which is the focus of this guideline. Unlike the spleen, the liver infrequently develops pseudoaneurysms (extra-luminal contrast enhancement totally surrounded by liver parenchyma) in lower grade injuries and follow-up imaging is not necessary for grade I – III injuries unless the H/H drops without other explanation. When delayed bleeding occurs, it can present as hemobilia. In this circumstance, a CT scan may or may not show a blush (abnormal intravenous contrast enhancement) and is usually not associated with an increased hepatic hematoma. Work up for hemobilia can include an EGD to identify blood coming from the ampula of Vater if the patient presents with blood per rectum or hematemesis. In this case the EGD will allow exclusion of other sources of upper GI bleeding such as gastritis or a peptic ulcer etc. In some cases, it may be prudent to proceed directly to IR for definitive diagnosis and treatment if the patient appears to be actively bleeding with signs of shock. Treatment is individualized and requires point of care decisions and direct communication with consultants such as IR, GI and the trauma attending.

Unlike splenic trauma that would go emergently to surgery, liver injury patients with active extravasation of contrast (intravenous contrast pooling freely into the abdominal cavity) or contained hepatic blush can be taken emergently to IR with active blood product administration if there is no other concomitant sources of bleeding. Most series demonstrate reduced blood transfusions if patients can be transported urgently (< 30 minutes) to IR for angioembolization of hepatic arterial bleeds. Abdominal distension may be significant in this scenario and patients need to be monitored for abdominal compartment syndrome.

3. Biloma

While the risk of bile leak can at least in theory occur with any with any liver injury, the risk increases with increasing severity. If any liver injury patient develops an unexplained fever, leukocytosis, abdominal distension, jaundice or an ileus, they may require workup for a biloma which may require a CT and a HIDA scan.

B. Guidelines:

The following guidelines should be used for blunt trauma patients:

1. All trauma patients who meet criteria for level I & II activations should undergo a FAST examination, unless it is an isolated trauma that does not include the chest or abdomen.
2. Level III trauma patients should be considered for a FAST examination.
3. The FAST examination should be performed by the Emergency Medicine attending or by an Emergency Medicine resident who has completed his/her ultrasound rotation.
4. The FAST examination must be interpreted by the operating surgical team if basing emergency surgery on the examination.
5. If the patient is hypotensive with a positive FAST, consideration should be to take the patient to the operating room for emergency surgical intervention.
6. If the patient is stable with a positive FAST, CT scan should be done on an expedited basis with presence of the trauma chief or trauma attending in the CT scanner with the patient.
7. If the patient is stable with a negative FAST, standard work-up should proceed.
8. If the patient is unstable with a negative or equivocal FAST, consideration should be given to DPL if inadequate windows were obtained and there were no findings on chest or pelvic radiograph that would explain the patient's condition.
9. The results of all FAST exam for blunt Level I & II traumas will be correlated with CT scan or operative findings.

Blunt Splenic Trauma Inpatient PMG - #7135.9

1. Introduction

There can be many causes of hypotension in blunt trauma that must be considered in the formulation of an appropriate treatment plan. In the case of splenic trauma, careful analysis of certain CT scan characteristics of the injured spleen real-time by the treating clinician is necessary in determining if the spleen is indeed a likely cause of hypotension. Additionally, unique to the natural history of the injured spleen relative to other solid organs is the formation of pseudoaneurysm(s) that can lead to delayed bleeding even in the most innocuous splenic injury. A **pseudoaneurysm (PA)** in this context is defined as an abnormal contrast enhancement, as compared to normal parenchymal vessels, completely contained within the parenchyma of the spleen. PAs can occur acutely on the initial CT or develop over 24 to 48 hours. This unique propensity of PA formation is why *every* splenic injury deserves a follow up scan. **Active extravasation** in reference to splenic trauma means that intravenous contrast is escaping from the parenchyma of the spleen indicating potentially life-threatening hemorrhage. With these considerations in mind, the following conditions dictate the management of blunt splenic trauma.

2. Guidelines

- a. Hemodynamically **unstable** patients with splenic injury and evidence of contrast extravasation or PA on CT scan should undergo **emergent** laparotomy.
- b. Hemodynamically stable patients with free intraperitoneal contrast need **emergent** laparotomy or in select cases of **unequivocal** hemodynamic stability, **emergent** interventional radiology for splenic embolization.
- c. Hemodynamically stable patients with grade IV or V injuries, sub-capsular splenic hematomas or PA should be considered for arteriogram and angiographic embolization and **should also be admitted to the ICU.**
- d. Hemodynamically stable grade I-III injuries *may* be admitted to the floor if ICU care is not necessary for other injuries.
- e. A follow up CT scan with IV contrast should be performed within 24 to 48 hours of admission on **all** blunt splenic trauma.
- f. Patients with PA or other evidence of progression of splenic injury detected on follow up CT imaging should be considered for arteriogram and angioembolization.
- g. Patients **55 years and older are at increased risk for failure of nonoperative management** and require more vigilant ICU monitoring and may best served with lower thresholds for arteriography and splenectomy.

Bowel Program Digital Stimulation PMG - # 7135.222

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

Scope: All Trauma Surgical Critical Care Staff/ Nursing

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

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

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

- I. Perform rectal digital stimulation 30 minutes following meal or hot liquid. A suppository and/or enema may also be used in conjunction with rectal digital stimulation as per physician orders.
- II. Assemble equipment:
 - a. Examination gloves (obtain several pairs- will be changing frequently)
 - b. Water soluble lubricant and/or local anesthetic ointment (requires physician's order).
 - c. Under pads
 - d. Wash basin, wash cloths and towels
 - e. Bed, commode or bedside commode with any bowel program equipment as per OT and PT.
- III. Explain procedure to patient.
- IV. Wash hands.
- V. 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.
- VI. Don gloves and apply a liberal amount of lubricant (and local anesthetic if ordered) to index finger.
- VII. 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.
- VIII. 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.
- IX. When results are produced, assist the removal of stool when necessary. Must wait 15 minutes before continuing the program. Continue to dilitate the patient until no more stool is produced for 5 minutes.
- X. 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 effects.
- XI. Cleanse the perineal area with soap and water and dry following the procedure.
- XII. Return the patient to a safe and comfortable position.
- XIII. Dispose of stool and contaminated material appropriately and document the procedure, the results and the patient's tolerance to the program.
- XIV. Educate the patient/caregiver on the procedure and assess for ability and willingness to competently perform. Document the education process.

Brain Death Determination for Adult Patients and Pediatric Patients - # 8316.004

Policy Statement: Criteria for Brain Death Declaration for both Adult and Pediatric patients.

Scope: Erlanger Health System (EHS) personnel (Adult and Pediatrics), 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.

I. GENERAL PROCEDURE

1. When the criteria are met and agreed upon by required physicians, the Brain Death Examination documentation **MUST** 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 or designee, 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/her 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.

II. Adult Procedure - For Patients 18 years and older

I. Criteria for Brain Death

- A. Prerequisites
 1. Clinical or neuro-imaging evidence of an acute CNS catastrophe that is compatible with the clinical diagnosis of brain death.
 2. Exclusion of complicating medical conditions that may confound clinical assessment (no severe electrolyte, acid-base or endocrine disturbance).
 3. No drug intoxication or poisoning.
 4. Core temperature $>36^{\circ}$ (96.8 $^{\circ}$).
 5. Absence of hypotension (Blood pressure above 100 mm/Hg systolic).
- B. The period of observation required to confirm the diagnosis of brain death will vary according to specific clinical circumstances. A minimum of six (6) hours is recommended, except when the cause of coma is not known or the potential for recovery is uncertain in which a longer period may be needed.
- C. Neurological Criteria: The three cardinal findings in brain death are coma or unresponsiveness, absence of brain stem reflexes and apnea. .
 1. Coma or unresponsiveness – lack of all evidence of responsiveness. No cerebral motor response to pain in all extremities (nail-bed pressure and supraorbital pressure). Eye opening or eye movement to noxious stimuli is absent. True decerebrate or decorticate posturing or seizures *are inconsistent* with the diagnosis of death.
 2. Absence of brainstem reflexes:

- i. Pupils
 1. Absence of papillary response to bright light documented in both eyes.
 2. Size: mid-position (4 mm) to dilated (9 mm)
- ii. Ocular movement (Absence of)
 1. No oculocephalic reflex (testing only when no fracture or instability of the cervical spine is apparent). - Dolls head phenomenon – if the head is briskly rotated horizontally and vertically, there shall be no movement of the eyes relative to head movement (toward the opposite side).
 2. No Oculovestibular reflex - No deviation of the eyes to irrigation in each ear with 50ml of **cold** water (allow 1 minute after injection and at least 5 minutes between testing on each side).
 3. No corneal reflex – Absent of corneal reflex when touching the corneal with a piece of tissue paper, cotton swab, or squirts of water. No eyelid movement should be seen.
 4. Absence of facial muscle movement to noxious stimulus. No grimacing or facial muscle movement when deep pressure applied to supraorbital ridge, or deep pressure on the condyles at the level of the temporomandibular joint with no jaw reflex.
 5. Absence of the pharyngeal and tracheal reflexes.
 - No pharyngeal or gag reflex after stimulation of the posterior pharynx with tongue blade or suction device (no gag).
 - No cough response to insertion of catheter into trachea, advanced to level of carina, followed by 1 or 2 suctioning passes
- iii. Apnea
 1. The Attending physician, and/or their designated physician, who is competent in the application of apnea testing and brain death criteria must be present during the apnea test.
 2. Absence of a breathing drive. CO₂ challenge documenting an increase in PaCO₂ (above normal levels). Prerequisites for test:
 - Normotension - Systolic blood pressure >100 mm/Hg
 - Normothermia- Core temperature >36°C or 96.8°F
 - Euvolemia - An option is a positive fluid balance in the previous six (6) hours
 - Eucapnia (PaCO₂ 35 – 45 mm Hg)
 - Absence of hypoxia
 - No prior evidence of CO₂ retention (i.e. Chronic Obstructive Pulmonary Disease, Severe Obesity)
 3. Adjust vasopressors to a systolic blood pressure ≥100 mm/Hg.
 4. Perform Apnea Test
 - Pre-oxygenation for at least 10 minutes with 100% oxygen to obtain arterial PO₂>200 mm/Hg.
 - Adjust ventilator settings to get eucapnia. Get baseline ABG. (Reduce down to at least 10 breaths per minute and/or < 5 cm H₂O PEEP for eucapnia).
 - If pulse oximetry oxygen saturation remains > 95%, obtain a baseline blood gas (PaO₂, PaCO₂, pH, bicarbonage, base excess)
 - Disconnect from ventilator.
 - Deliver 100% O₂ into trachea (use cannula or T-tube) to preserve oxygenation
 - Look closely for respiratory movements for 8 – 10 minutes (abdominal or chest).
 - Abort if systolic blood pressure decreases to < 90 mm Hg
 - Abort if oxygen saturation via pulse oximetry is <85% for > 30 seconds
 - Abort if cardiac arrhythmias are present, immediately reconnect to ventilator, draw an arterial blood sample and analyze arterial blood gas.
 - If no respiratory drive is observed, repeat blood gases (measure arterial PO₂, PCO₂, pH, bicarbonate, base excess) after approximately 8 minutes
 - Reconnect the ventilator.

- If respiratory movements are absent and arterial PCO₂ is > 60 mm/Hg (or: 20 mm Hg increase in arterial PCO₂ over baseline normal arterial PCO₂), the apnea test result is positive (supporting the clinical diagnosis of brain death).
- If the test is inconclusive by the patient is hemodynamically stable during the procedure, it may be repeated for a longer period of time (10 – 15 minutes) after the patient is again adequately preoxygenated.
- If ventilator settings were changed for preparation of the apnea test, be sure to return original settings.

iv. Ancillary / Confirmatory Tests

A confirmatory test will be done only on patients for whom specific components of clinical testing cannot be reliably performed or evaluated. The following confirmatory test findings are:

- Cerebral Nuclear Scan – Technetium-99m hexamethylpropylene-amineoxime brain scan. Absence of cerebral blood flow with NO uptake of isotope in brain parenchyma.
- Cerebral Angiography – (CTA) - no intracerebral filling at the level of carotid bifurcation or Circle of Willis.
- Transcranial Doppler Ultrasonography (TCD)

II. Pitfalls in the diagnosis of brain death:

The following conditions may interfere with the clinical diagnosis of brain death, so that the diagnosis cannot be made with certainty on clinical grounds alone – confirmatory test(s) are recommended.

- A. Severe facial trauma.
- B. Pre-existing papillary abnormalities
- C. Toxic levels of any sedative drugs, aminoglycosides, tricyclic antidepressants, anticholinergics, antiepileptic drugs, chemotherapeutic agents, or neuromuscular blocking agents.
- D. Sleep apnea or severe pulmonary disease resulting in chronic retention of CO₂.

III. **Clinical observations compatible with the diagnosis of brain death.** These manifestations are occasionally seen and should not be misinterpreted as evidence for brainstem function.

- A. Spontaneous movements of limbs other than pathological flexion or extension response
- B. Respiratory-like movements (shoulder elevation and adduction, back arching intercostals expansion without significant tidal volumes)
- C. Sweating, blushing, tachycardia
- D. Normal blood pressure without pharmacologic support or sudden increases in blood pressure
- E. Absence of diabetes insipidus
- F. Deep tendon reflexes; superficial abdominal reflexes, triple flexion response
- G. Babinski reflex

IV. Guidelines

1. CIRCULATORY/RESPIRATORY CESSATION

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

2. BRAIN FUNCTION CESSATION (BRAIN DEATH)

- A. Physicians who are active members of the medical staff, and who are skilled in the application of accepted neurological standards based on the neurological criteria to declare brain death, should pronounce brain death.
- B. Considering the responsibility entailed in the determination of death based upon neurological criteria, Neurology or Neurosurgery consultation is recommended.

- C. After the physician has seen the patient and made a diagnosis and a prognosis (irreversibility) regarding brain death, a senior level resident that has been educated in the diagnosis of brain death, may make the declaration of brain death after re-evaluation.
- D. Medical record documentation must include Determination of Brain Death Checklist. (see Addendum A)
- E. TDS is to be notified of anyone who has died or death is imminent or a Glasgow Coma score or < 5 or any one identified potential organ donors/patients eligible for a declaration of death based on irreversible cessation of brain function according to the TCA 68-3-501 (2), within 1 (one) hour of awareness.
- F. In the event of organ donation, the patient will be supported by mechanical means, under the care of the organ retrieval team until this is completed.
- G. Time of death **must be** recorded as the time "Brain Death" is declared. Record on Record of Death the time the patient is pronounced brain dead.
- H. Once the diagnosis of brain death has been established, the patient will be removed from ventilator support within 6 hours unless the family is considering donation.

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

ADDENDUM
Checklist for Determination of Brain Death

Prerequisites (all must be checked)

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

Examination (all must be checked)

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

Apnea Testing (all must be checked)

The Attending physician, and/or their designated physician who is competent in the application of apnea testing and brain death criteria must be present during the apnea test.

- Patient is hemodynamically stable.
- Ventilator adjusted to provide normocarbia (PaCO₂ 35 – 45 mm Hg).
- Patient preoxygenated with 100% FiO₂ for > 10 minutes to PaO₂ > 200 mm Hg.
- Patient well-oxygenated with a positive end-expiratory pressure (PEEP) of 5 cm of water.
- Provide oxygen via a suction catheter to the level of the carina at 6 L/min or attach T-piece with continuous positive airway pressure (CPAP) at 10 cm H₂O.
- Disconnect ventilator.
- Spontaneous respirations absent
- Arterial blood gas drawn at 8 – 10 minutes, patient reconnected to ventilator.
- PCO₂ ≥ 60 mm Hg or 20 mm Hg rise from normal baseline value

OR

- Apnea test aborted or deferred due to underlying pulmonary condition

Ancillary testing (only one needs to be performed) (to be ordered only if clinical examination cannot be fully performed due to patient factors, or if apnea testing inconclusive or aborted or deferred)

- HMPAO SPECT- Brain Flow Study by Nuclear Med.
- Cerebral angiogram- CTA

Time of Death (DD/MM/YY) _____/_____/_____

Name of Physician (print): _____

Signature of Physician: _____

III. PEDIATRIC PROCEDURE for Patient less than 18 years of age

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

- I. Determination of brain death in neonates, infants, and children relies on a clinical diagnosis that is based on the absence of neurologic function with a known irreversible cause of coma. Coma and apnea must coexist to diagnose brain death. This diagnosis should be made by physicians who have evaluated the history and completed the neurologic examination.
- II. Prerequisites for initiating a brain death evaluation:
 - a. Hypotension, hypothermia, and metabolic disturbances that could affect the neurologic examination must be corrected before examination for brain death.
 - b. Sedatives, analgesics, neuromuscular blockers, and anticonvulsant agents should be discontinued for a reasonable time period based on elimination half-life of the pharmacologic agent to ensure they do not affect the neurologic examination. Knowledge of the total amount of each agent (mg/kg) administered since hospital admission may provide useful information concerning the risk of continued medication effects. Blood or plasma levels to confirm high or supratherapeutic levels of anticonvulsants with sedative effects that are not present should be obtained (if available) and repeated as needed or until the levels are in the low to midtherapeutic range.
 - c. The diagnosis of brain death based on neurologic examination alone should not be made if supratherapeutic or high therapeutic levels of sedative agents are present. When levels are in the low or in the midtherapeutic range, medication effects sufficient to affect the results of the neurologic examination are unlikely. If uncertainty remains, an ancillary study should be performed.
 - d. Assessment of neurologic function may be unreliable immediately after cardiopulmonary resuscitation or other severe acute brain injuries and evaluation for brain death should be deferred for >24-48 hours if there are concerns or inconsistencies in the examination.
- III. Number of examinations, examiners, and observation periods:
 - a. Two examinations including apnea testing with each examination separated by an observation period are required.
 - b. The examinations should be performed by different attending physicians involved in the care of the child. The apnea test may be performed by the same physician, preferably the attending physician who is managing ventilator care of the child.
 - c. Recommended observation periods:
 1. Twenty-four hours for neonates (37 weeks gestation to term infants 30 days of age)
 2. Twelve hours for infants and children (>30 days to 18 years)
 - d. The first examination determines the child has met neurologic examination criteria for brain death. The second examination, performed by a different attending physician, confirms that the child has fulfilled criteria for brain death.
 - e. Assessment of neurologic function may be unreliable immediately after cardiopulmonary resuscitation or other severe acute brain injuries and evaluation for brain death should be deferred for >24-48 hours if there are concerns or inconsistencies in the examination.
- IV. Apnea testing:
 - a. Apnea testing must be performed safely and requires documentation of an arterial PaCO₂ 20 mm Hg above the baseline PaCO₂ and >60 mm Hg with no respiratory effort during the testing period to support the diagnosis of brain death. Some infants and children with chronic respiratory disease or insufficiency may only be responsive to supranormal PaCO₂ levels. In this instance, the PaCO₂ level should increase to >20 mm Hg above the baseline PaCO₂ level.
 - b. If the apnea test cannot be performed as a result of a medical contraindication or cannot be completed because of hemodynamic instability, desaturation to <85%, or an inability to reach a PaCO₂ of >60 mm Hg, an ancillary study should be performed.
- V. Ancillary studies:
 - a. Ancillary studies (electroencephalography and radionuclide cerebral blood flow) are not required to establish brain death unless the clinical examination or apnea test cannot be completed.

- b. Ancillary studies are not a substitute for the neurologic examination.
- c. For all age groups, ancillary studies can be used to assist the clinician in making the diagnosis of brain death to reduce the observation period or when 1) components of the examination or apnea testing cannot be completed safely as a result of the underlying medical condition of the patient; 2) if there is uncertainty about the results of the neurologic examination; or 3) if a medication effect may interfere with evaluation of the patient. If the ancillary study supports the diagnosis, the second examination and apnea testing can then be performed. When an ancillary study is used to reduce the observation period, all aspects of the examination and apnea testing should be completed and documented.
- d. When an ancillary study is used because there are inherent examination limitations (i.e., 1-3 in 5c), then components of the examination done initially should be completed and documented.
- e. If the ancillary study is equivocal or if there is concern about the validity of the ancillary study, the patient cannot be pronounced dead. The patient should continue to be observed until brain death can be declared on clinical examination criteria and apnea testing or a follow-up ancillary study can be performed to assist with the determination of brain death. A waiting period of 24 hours is recommended before further clinical re-evaluation or repeat ancillary study is performed. Supportive patient care should continue during this time period. VI.

VI. Declaration of death:

- a. Death is declared after confirmation and completion of the second clinical examination and apnea test.
- b. When ancillary studies are used, documentation of components from the second clinical examination that can be completed must remain consistent with brain death. All aspects of the clinical examination, including the apnea test, or ancillary studies must be appropriately documented.
- c. The clinical examination should be carried out by experienced clinicians who are familiar with infants and children and have specific training in neuro-critical care.

Neurologic examination components to assess for brain death in neonates, infants, and children^a including apnea testing.

Reversible conditions or conditions that can interfere with the neurologic examination must be excluded before brain death testing.

1. Coma.

- The patient must exhibit complete loss of consciousness, vocalization, and volitional activity.
- Patients must lack all evidence of responsiveness. Eye opening or eye movement to noxious stimuli is absent.
- Noxious stimuli should not produce a motor response other than spinally mediated reflexes. The clinical differentiation of spinal responses from retained motor responses associated with brain activity requires expertise.

2. Loss of all brain stem reflexes, including:

- **Midposition or fully dilated pupils** which do not respond to light. Absence of papillary response to a bright light is documented in both eyes. Usually, the pupils are fixed in a midsize or dilated position(4-9 mm). When uncertainty exists, a magnifying glass should be used.
- **Absence of movement of bulbar musculature including facial and oropharyngeal muscles.** Deep pressure on the condyles at the level of the temporomandibular joints and deep pressure at the supraorbital ridge should produce no grimacing or facial muscle movement.
- **Absent gag, cough, sucking, and rooting reflex.** The pharyngeal or gag reflex is tested after stimulation of the posterior pharynx with a tongue blade or suction device. The tracheal reflex is most reliably tested by examining the cough response to tracheal suctioning. The catheter should be inserted into the trachea and advanced to the level of the carina followed by one or two suctioning passes.

- **Absent corneal reflexes.** Absent corneal reflexes is demonstrated by touching the cornea with a piece of tissue paper, a cotton swab, or squirts of water. No eyelid movement should be seen. Care should be taken not to damage the cornea during testing.
- **Absent oculovestibular reflexes** The oculovestibular reflex is tested by irrigating each ear with ice water (caloric testing) after the patency of the external auditory canal is confirmed. The head elevated to 30°. Each external auditory canal is irrigated (one ear at a time) with approximately 10-50 mL of ice water. Movement of the eyes should be absent during 1 minute of observation. Both sides are tested with an interval of several minutes.

3. Apnea.

- The patient must have the complete absence of documented respiratory effort (if feasible) by formal apnea testing demonstrating a PaCO₂ >60 mm Hg >20 mm Hg increase above baseline.
- Normalization of the pH and PaCO₂ measured by arterial blood gas analysis, maintenance of core temperature >35°C, normalization of blood pressure appropriate for the age of the child, and correcting for factors that could affect respiratory efforts are a prerequisite to testing.
- The patient should be preoxygenated using 100% oxygen for 5-10 minutes before initiating this test.
- Intermittent mandatory mechanical ventilation should be discontinued once the patient is well oxygenated and a normal PaCO₂ has been achieved.
- The patient's heart rate, blood pressure, and oxygen saturation should be continuously monitored while observing for spontaneous respiratory effort throughout the entire procedure.
- Follow-up blood gases should be obtained to monitor the rise in PaCO₂ while the patient remains disconnected from mechanical ventilation.
- If no respiratory effort is observed from the initiation of the apnea test to the time the measured PaCO₂ >60 mm Hg and >20 mm Hg above the baseline level, the apnea test is consistent with brain death.
- The patient should be placed back on mechanical ventilator support and medical management should continue until the second neurologic examination and apnea test confirming brain death is completed.
- If oxygen saturations fall <95%, hemodynamic instability limits completion of apnea testing, or a PaCO₂ level of >60 mm Hg cannot be achieved, the infant or child should be placed back on ventilator support with appropriate treatment to restore normal oxygen saturations, normocarbia, and hemodynamic parameters. Another attempt to test for apnea may be performed at a later time or an ancillary study may be pursued to assist with determination of brain death.
- Evidence of any respiratory effort is inconsistent with brain death and the apnea test should be terminated.

4. Flaccid tone and absence of spontaneous or induced movements, *excluding spinal*

cord events such as reflex withdrawal or spinal myoclonus.

- The patient's extremities should be examined to evaluate tone by passive range of motion assuming that there are no limitations to performing such an examination (e.g., previous trauma, etc.) and the patient observed for any spontaneous or induced movements.
- If abnormal movements are present, clinical assessment to determine whether there are spinal cord reflexes should be done.

Medications administered to critically ill pediatric patients and recommendations for time interval to testing after discontinuation

Medication	Infants/Children Elimination Half-Life	Neonates Elimination Half-Life
Intravenous induction anesthetic, and sedative agents Thiopental Ketamine Etomidate Midazolam Propofol Dexmedetomidine	Adults: 3-11.5 hrs (shorter half-life in children) 2.5 hrs 2.6-3.5 hrs 2.9-4.5 hrs 2-8 mins., terminal half-life 200 mins (range, 300-700 mins) Terminal half-life 83-159 mins (79-81)	4-12 hrs Infants have faster clearance (81-83)
Antiepileptic drugs Phenobarbital Pentobarbital Phenytoin Diazepam Lorazepam Clonazepam Valproic acid Levetiracetam	Infants: 20-133 hrs ^a ; children: 37-73 hrs ^a 25 hrs ^a 11-55 hrs ^a 1 month to 2 yrs: 40-50 hrs 2-12 yrs: 15-21 hrs 12-16 yrs: 18-20 hrs Infants: 40.2 hrs (range, 18-73 hrs) Children: 10.5 hrs (range, 6-17 hrs) 22-33 hrs Children >2 months: 7-13 hrs ^a Children 2-14 yrs: mean 9 hrs; range, 3.5-20 hrs Children 4-12 hrs: 5 hrs	45-500 hrs ^a 63-88 hrs ^a 50-95 hrs 40 hrs 10-67 hrs ^a
Intravenous narcotics Morphine sulfate Meperidine Fentanyl Sufentanil	Infants 1-3 months: 6.2 hrs (5-10 hrs) 6 months to 2.5 yrs: 2.9 hrs (1.4-7.8 hrs) Children: 1-2 hrs Infants <3 months: 8.2-10.7 hrs (range, 4.9-31.7 hrs); infants 3-18 months: 2.3 hrs; children 5-8 yrs: 3 hrs 5 months to 4.5 yrs: 2.4 hrs (mean); 0.5-14 yrs: 21 hrs (range, 11-36 hrs for long-term infusions) Children 2-8 yrs: 97+ 42 mins.	7.6 hrs (range, 4.5-13.3 hrs) (70, 89-91) 23 hrs (range, 12-39 hrs) 1-15 hrs 382-1,162 mins.
Muscle relaxants Succinylcholine Pancuronium Vecuronium Atracurium Rocuronium	5-10 mins; prolonged duration of action in patients with pseudocholinesterase deficiency or mutation 110 mins. 41 mins. 17 mins. 3-12 months: 1.3 + 0.5 hrs 1 to <3 yrs: 1.2 + 0.7 hrs 3 to <8 yrs: 0.8 + 0.3 hrs Adults: 1.4-2.4 hrs	 65 mins. 20 mins

^aElimination half-life does not guarantee therapeutic drug levels for longer-acting medications or medications with active metabolites. Drug levels should be obtained to ensure that levels are in a low to midtherapeutic range before neurologic examination to determine brain death. In some instances, this may require waiting several half-lives and rechecking serum levels of the medication before conducting the brain death examination.

Modified from Ashwal and Schneider (57). Metabolism of pharmacologic agents may be affected by organ dysfunction and hypothermia. Physicians should be aware of total amounts of administered medication that can affect drug metabolism and levels.

Comatose Child
(37 weeks gestational age to 18 years of age)

Does Neurologic Examination Satisfy Clinical Criteria for Brain Death?

A. Physiologic parameters have been normalized:
 1. Normothermic: Core Temp. > 35°C (95°F)
 2. Normotensive for age without volume depletion

B. Coma: No purposeful response to external stimuli (exclude spinal reflexes)

C. Examination reveals absent brainstem reflexes: Pupillary, corneal, vestibuloocular (Caloric), gag

D. Apnea: No spontaneous respirations with a measured pCO₂ ≥ 20 mm Hg above the baseline PaO₂

NO

A. Continue observation and management
B. Consider diagnostic studies: baseline EEG, and imaging studies

YES

Toxic, drug or metabolic disorders have been excluded?

NO

A. Await results of metabolic studies and drug screen
B. Continued observation and reexamination

YES

Patient Can Be Declared Brain Dead
(by age-related observation periods*)

A. Newborn 37 weeks gestation to 30 days: Examinations 24 hours apart remain unchanged with persistence of coma, absent brainstem reflexes and apnea. Ancillary testing with EEG and CBF studies should be considered if there is any concern about the validity of the examination.

B. 30 days to 18 years: Examinations 12 hours apart remain unchanged. Ancillary testing with EEG or CBF studies should be considered if there is any concern about the validity of the examination.

*Ancillary studies (EEG & CBF) are not required but can be used when (1) components of the examination or apnea testing cannot be safely completed; (2) there is uncertainty about the examination; (3) if a medication effect may interfere with evaluation or (4) to reduce the observation period.

Brain Death Examination for Infants and Children

Two physicians must perform independent examination separated by specified intervals.

Age of Patient	Timing of first exam	Inter-exam, interval			
Term newborn 37 weeks gestational age and up to 30 days old	<input type="checkbox"/> First exam may be performed 24 hours after birth OR following cardiopulmonary resuscitation or other severe brain injury	<input type="checkbox"/> At least 24 hours <input type="checkbox"/> Interval shortened because ancillary study (section 4) is consistent with brain death			
31 days to 18 years old	<input type="checkbox"/> First exam may be performed 24 hours following cardiopulmonary resuscitation or other severe brain injury	<input type="checkbox"/> At least 12 hours OR <input type="checkbox"/> Interval shortened because ancillary study (section 4) is consistent with brain death			
Section 1. PREREQUISITES for brain death examination and apnea test					
A. IRREVERSIBLE AND IDENTIFIABLE Cause of Coma (Please check)					
<input type="checkbox"/> Traumatic brain injury <input type="checkbox"/> Anoxic brain injury <input type="checkbox"/> Known metabolic disorder <input type="checkbox"/> Other (specify)					
B. Correction of contributing factors that can interfere with the neurologic examination		Examination One		Examination Two	
a. Core Body Temp is over 95° F (35° C)		<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Yes	<input type="checkbox"/> No
b. Systolic blood pressure or MAP in acceptable range (Systolic BP not less than 2 standard deviations below age appropriate norm) based on age		<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Yes	<input type="checkbox"/> No
c. Sedative/analgesic drug effect excluded as a contributing factor		<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Yes	<input type="checkbox"/> No
d. Metabolic intoxication excluded as a contributing factor		<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Yes	<input type="checkbox"/> No
e. Neuromuscular blockade excluded as a contributing factor		<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Yes	<input type="checkbox"/> No
<input type="checkbox"/> If ALL prerequisites are marked YES, then proceed to section 2, OR If confounding variable was present. Ancillary study was therefore performed to document brain death. (Section 4).					
Section 2. Physical Examination (Please check) NOTE: SPINAL CORD REFLEXES ARE ACCEPTABLE		Examination One Date/Time:		Examination Two Date/Time	
a. Flaccid tone, patient unresponsive to deep painful stimuli		<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Yes	<input type="checkbox"/> No
b. Pupils are midposition or fully dilated and light reflexes are absent		<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Yes	<input type="checkbox"/> No
c. Corneal, cough, gag reflexes are absent Sucking and rooting reflexes are absent (in neonates and Infants)		<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Yes	<input type="checkbox"/> No
d. Oculo-vestibular reflexes are absent		<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Yes	<input type="checkbox"/> No
e. Spontaneous respiratory effort while on mechanical ventilation is absent		<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Yes	<input type="checkbox"/> No
<input type="checkbox"/> The _____ (specify) element of the exam could not be performed because _____. Ancillary study (EEG or radionuclide CBF) was therefore performed to document brain death. (Section 4).					
Section 3. APNEA Test		Examination One Date/Time		Examination Two Date/Time	
No spontaneous respiratory efforts were observed despite final PaCO ₂ ≥ 60 mm Hg and a ≥ 20 mm Hg increase above baseline. (Examination One) No spontaneous respiratory efforts were observed despite final PaCO ₂ ≥ 60 mm Hg and a ≥ 20 mm Hg increase above baseline. (Examination Two)		Pretest PaCO ₂ : _____ Apnea duration: _____ min Posttest PaCO ₂ : _____		Pretest PaCO ₂ : _____ Apnea duration: _____ min Posttest PaCO ₂ : _____	
Apnea test is contraindicated or could not be performed because _____					

Section 4. ANCILLARY testing is required when (1) any components of the examination or apnea testing cannot be completed; (2) if there is uncertainty about the results of the neurologic examination; or (3) if a medication effect may be present. Ancillary testing can be performed to reduce the inter-examination period, however, a second neurologic examination is required. Components of the neurologic examination that can be performed safely should be completed in close proximity to the ancillary test.	Date/Time: <hr/>
<input type="checkbox"/> Electroencephalogram (EEG) report documents electrocerebral silence OR	<input type="checkbox"/> Yes <input type="checkbox"/> No
<input type="checkbox"/> Cerebral Blood Flow (CBF) study report documents no cerebral perfusion	<input type="checkbox"/> Yes <input type="checkbox"/> No
Section 5. Signatures	
Examiner One	
I certify that my examination is consistent with cessation of function of the brain and brainstem. Confirmatory exam to follow <hr/> <div style="display: flex; justify-content: space-between;"> (Printed Name) (Signature) </div> <hr/> <div style="display: flex; justify-content: space-between;"> (Specialty) (Pager #/License #) (Date mm/dd/yyyy) (Time) </div>	
Examiner Two	
<input type="checkbox"/> I certify that my examination <input type="checkbox"/> and/or ancillary test report <input type="checkbox"/> confirms unchanged and irreversible cessation of function of the brain and brainstem. The patient is declared brain dead at this time. Date/Time of death: _____ <hr/> <div style="display: flex; justify-content: space-between;"> (Printed Name) (Signature) </div> <hr/> <div style="display: flex; justify-content: space-between;"> (Specialty) (Pager #/License #) (Date mm/dd/yyyy) (Time) </div>	

Brain Death Examination for Infants and Children

Two physicians must perform independent examination separated by specified intervals.

Age of Patient	Timing of first exam	Inter-exam, interval	
Term newborn 37 weeks gestational age and up to 30 days old	<input type="checkbox"/> First exam may be performed 24 hours after birth OR following cardiopulmonary resuscitation or other severe brain injury	<input type="checkbox"/> At least 24 hours <input type="checkbox"/> Interval shortened because ancillary study (section 4) is consistent with brain death	
31 days to 18 years old	<input type="checkbox"/> First exam may be performed 24 hours following cardiopulmonary resuscitation or other severe brain injury	<input type="checkbox"/> At least 12 hours OR <input type="checkbox"/> Interval shortened because ancillary study (section 4) is consistent with brain death	
Section 1. PREREQUISITES for brain death examination and apnea test			
A. IRREVERSIBLE AND IDENTIFIABLE Cause of Coma (Please check)			
<input type="checkbox"/> Traumatic brain injury <input type="checkbox"/> Anoxic brain injury <input type="checkbox"/> Known metabolic disorder <input type="checkbox"/> Other (specify)			
B. Correction of contributing factors that can interfere with the neurologic examination	Examination One	Examination Two	
a. Core Body Temp is over 95° F (35° C)	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
b. Systolic blood pressure or MAP in acceptable range (Systolic BP not less than 2 standard deviations below age appropriate norm) based on age	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
c. Sedative/analgesic drug effect excluded as a contributing factor	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
d. Metabolic intoxication excluded as a contributing factor	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
e. Neuromuscular blockade excluded as a contributing factor	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
<input type="checkbox"/> If ALL prerequisites are marked YES, then proceed to section 2, OR <input type="checkbox"/> If confounding variable was present. Ancillary study was therefore performed to document brain death. (Section 4).			

Section 2. Physical Examination (Please check) NOTE: SPINAL CORD REFLEXES ARE ACCEPTABLE	Examination One Date/Time:		Examination Two Date/Time	
a. Flaccid tone, patient unresponsive to deep painful stimuli	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Yes	<input type="checkbox"/> No
b. Pupils are midposition or fully dilated and light reflexes are absent	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Yes	<input type="checkbox"/> No
c. Corneal, cough, gag reflexes are absent Sucking and rooting reflexes are absent (in neonates and Infants)	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Yes	<input type="checkbox"/> No
d. Oculo-vestibular reflexes are absent	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Yes	<input type="checkbox"/> No
e. Spontaneous respiratory effort while on mechanical ventilation is absent	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Yes	<input type="checkbox"/> No
<input type="checkbox"/> The _____ (specify) element of the exam could not be performed because _____. Ancillary study (EEG or radionuclide CBF) was therefore performed to document brain death. (Section 4).				
Section 3. APNEA Test	Examination One Date/Time		Examination Two Date/Time	
No spontaneous respiratory efforts were observed despite final PaCO ₂ ≥ 60 mm Hg and a ≥ 20 mm Hg increase above baseline. (Examination One) No spontaneous respiratory efforts were observed despite final PaCO ₂ ≥ 60 mm Hg and a ≥ 20 mm Hg increase above baseline. (Examination Two)	Pretest PaCO ₂ : _____ Apnea duration: _____ min Posttest PaCO ₂ : _____		Pretest PaCO ₂ : _____ Apnea duration: _____ min Posttest PaCO ₂ : _____	
Apnea test is contraindicated or could not be performed because _____				
Section 4. ANCILLARY testing is required when (1) any components of the examination or apnea testing cannot be completed; (2) if there is uncertainty about the results of the neurologic examination; or (3) if a medication effect may be present. Ancillary testing can be performed to reduce the inter-examination period, however, a second neurologic examination is required. Components of the neurologic examination that can be performed safely should be completed in close proximity to the ancillary test.			Date/Time: _____	
<input type="checkbox"/> Electroencephalogram (EEG) report documents electrocerebral silence OR			<input type="checkbox"/> Yes <input type="checkbox"/> No	
<input type="checkbox"/> Cerebral Blood Flow (CBF) study report documents no cerebral perfusion			<input type="checkbox"/> Yes <input type="checkbox"/> No	
Section 5. Signatures				
Examiner One				
I certify that my examination is consistent with cessation of function of the brain and brainstem. Confirmatory exam to follow				
_____ (Printed Name)		_____ (Signature)		
_____ (Specialty)	_____ (Pager #/License #)	_____ (Date mm/dd/yyyy)	_____ (Time)	
Examiner Two				
<input type="checkbox"/> I certify that my examination <input type="checkbox"/> and/or ancillary test report <input type="checkbox"/> confirms unchanged and irreversible cessation of function of the brain and brainstem. The patient is declared brain dead at this time.				
Date/Time of death: _____				
_____ (Printed Name)		_____ (Signature)		
_____ (Specialty)	_____ (Pager #/License #)	_____ (Date mm/dd/yyyy)	_____ (Time)	

Bundled Consent Policy - # 7135.19

Policy statement: To develop and provide a systematic and safe approach to the care of the adult trauma patient who may require care in the intensive care unit (ICU). This care may include procedures that will allow the most effective monitoring and treatment of the patient. The bundles consent provides education to patients and families on some of the most common invasive procedures for trauma patients in the ICU.

The Policy:

Bundled Consent (Packet should be on the patient chart, if applicable)

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

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

These procedures include:

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

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

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

What is a "Resident" Physician?

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

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

Dr. _____

Dr. _____

Dr. _____

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

Dr. _____

What is an "Attending" Physician?

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

One of the following attending surgeons will be the supervising physicians in the care of your family member:

Dr. Donald E. Barker

Dr. Benjamin W. Dart

Dr. Robert A. Maxwell

Dr. Darren J. Hunt

Dr. Vicente A. Mejia

Dr. Philip W. Smith

Please clearly initial below to indicate 'Yes, I consent for this procedure' or 'No,

I do not consent for this procedure:

Tracheal Intubation and Mechanical Ventilation Yes: _____ No: _____

Central Venous Line Placement Yes: _____ No: _____

Arterial Line Placement Yes: _____ No: _____

Blood Products Transfusion Yes: _____ No: _____

Bronchoscopy Yes: _____ No: _____

Chest Tube Insertion Yes: _____ No: _____

I hereby consent to the performance of the invasive procedures above for which I have initialed 'Yes'. I understand that ***some of these procedures may be performed more than once*** during the ICU course. I understand that I may refuse to consent for any procedure and that I may at any time withdraw my consent. These procedures and their use in the course of ICU care have been explained to me, and I have had the opportunity to ask questions about their indications, complications, and alternatives. I have read and understand this form.

Signed: Relationship to patient: _____

Date: _____ Time: _____

Witness to signature: _____

Physician providing procedure information: Pager # _____

Procedure: Tracheal Intubation & Mechanical Ventilation

Basic description:

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

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

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

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

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

Benefits:

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

Alternatives:

-Supplemental oxygen – This is not an equal alternative to intubation with mechanical ventilation. It is, however, a way to help make a patient more comfortable if he/she does not wish to be intubated. There are several different ways to provide this, including tubes that sit at the tip of the nose, and simple masks that rest over the nose and mouth.

-Noninvasive Positive-Pressure Ventilation – This is not an equal alternative to intubation with mechanical ventilation. However, it may be used in an effort to prevent a patient from needing to be intubated. Also, it may be an option for patients who do not wish to be intubated. The most common types are "CPAP" and "BiPAP," and they involve placing a *sealed* mask over the patient's face to help with breathing. This is similar to the mask that people with sleep apnea wear at night to help them breathe better while they are sleeping.

Procedure: Central Venous Line Placement

Basic description:

A “central venous line” (CVL) is a thin, soft and flexible catheter (tube / “line”) that is used to give medications, fluids, and/or nutrition through a patient’s veins. Unlike the typical IV that goes into tiny veins in your hands or arms, a CVL goes into one of the larger “central” veins (internal jugular, subclavian, femoral). It may be inserted at the neck, just below the collarbone, or in the groin, and is then sutured to the skin. It usually has several ports so that multiple medications can be given through the single tube.

Some of the possible reasons that a patient might need a CVL include, but are not limited to: the need for certain medications that can be very irritating to the smaller veins in the hands and arms; for patients with veins in the hands and arms that are very difficult to access; or, to give nutrition through the veins when patients are unable to get it by mouth.

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

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

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

Benefits:

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

Alternatives:

-No venous access

-Peripheral venous access – This is an option, but not an equal alternative. (See above)

-Peripherally inserted central catheter – This may be used for many of the same reasons as a CVL, however it is typically used when access will be needed on a long-term basis (i.e. weeks). It is generally quicker to place a central venous line, so in certain situations, the CVL may be the most appropriate treatment for a patient.

Procedure: Arterial Line Placement

Basic description:

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

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

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

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

Benefits:

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

Alternatives:

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

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

Procedure: Blood Products Transfusion

Basic description:

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

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

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

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

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

Benefits:

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

Alternatives:

-Medications to help build up blood supply – Though these medicines may help in the long run, they do take some time to work, and will not provide support as quickly as a blood transfusion would. They may be used as an additional way to help build the blood back up, or they can be used for patients who do not want a transfusion.

-Medications to help the blood clot better – Depending on the particular reason why a patient's blood is not clotting normally, there are various medications that may help the blood to clot better. This may not be an option for every patient. Your physician can help explain to you if this might be an option for your family member.

-Transfusing the patient with his/her own blood – This may be an option for some patients, particularly those who have traumatic injuries with active bleeding and blood that can be easily collected.

Procedure: Bronchoscopy

Basic description:

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

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

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

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

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

Benefits:

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

Alternatives:

-Chest x-ray – This is often done before recommendation of bronchoscopy. However, in an emergent setting, waiting for a chest x-ray may delay appropriate treatment. Additionally, although a chest x-ray may help diagnose a problem, an additional therapeutic procedure is often necessary to fix whatever problem is identified.

-Suctioning through long, thin catheters without direct visualization – Long thin tubes inserted through the nose, mouth, or through a breathing tube can be used to blindly suction the airway and lungs. This is often a useful tool regardless

Procedure: Chest Tube Insertion

Basic description:

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

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

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

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

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

Benefits:

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

Alternatives:

-Observation without drainage – This is an option, but not an equal alternative. Breathing may become difficult or even impossible depending on the amount of air, blood or fluid that has accumulated in the chest cavity.

-Thoracentesis – This is an option, but not an equal alternative. This involves drainage through a needle that is inserted into the chest cavity and then removed at that same time. It does not provide any drainage once the needle is removed, and may not provide adequate drainage of thicker material, such as blood.

Clearance of the Cervical Spine in Obtunded/Intubated Patients or Patient with Neck Pain PMG - # 7041.822

Process Guideline Statement: To ensure proper procedure is used clearing the cervical spine in obtunded patients and patients with neck pain.

Scope: All Radiology Personnel/Trauma Services

Definitions: Cervical collars place blunt trauma patients at risk for skin breakdown and decubitus ulcers. Timely removal of collars based on peer reviewed literature will facilitate patient care and satisfaction.

Procedure:

- 1) **Obtunded or intubated patients:** with normal boney cervical CT scans with 3mm cuts or less and coronal and sagittal reconstructions can have their cervical collars removed if the official radiology report demonstrates no evidence of acute injury. Erlanger cervical imaging studies meet the necessary criteria. Studies from outside facilities need to be reviewed for cut thickness and reformatting. If the necessary criteria are not met, a repeat study should be ordered.
- 2) **Patients with cervical pain:** Patients that have pain with range of motion and normal cervical spine CT should undergo flexion extension imaging.

When an order is received in the Radiology Department for **flexion-extension**, Radiology will **verify C-spine CT** has been performed and interpreted. If report is normal, then appropriate staff will be coordinated to perform the study. If abnormal, approval from Radiologist will be ascertained. During hours of 7:00 a.m. to 4:00 p.m., the Radiology Nurse will be contacted. If not available or after 4:00 p.m., contact the Critical Care Nurse Clinician, formerly Trauma Nurse Specialist, on duty: pager 778-2121 #1891 or extension 6742.

Patient Mental Status

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

Routine Procedure

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

Patient Unable to Sit Up due to Other Injury

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

Pain:

At any point in procedure, if patient develops increasing pain during positioning, stabilize head and obtain an image in that position, reapply c-collar and performing nurse will notify floor nurse.

Chest Tube Management PMG - # 7135.203

- A. Policy Statement:** 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. Scope:** Trauma Residents, Trauma Attendings, Critical Care Nurse Clinicians (Redshirts)
- C. 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. Non-ventilated 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 be attempted after discussing with the chief and attending and should be done with the assistance of a senior resident.
 - e. Chest tubes, as a general rule, should never be clamped.
 2. Ventilated patients
 - a. Same guidelines apply to chest tube management for ventilated patients as far as air leak and output. (See Removal of chest tubes below)
 - b. Patients on high levels of PEEP, generally considered over 10 cm H₂O, or patients with high peak airway pressures, > 35 cm H₂O, may be at an increased risk for recurrent pneumothorax following tube removal.
 - c. Patients with stable ventilator settings and stable chest x-ray after 24 hours on water seal may be candidates for tube removal if output is within stated guidelines.
 - d. Extremely high levels of PEEP demand careful consideration concerning chest tube management.
 - e. Chest tubes, as a general rule, should never be clamped.
 3. Removal of chest tubes
 - a. For patients with hemothorax, the timing of chest tube removal is dependent on chest tube output. Chest tubes may be removed when the drainage is less than 200 ml/24 hours. Tubes still draining gross blood should generally be left in place.
 - b. Patients with pneumothorax and/or a history of an air leak may have their tube removed when the lung has been "up" on CXR for 24 hours while on H₂O seal provide the 24 hours output < 200 ml.
 - c. When placing a chest tube to water seal or ceasing/decreasing/discontinuing the suction, it is best to wait 6 hours before repeating a chest x-ray.
 - d. When pulling a chest tube:
 - Prepare a dressing of Xeroform and 4 x 4's and several pieces of 2" silk or adhesive tape.
 - Cut the suture when the dressing is ready.
 - Instruct the patient to take a full inspiration, hold their breath, and Valsalva maneuver. Practice this sequence several times.
 - Repeat the above sequence, briskly withdraw the thoracostomy tube with the patient performing Valsalva at full inspiration
 - Immediately apply the occlusive dressing to the thoracostomy wound. This dressing should remain in place for 48-72 hours (unless soiled).
 - Patients on a ventilator should have the chest tube pulled during the inspiratory phase of their

- ventilatory cycle.
- e. Once a tube has been removed, generally wait 6 hours to repeat a chest x-ray to assure no recurrent pneumothorax.
 - f. Patients having a chest tube for pneumothorax should be advised not to fly or scuba dive for 6-8 weeks following tube removal due to the risk of recurrent pneumothorax with altitude/pressure change. This should be addressed with the patient both verbally and in their printed After Visit Summary. Patients with complicated histories of chest tube management, persistent air leaks, multiple chest tubes, etc. should confer with rounding attending regarding ultimate discharge timing following tube removal.

Continuous Renal Replacement Therapy (CRRT) policy - # 8029.023

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

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

Definitions:

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

CRRT is subdivided into the following four therapy modalities:

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

Criteria for CRRT:

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

Procedure: CRRT orderset # 5168

Standards of Care for CRRT:

1. Only RNs who have completed unit based CRRT orientation and training will independently perform Continuous Renal Replacement Therapy (CRRT).
2. CRRT will be performed only in an Intensive Care Setting.
3. A Nephrologist or Surgical Intensivist (Fellow with Intensivist) will be consulted by the patient's attending physician and will determine the need for CRRT.
4. The Nephrologist or Surgical Intensivist (Fellow with Intensivist) will obtain necessary consent for treatment and initiate CRRT order set.
5. Any qualified physician responsible for the care of the patient will be responsible for obtaining the necessary large bore multi-lumen vascular access for CRRT.
 - a. Large bore multi-lumen vascular access will be inserted and threaded into a central vein.
 - b. Access established for CRRT is not to be used for other fluid or blood product administration except in life threatening emergencies
 - c. After venous access is established, the physician that inserted the line, or the RN caring for the patient will instill an anticoagulant (i.e. Heparin, Alteplase) as ordered, diluted with saline to fill the lumen size of the catheter inserted.
 - d. The large bore multi-lumen catheter will be clearly labeled with date, time, initial, and type of anticoagulant instilled.
6. The RN performing CRRT will:
 - a. Perform complete physical assessment. Review past medical history and current disease processes, therapy or medications being used and laboratory analysis
 - b. Prepare the CRRT system
 - c. Start machine in high treatment mode (CVVHDF) on set up then change mode to what is ordered
 - d. Prior to initiation of the therapy the RN will verify orders for fluids and flow rates
 - e. Utilize appropriate warming device if patient's core temperature ≤ 94 degrees F°, per physician order
 - f. Prior to initiation of CRRT, patient identification will be verified by using 2 identifiers prior to the administration of CRRT
 - g. Assess blood flow of vascular catheter prior to connecting CRRT
 - Prior to using access withdraw and waste appropriate volume from each port to avoid systemic anticoagulation of the patient
 - h. Initiate CRRT as ordered per Nephrologist or Surgical Intensivist
 - i. Administer infusions as ordered and hang dialysate and other admixtures when indicated
 - a. Ensure correct solution is attached to the appropriate line (check all solutions like drugs)
 - b. Mix solutions as directed (e.g. PrismaSate)
 - c. Adjust dialysate, replacement, blood flow, fluid removal and pre-blood pump rates as ordered by the Nephrologist or Surgical Intensivist
 - d. Calcium Chloride infusion is always to infuse through a central venous line, except under extreme circumstances (central access not available and only with approval of Nephrologist or Surgical Intensivist)
 - Calcium Gluconate may be infused through peripheral IV
 - j. Change PrismaFlex filter set every 72 hours and PRN
 - k. Document reason for filter change on CRRT flow sheet
 - l. Document all fluids used with CRRT
 - m. Document per CRRT flow sheet pressure flow rate, and CRRT fluid balances every hour along with other outlined parameters
 - Flow sheet documentation will also include time of flow rate, fluid changes and other CRRT interventions
 - n. All order changes will be given by the Nephrologist or Surgical Intensivist
 - o. Do not change dialysate, replacement, or effluent bags until prompted by the machine
 - p. Record only "Actual pt fluid removed" as output on ICU flow sheet
 - q. Replacement fluids that are infused directly to the patient via central or peripheral IV line are to be documented and counted as intake on the ICU flow sheet
 - r. During treatment observe the ultrafiltrate for color and amount
 - a. Pink tinged ultrafiltrate and/or obvious blood in ultrafiltrate are signs of ruptured membrane
 - If above occurs, stop the machine. DO NOT RETURN BLOOD.

- b. Decrease in ultrafiltrate amount may be a sign of clotting.
- s. IMMEDIATE attention will be given to all alarms.
- t. If CRRT is stopped, stop infusions and lab work associated with CRRT.

7. In the event the patient has to be disconnected from CRRT:

Temp Disconnect:

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

Direction of Internal Vital Emergency Resources for Trauma Policy - #7135.505

Policy statement: Adequate resources for trauma resuscitation are required at all times to ensure the safe, quality care of trauma patients. As the region's only Level 1 Trauma Center, Erlanger must make every reasonable attempt to care for trauma patients. Peak patient volumes, high acuity or lack of resources may impact flow in various departments of the hospital at various times. Patient care and safety will be the overriding priority in all patient placements.

Scope: Emergency Department Staff, Trauma Services Staff, and all Hospital and Medical Staff

Definitions:

- A. Vital Emergency Resources for Trauma ("trauma bay"): Space and equipment necessary for the care of the trauma patient, including:
 - 1. A trauma resuscitation bay
 - 2. Specialized equipment unique to trauma resuscitation ie fluid warmer, ventilator, warming equipment, surgical trays, central line kits, level one rapid infuser, etc.
- B. NEDOCS: The NEDOCS score calculated at 4 hour intervals is a nationally accepted standard and an accurate and reliable method for calculation of ED overcrowding.
- C. Regional Trauma Patients: Patients that are of equal or shorter transport time to our center rather than to another level one trauma center.

Procedure: A primary trauma resuscitation bay will be set up and available at all times.

- 1. Baroness ED Bed 8 is the preferred location for resuscitation of level 1 or 2 trauma patients.
- 2. If Bed 8 is unavailable or occupied, Bed 7 will be designated as an alternative trauma bay.
- 3. If bed 7 and 8 are unavailable beds 3-6 will be set up and made available.
- 4. Trauma patients undergoing ongoing emergent evaluation and treatment in the ED will be preferentially assigned Beds 3-8.

In the event that a trauma resuscitation bay is unavailable, the on-call trauma attending in consultation with the ED attending may determine that trauma patients outside of our region cannot be accommodated until adequate resources exist for a safe patient care environment. An assessment of the distribution of vital emergency resources for trauma will be initiated by the ED and trauma attending providers when anyone of the following criteria is met:

- 1. All available areas for trauma resuscitation are occupied
- 2. NEDOCS score is greater than or equal to 250 for two consecutive 4-hour measurements.
- 3. A single NEDOCS score greater than or equal to 300.
- 4. Erlanger Executive Leadership, the Administrator on Call (AoC), or their designee identifies a potential for patient care and safety compromise as determined by:
 - a. Direct evaluation of available vital resources needed for trauma
 - b. Erlanger Health System Emergency Management Plan5
 - c. EHS Capacity Plan1

In the event that vital emergency resources for trauma are unavailable, the Erlanger Regional Operations Center (EROC) will be notified. This notification should result in:

- 1. Patients with non-trauma conditions be redirected to alternative hospitals that can provide necessary care after provider-to-provider discussion through EROC. Patients requiring services unique to Erlanger, such as patients requiring Acute Stroke and Maternal-Fetal-Medicine services may still be accepted.
- 2. Deferred or delayed transfers from outside facilities,
- 3. Trauma patients that have a shorter transport time to another Level 1 trauma center should be transported to the alternative center.
- 4. Patient Flow Manager should notify the Administrator on Call (AoC) and the VP of Patient Logistics of a facility status change.

Trauma patients within our primary referral area will still be seen at BEH, including:

- 1. Locally transported trauma from EMS
- 2. Trauma patients accepted by the trauma attending in transfer after direct discussion with EROC/transferring physician
- 3. Regional trauma patients

EROC will be notified when vital resources for trauma resuscitation are available again for patient care.

All provider-initiated status changes delineated in this policy will be reviewed by the Emergency Medicine Quality Improvement Committee (EMQIC) and/or the Multidisciplinary Trauma Peer Review Committee Meeting (MTPRC).

DVT/Venous Thromboembolism Practice Management Guideline - # 7135.202

Guideline Statement: The Deep Vein Thrombosis (DVT)/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 managing patients with multiple traumatic injuries.

Scope: All patients admitted to the Trauma Service at Erlanger Medical Center.

Guideline:

A. Background

VTE, inclusive of both DVT and pulmonary embolus (PE), is a common cause of morbidity and mortality in hospitalized patients. The overall annual incidence of VTE is approximately 143 per 100,000 person years. In 2011, 2.4% of all hospitalized patients were diagnosed with VTE. The approximate 30-day mortality risk for DVT and PE is 5% and 13%, respectively. In the United States, up to 100,000 patients per year die from PE. While the reported incidence of VTE in the literature for trauma patients varies widely, 5-50%, these patients have multiple interrelated risk factors that deserve special consideration.

B. DVT Risk Factors

- Age > 40 years
- GCS < 8
- Spinal cord Injury
- Spine fractures
- Pelvic fracture
- Long-bone fracture
- Obesity (BMI >40)
- Surgical procedure > 2 hours
- Femoral vein access
- ≥ 4 PRBCs in first 24 hours
- History of VTE
- Malignancy

C. Contraindications to Prophylactic Anticoagulation

- VTE prophylaxis should be held for 48 hours after a stable follow up brain CT (unless contraindicated by neurosurgery for severe TBI).
- Patients with unstable spinal fractures or spinal epidural hematomas should have prophylactic anticoagulation held until cleared by neurosurgery.
- VTE prophylaxis should start within 48 hours for patients with spinal fractures that are non-operative and without a spinal cord injury.
- Patients with grade IV-V liver injury, grade I-V splenic injury or pelvic fractures with moderate to large pelvic hematomas, should be started on prophylactic anticoagulation within 24-48 hours or when their hemoglobin/hematocrit is stable.
- Patients to whom these contraindications do not pertain should begin prophylactic anticoagulation therapy upon admission. If there are any variances from this protocol, the reasons need to be documented in the chart.
- Prophylaxis should not routinely be held prior to or following surgery.

Exception: Prophylactic anticoagulation should not be given later than 9 p.m. on the evening prior to surgery and should be held on the morning of surgery for pelvic and/or acetabular surgery.

D. DVT Screening

1. Patients with the following should undergo screening bilateral lower extremity venous duplex on hospital day 3 or prior to discharge if before day 3:
 - Long bone fracture
 - SCI
 - Pelvic fracture
 - Immobility
 - T/L spine fracture requiring surgery
2. Patients should then undergo venous duplex examinations every 7 days (after initial scan) while hospitalized or until ambulating with > 50% of their normal weight bearing status on the affected extremity.
3. Patients not meeting the above criteria should undergo weekly ultrasounds starting on hospital day 7.
4. Weekly screening ultrasounds should be discontinued once patients are ambulatory and have had one follow-up negative duplex.

E. Prophylaxis Regimens

1. Low Molecular Weight Heparin (LMWH)-Enoxaparin is preferred formulary agent

Enoxaparin Dosing-VTE prophylaxis in trauma patients		
	CrCl >30 mL/min	CrCl ≤30 mL/min
Patient weight <100 kg	30 mg SubQ Q 12 hrs	30 mg SubQ Q 24 hrs
Patient weight ≥100 kg	40 mg SubQ Q 12 hrs	40 mg SubQ Q 24 hrs

*May consider Enoxaparin 30 mg SubQ Q 24 hrs in patients ≤45 kg-must write “Pharmacy do not adjust dose” in medication order

2. Unfractionated Heparin (UH) – Typically only utilized in trauma patients for VTE prophylaxis if patient has renal insufficiency or is undergoing renal replacement therapy. Patients on SubQ heparin at home need monthly platelet monitoring for heparin induced thrombocytopenia (HIT).

Patient BMI	Heparin Dose
<40	5000 units SubQ Q 8 hrs
≥40	7500 units SubQ Q 8 hrs

3. All non-weight-bearing patients require SCDs. Patients in skeletal traction or external fixators can use SCDs or A-V Impulse Foot pump on the affected extremity.

F. DVT or PE Treatment

1. Unless the thrombus is mobile/free-floating patients should NOT be placed on bedrest following the diagnosis of DVT nor should SCDs be removed.
2. **Patients will be treated in accordance to the 2016 CHEST Guidelines for Antithrombotic Therapy for VTE Disease while also considering risk of bleeding, need for urgent reversal, need for repeat surgical procedures resulting in interruptions of therapy, and patient comorbidities (weight, renal function, and enteral access).**
3. Treatment duration for DVT and PE is 3 months. Patients should be reevaluated after 3 months for the need to continue anticoagulation. When therapy is near completion a follow-up venous duplex exam should be documented to demonstrate resolution of the thrombus.

G. Heparin-Induced Thrombocytopenia (HIT)

1. Hospitalized patients on UH or LMWH should have a platelet level checked at baseline and every 48-72 hrs for the first 2 weeks of therapy to monitor for heparin induced thrombocytopenia (HIT). When platelets fall below 100K or to half of baseline levels, then patients may be at risk for HIT. If concern for HIT, calculate a 4T score.

Thrombocytopenia	<ul style="list-style-type: none"> • Platelet count fall >50% and nadir ≥20,000-2 points • Platelet count fall 30-50% or nadir 10-19,000-1 point • Platelet count fall <30 % or nadir <10,000-0 points
Timing of platelet count fall	<ul style="list-style-type: none"> • Clear onset between days 5 and 10 or platelet count fall at ≤1 day if prior heparin exposure within the last 30 days-2 points • Consistent w/ fall at 5 to 10 days but unclear, onset after day 10, or fall ≤1 day with prior heparin exposure within 30-100 days-1 point • Platelet count fall at <4 days without recent exposure – 0 points
Thrombosis or other sequelae	<ul style="list-style-type: none"> • Confirmed new thrombosis, skin necrosis, or acute systemic reaction after intravenous UFH bolus-2 points • Progressive or recurrent thrombosis, non-necrotizing skin lesions, or suspected thrombosis that has not been proven-1 point • None-0 points

Other causes for thrombocytopenia	<ul style="list-style-type: none"> • None apparent-2 points • Possible-1 point • Definite-0 points
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2. 4T Score Interpretation

4T Score	Probability of HIT	Action
0-3 points	Low	No need for serologic testing or discontinuation of heparin. If clinical suspicion of HIT remains high may consider action below.
4-5 points	Intermediate	Discontinue all heparin products, add heparin as an allergy in EPIC, and follow Argatroban/HIT order set (#2287) for treatment, consult pharmacy anticoagulation service for HIT management
6-8 points	High	

3. Patients with documented heparin allergy may receive VTE prophylaxis with Arixtra (fondaparinux) 2.5 mg SubQ daily. It is contraindicated in patients with CrCl<30 mL/min.

H. IVC Filter

Indications for IVC filter placement include the following:

- Acute VTE and inability to anticoagulate
- Anticoagulation failure
- Mobile/free-floating thrombus
- Ilio-caval DVT

Trauma Dobhoff Tube Practice Management Guideline - # 7135.503

Practice Management Guideline Statement: To develop and provide a systematic and safe approach to the care of the adult trauma patient who requires a Dobhoff tube at the time of discharge.

Scope: Trauma Services, Trauma Attending Physicians, Trauma Resident Physicians, Critical Care Nurse Clinicians, Any Nurses or Nurse Extenders within BEH taking care of trauma patients

Guideline: All trauma patients that are being discharged with a Dobhoff tube in place should have the following completed prior to discharge:

1. Dobhoff tube bridled in place.
2. Dobhoff tube location at nare in centimeters documented in the medical record prior to discharge

Enteral Feeding Pre-operative PMG for Patients with a Protected Airway - # 7135.16A

Process Statement: 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.

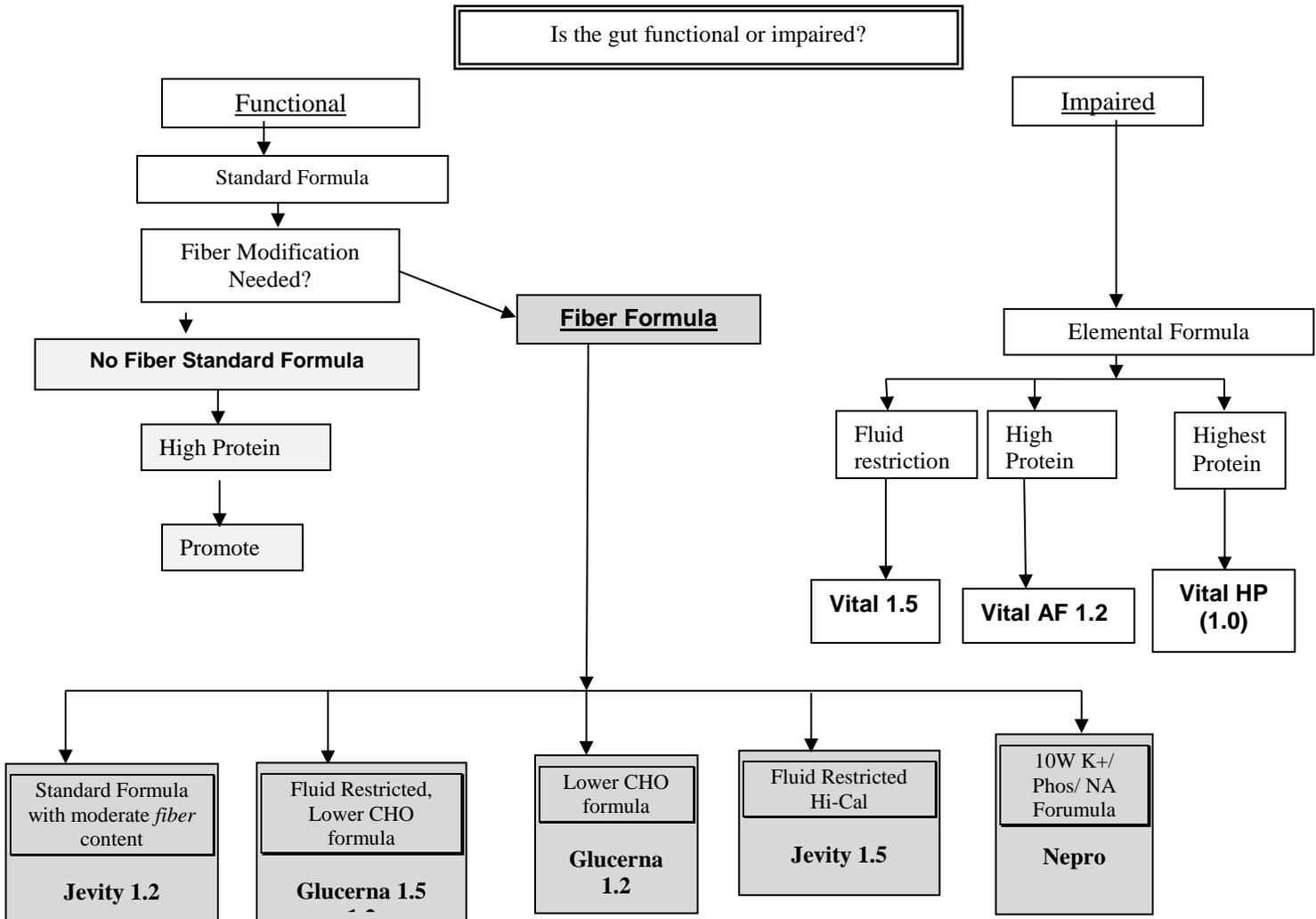
SCOPE: The Intensive Care Units (ICU) in which trauma patients are admitted.

PROCESS Guideline:

1. This process guideline ONLY applies to patients who are intubated or have tracheostomy tubes in place and are receiving gastric feeds.
2. This process guideline is used in conjunction with the Enteral Nutrition Support Guidelines #8051.902.
3. 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 accucheck every hour if patient had been on an insulin infusion; or perform an accucheck after one hour if patient had been given sub-q insulin within 2 hours of surgery.
 - e. Restart tube feedings post-surgery or post-procedure unless orders state to hold tube feedings post-surgery.
4. 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 sub-q 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. 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 sub-q 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. This guideline does NOT apply to patients with a confirmed post-pyloric Dobb Hoff Tube. For patients with confirmed post-pyloric feeding tube, consider perioperative continuous feeding by anesthesiologist and surgeon. If patient is on insulin infusion, continue along with tube feedings.

Enteral Feeding: Tube Feeding Formula in the Non-Critically Ill Patient

Calculate Nutrient Needs



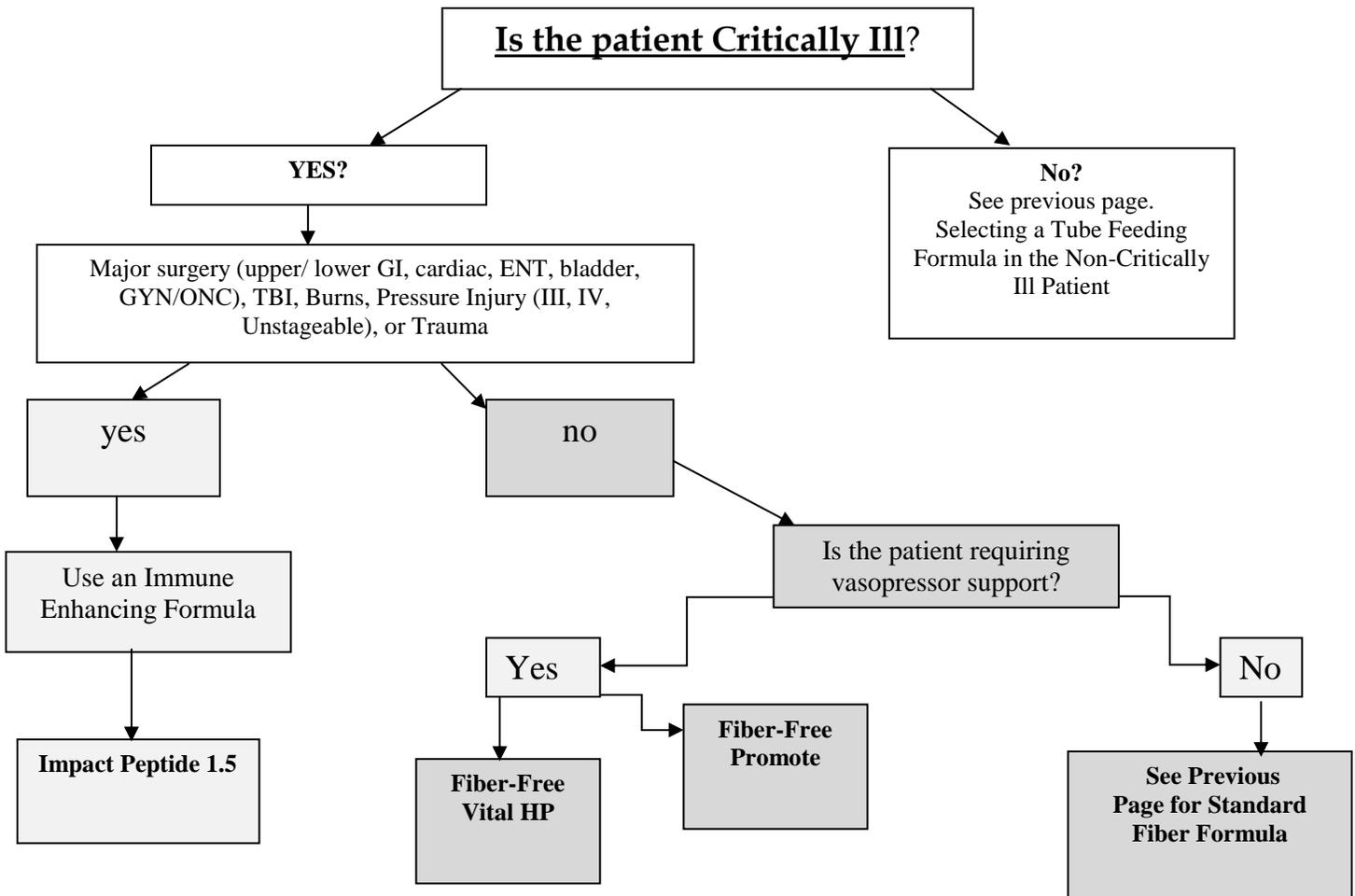
Free H2O Flush:

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

ASPEN Guidelines (2016):

- 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 (defined as: adequate perfusion pressure, stable doses of vasoactive drugs or decreasing levels of lactate and metabolic acidosis, and a MAP >60mmHg)

Enteral Feeding: Tube Feeding Formula in the 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 and consider consulting nutrition (if they are not already seeing the patient).

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.

ENTERAL NUTRITION FORMULARY

	Standard Formulas							Specialty Formulas			
Category	High Protein with Fiber	Concentrated Calories with Fiber	Diabetes	Diabetes	Very High Protein	Calorie and Protein Dense	Renal (Dialysis)	Peptide Based, High Protein	Peptide-Based, High Protein	Peptide-Based	Immunonutrient Blend, High Protein
Product Name	Jevity 1.2®	Jevity 1.5®	Glucerna 1.2®	Glucerna 1.5®	Promote®	Two Cal HN®	Nepro®	Vital High Protein®	Vital AF 1.2®	Vital 1.5®	Impact Peptide 1.5®
Indications & Features	<ul style="list-style-type: none"> High protein formula Contains soluble, insoluble, and scFOS prebiotic fiber to maintain bowel function 	<ul style="list-style-type: none"> Calorically dense formula Contains soluble, insoluble, and scFOS prebiotic fiber to maintain bowel function 	<ul style="list-style-type: none"> Unique carbohydrate blend for those with abnormal glucose response/hyperglycemia 	<ul style="list-style-type: none"> Calorically dense, high protein formula Formulated for those with abnormal glucose response/hyperglycemia 	<ul style="list-style-type: none"> High protein/low calorie formula with safflower/MCT/soy oil blend Does not contain fiber 	<ul style="list-style-type: none"> High calorie, low volume formula Contains scFOS prebiotic fiber 	<ul style="list-style-type: none"> High-calorie, high-protein, low volume formula Low in sodium, phosphorus, and potassium for those on dialysis 	<ul style="list-style-type: none"> Low fat, high protein, fiber-free formula Peptide based formula to help manage inflammation & symptoms of GI intolerance 	<ul style="list-style-type: none"> Peptide-based formula Contains scFOS prebiotic fiber Formulated to help manage inflammation & symptoms of GI intolerance 	<ul style="list-style-type: none"> Peptide-based, calorically dense formula Contains scFOS prebiotic fiber Formulated for patients with malabsorption, maldigestion, or impaired GI function 	<ul style="list-style-type: none"> Contains immune modulating ingredients & balanced peptide profile Stage 3/4 wounds, major elective surgery (head, neck, GI), trauma, TBI, high risk of infection, and GI intolerance
Nutrient Values per	1L	1L	1L	1L	1L	1L	1L	1L	1L	1L	1L
Kcal/mL	1.2	1.5	1.2	1.5	1	2	1.8	1	1.2	1.5	1.5
Osmolality (mOsm/kg H ₂ O)	450	550	720	900	400	775	745	400	425	640	510
Protein (g)	56	64	60	83	62.5	84	81	88	75	68	94
Carbohydrate (g)	169	216	115	133	130	219	161	112	111	187	140
Fiber (g)	18	22	16	16	0	5	13	0	5	6	0
Fat % MCT	19	19	---	---	19	---	---	50	45	48	50
Fat (g)	39	50	60	75	26	91	96	23	54	57	64
Sodium (mg)	1350	1400	1110	1380	1000	1450	1060	1400	1266	1500	1170
Sodium (mEq)	59	61	48	60	44	64	46	61	55	65	51
Potassium (mg)	1850	2150	2020	2520	1980	2440	1060	1600	1688	2000	1870
Potassium (mEq)	47	55	52	65	51	63	27	41	43	51	48
Phosphorus (mg)	1200	1200	800	1000	1200	1050	720	800	844	1000	1000
mL to meet 100% RDIs*	1000	1000	1250	1000	1000	948	944	1422	1185	1000	1000
Usage	Oral/tube	Oral/tube	Oral/tube	Oral/tube	Oral/tube	Oral/tube	Oral/tube	Oral/tube	Oral/tube	Oral/tube	Oral/tube
Water (mL/L)	807	760	805	759	839	700	727	836	811	764	770

*mL to meet 100% RDI's for key vitamin and minerals.

Other specialty formulas available: Diabetisource AC (does not contain milk protein); Suplena (low protein for CKD); Peptamen 1.0 (hydrolyzed, high MCT content).

Physicians are requested to use only the products listed on this formulary.

Disclaimers: All product information is obtained from product literature as available upon the date of issue and is subject to change. For specific nutritional information, please consult the manufacturer.

ORAL SUPPLEMENTS														
Product	Ensure® Enlive®	Ensure® High Protein	Ensure® Clear	Ensure® Compact	Nepro® with Carb Steady®	Impact AR®	Magic Cup™	Prosource® NoCarb Liquid	Prosource® Gelatin Plus	Prosource® Gelatin 20	Carnation Instant Breakfast®	Unjury®	Banatul® Plus	Nutrisource Fiber®
Indications & Features:	<ul style="list-style-type: none"> All-in-one: muscle, heart, bone, immune, digestion Contains CaHMB 	<ul style="list-style-type: none"> High in protein and low in fat to support muscle health 	<ul style="list-style-type: none"> Suitable for clear liquid, and is fat free 	<ul style="list-style-type: none"> Small volume, calorically dense supplement 	<ul style="list-style-type: none"> High-calorie, high-protein, low volume supplement Low in sodium, phosphorus, and potassium 	<ul style="list-style-type: none"> Contains immune-modulating ingredients. Formulated for major surgery, elective head/neck, trauma, burns/wounds, etc. 	<ul style="list-style-type: none"> High-calorie, frozen nutrition supplement; appropriate for modified consistency diets 	<ul style="list-style-type: none"> Contains hydrolyzed collagen and whey protein for a sugar-free, concentrated, low-volume, high-protein supplement 	<ul style="list-style-type: none"> High protein gelatin. Contains hydrolyzed collagen protein for rapid utilization and absorption 	<ul style="list-style-type: none"> Sugar-free, high protein gelatin Contains hydrolyzed collagen protein for rapid utilization and absorption 	<ul style="list-style-type: none"> Excellent source of protein, calcium, and vitamin D & C 	<ul style="list-style-type: none"> High protein (whey), low carbohydrate supplement Do not mix with liquids > 140°F Not recommended for low sodium diets 	<ul style="list-style-type: none"> Soluble fiber formula solidifies stool to reduce length of time & severity of diarrhea Approved for use on patients with active with C.Diff 	<ul style="list-style-type: none"> Supports digestive health and normal bowel function
Nutrient Values Per:	8 fl oz	8 fl oz	8 fl oz	4 fl oz	8 fl oz	6 fl oz	4 oz	1 fl oz	4 oz	4 oz	36 g	27 g	11 g	4 g
Calories	350	160	240	220	425	200	290	60	150	90	130	90	40	15
Protein (g)	20	16	8	9	19	18	9	15	20	20	5	21	0	0
Carbohydrate (g)	44	19	52	32	38	15	38	0	21	0	27	0	10	4
Sugars (g)	20	4	32	9	8	13	31	0	19	0	19	0	7	0
Fat (g)	11	2	0	6	23	8	11	0	0	0	1	0	0	0
Sodium (mg)	240	135-180	30	170	250	200	110	40	45	50	90-120	770	25	15
Sodium (mEq)	10	6	1	7	11	9	5	2	2	2	4-5	33	1	1
Potassium (mg)	560	150	0	350	250	450	350	10	150	155	240-320	140	120	10
Potassium (mEq)	14	4	0	9	6	12	9	0	4	4	6-8	4	3	0
Phosphorus (mg)	350	250	0	200	170	240	150	120	2	1	500	80	10	---
Water (g/mL/cc)	180	210	199	85	172	145	---	---	---	---	0	0	0	0
Flavors	Vanilla, Chocolate, Strawberry	Vanilla, Chocolate	Apple, Mixed Berry	Vanilla, Chocolate	Vanilla, Mixed Berry	Vanilla	Vanilla, Orange Crème	Neutral	Lemon, Cherry	Fruit Punch	Variety Pack	Chicken Soup	Banana	Unflavored
Consistency	Thin	Thin	Thin	Thin	Thin	Thin	Pudding Thick	Thin	Pudding Thick	Pudding Thick	Powder	Powder	Powder	Powder
UL/Rec Dosage:	4 servings/day	3 servings/day	4 servings/day	6 servings/day	---	TID x 5 days pre- and post-op	---	---	4 servings/day	4 servings/day	3-5 servings/day	---	6 packets/day	---
Suitable for Lactose Intolerance	Yes†	Yes†	Yes†	Yes†	Yes†	Yes†	No	Yes†	Yes†	Yes†	Yes†	Yes†	No	Yes†
Gluten-Free	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
Halal	Certain Flavors	Yes	Yes	Yes	Certain Flavors	Yes	No	No	No	No	---	No	---	Yes
Kosher	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	No	Yes	Yes	---	---

† Not for individuals with galactosemia
CaHMB = calcium β-hydroxyl-β-methylbuterate
Note: Use of powdered thickener is discouraged with oral nutrition supplements due to poor palatability.

Extremity Vascular Trauma PMG - #7135.217

Guideline:

- I. Unstable patient with isolated penetrating injuries
 - A. External compression vs. tourniquet with BP cuff (avoid direct vessel clamping if possible)
 - B. I.V. access with volume loading maintain SBP of 70 mmHg on route to OR
 - C. Rapid triage in E.R.
 - D. 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 should be used as a screening tool in all patients where it is feasible

FAST Practice Management Guidelines for Blunt Trauma Patients - #7135.11

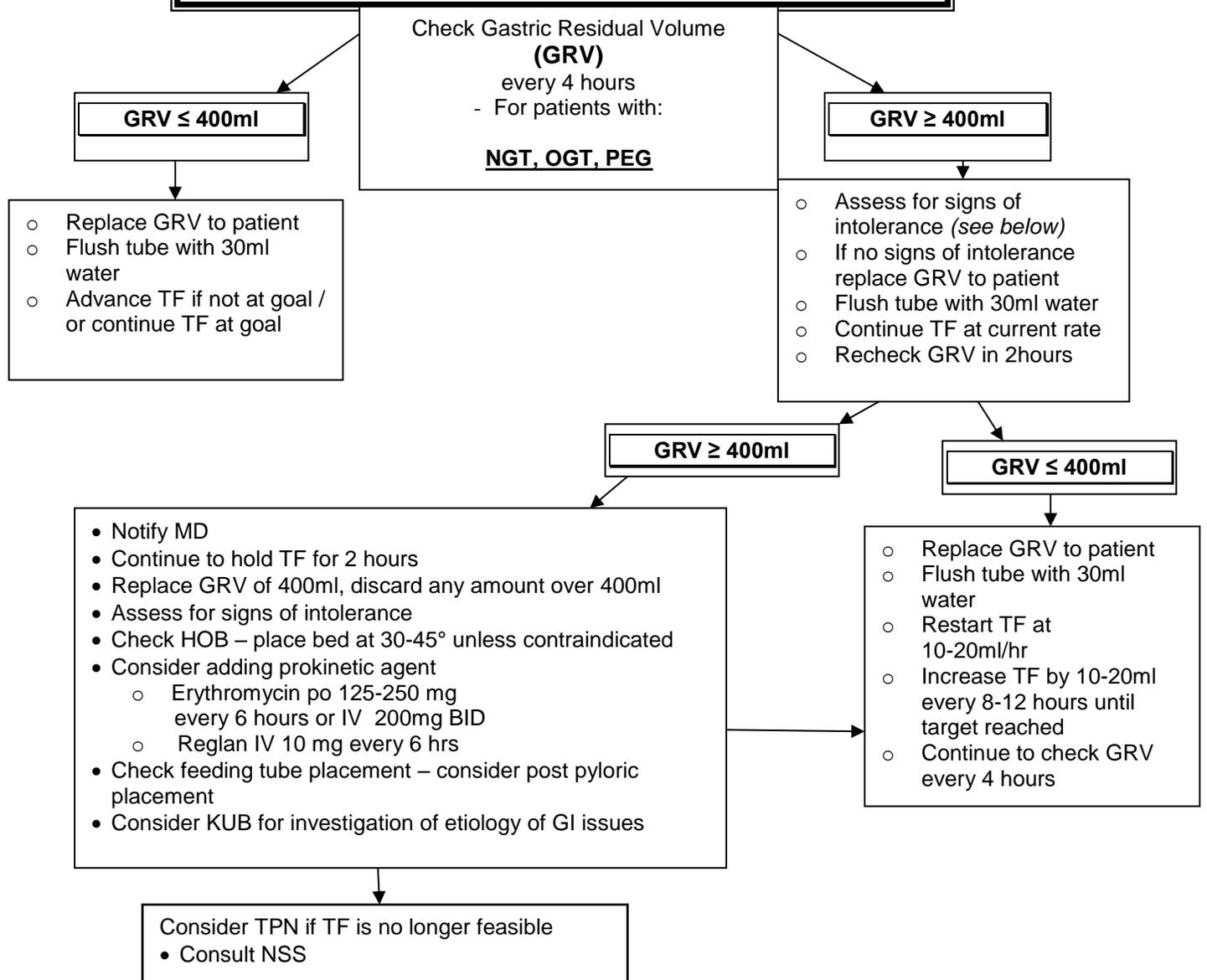
Statement: To develop and provide a systematic approach for use of FAST (Focus Assessment with Sonography for Trauma) in blunt trauma patients.

Scope: Emergency Department Attending, Emergency Department Resident, Trauma Residents, Trauma Attending.

Guidelines: The following guidelines should be used for blunt trauma patients:

1. All trauma patients who meet criteria for level I & II activations should undergo a FAST examination, unless it is an isolated trauma that does not include the chest or abdomen.
2. Level III trauma patients should be considered for a FAST examination.
3. The FAST examination should be performed by the Emergency Medicine attending or by an Emergency Medicine resident who has completed his/her ultrasound rotation.
4. The FAST examination must be interpreted by the operating surgical team if basing emergency surgery on the examination.
5. If the patient is hypotensive with a positive FAST, consideration should be to take the patient to the operating room for emergency surgical intervention.
6. If the patient is stable with a positive FAST, CT scan should be done on an expedited basis with presence of the trauma chief or trauma attending in the CT scanner with the patient.
7. If the patient is stable with a negative FAST, standard work-up should proceed.
8. If the patient is unstable with a negative or equivocal FAST, consideration should be given to DPL if inadequate windows were obtained and there were no findings on chest or pelvic radiograph that would explain the patient's condition.
9. The results of all FAST exam for blunt Level I & II traumas will be correlated with CT scan or operative findings.

Gastric Residual Practice Guidelines at Erlanger Health Systems



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)

Trauma Incidental Findings Documentation Policy - # 7135.507

Background: During trauma evaluation, incidental findings may be identified. This information, along with recommendations for appropriate follow-up, should be provided to the patient. This should be documented consistently in the patient medical record.

Progress Note

1. All trauma patients will be evaluated for incidental findings during the trauma exam and diagnostic testing
2. The trauma surgery resident or Trauma NP is responsible for notifying the patient and/or family of any incidental findings identified during trauma evaluation.
3. Notification of these findings includes:
 - a) Identification of specific findings
 - b) Recommended follow-up provider
 - c) Recommended time-frame for appropriate follow-up
4. Notification of the patient and/or family will be documented in the progress notes using the shared accepted form in the electronic medical record (dot-phrased INCIDENTALPROGNOSIS).
5. All required elements must be addressed.

Discharge Instructions

1. Any identified incidental findings will be documented in the Discharge Instructions to be printed in the After-Visit Summary
2. The trauma surgery resident or Trauma NP is responsible for completing the discharge instructions regarding incidental findings.
3. The discharge instructions documentation related to incidental findings includes:
 - a) Identification of specific findings
 - b) Recommended follow-up provider
 - c) Recommended time-frame for appropriate follow-up.
 - d) Confirming verbal notification of patient and/or family by trauma team member
4. The discharge instructions related to incidental findings will be documented using the shared accepted form in the electronic medical record (dot-phrased DCINCIDENTAL).
5. All required elements must be addressed.

Informed Consent/Consent to Treat - #PC.014

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

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

B. Medical treatment that requires use of the "Authorization for and Informed Consent to Surgery or Special Diagnostic or Therapeutic Procedures" form (15104) includes 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/non-intravenous 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 Tennessee 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 pre-medicated, 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.

Line Management PMG - # 7135.204

A. Policy Statement

There are a number of pitfalls and problems associated with central access. The following guidelines will hopefully aid in safe line placement with minimal 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. Who Should Read this Policy

Trauma Residents, Trauma Attendings, Trauma Nurse Practitioners, Critical Care Nurse Clinicians (Redshirts)

D. The Guideline

a. Non emergent central line placement

- i. 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 central access, A-line or chest tube placement. Insertion site should be prepped either with chloraprep or hibaclens.
- ii. When placing subclavian lines, it is good practice 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.
- iii. C-spine precautions should be observed.
- iv. General draping protocol should be application of sterile blue towels followed by covering the area with the fenestrated paper/cellophane drape from the kit.

b. Emergent central line placement

- i. Under conditions of duress, quick betadine prep to the area followed by application of the paper/cellophane drape will be sufficient. However, it should be noted this was an emergent line placement and these catheters should be changed out using non-emergent techniques within 24 hours.
- ii.

E. Line changing protocols

1. Central line 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. A-lines should probably be changed every 10-14 days or when redness around the catheter site occurs. It is usually best to change these to a new site rather than guide wire changes.
3. Central lines in femoral position should be removed and access obtained peripherally as soon as is practical.

Management of Injury-Specific Discharge Needs for Trauma Patients Policy – #7135.2

Policy Statement: The purpose of this policy is to establish guidelines for the discharge planning process of trauma patients with varying injury patterns. This includes prescriptions, equipment, home health, and follow-up. These guidelines are set forth and agreed upon by the Trauma Surgery Service in collaboration with the Orthopedics, Plastics and Neurosurgery Services.

Scope: Trauma Attending, Orthopedics Attending, Plastics Attending, Neurosurgery Attending, Trauma Residents, Orthopedic Residents, Plastics Residents, Trauma/Orthopedics/Neurosurgery APPs

Definitions:

- Patients with Isolated Orthopedic Injuries: These patients have one or more orthopedic injuries but no general trauma injuries and no indication for follow-up with Trauma Surgery
- Patients with Isolated Neurosurgery Injuries: These patients have one or more neurosurgical injuries (brain or spine) but no general trauma injuries and no indication for follow-up with Trauma Surgery
- Patients with Isolated Plastics Injuries: These patients have one or more plastics injuries but no general trauma injuries and no indication for follow-up with Trauma Surgery
- Multi-system Trauma Patients: These patients have injuries to more than one isolated system and/or general trauma injuries

Procedure: For patients admitted to the Trauma Surgery service: When consulting service(s) deems the patient ready for discharge with regards to the injuries being managed by that service (i.e. when ready to “sign off”), the following should be done:

1. Orders for medical equipment, if indicated
2. Injury- specific prescriptions (anticoagulation, steroids, seizure prophylaxis, antibiotics, et al) signed and hard copies placed in patient folder
3. Narcotic and other pain management medications as appropriate, signed and hard copies placed in patient folder, by the service managing the principal hospital problem
4. Trauma Surgery will evaluate all consulting services discharge orders and prescriptions prior to finalizing the hospital discharge orders and make modifications if indicated based on hospital length of stay or other compounding factors. This will include arrangement of placement, equipment, services and additional or alternative medication prescriptions as indicated.

Mandible Fracture Practice Management Guideline - #7135.226

Guideline statement: The purpose of this policy is to develop and provide a systematic approach to the care of the adult trauma patient with mandible fractures

Scope:

Plastic Surgery Residents, Plastic Surgery Attending, Emergency Department Attending, Emergency Department Resident, Trauma Residents, Trauma Attending

Guidelines: After the appropriate work-up, Plastic Surgery should be consulted to evaluate all mandible fractures. Mandible fractures will be seen and evaluated by the plastic surgery service at the request of the trauma team or the emergency room staff. Mandible fractures will then be treated as deemed by the attending plastic surgeon after evaluation by the plastic surgery resident.

- Simple/non-displaced fractures may be discharged from the emergency room and scheduled for outpatient treatment as needed.
- Displaced fractures may be stabilized with bridle wires or other means then discharged and scheduled for outpatient surgery.
- Open wounds should be irrigated and closed.
- All fractures will be treated with oral or intravenous antibiotics as indicated by plastic surgery until definitive fixation is performed.
- Definitive fixation will be performed as soon as possible within the limitations of the operative schedule and availability.
- The decision to admit ***isolated*** mandible fractures to the hospital or to discharge from the emergency room will be made by the attending plastic surgeon.

Massive Transfusion Protocol Policy - #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 >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 judgement 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 likelihood that that substantial blood loss will continue over of the short term (minutes to a few hours)

Policy and Procedure:

- A. **Initiation of Massive Transfusion Protocol (MTP):** Only the attending physician or senior resident directly involved in the care of the patient may implement this protocol. **The Trauma Attending has the authority to override the protocol in life or death situations.** The physician who implements the protocol is responsible for ordering cessation of the MTP 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 MTP. It can be discontinued at any time by calling the Blood Bank.
- B. To initiate MTP call #7789 (rapid response line) and tell the EROC staff to initiate the Massive Transfusion Protocol page, give them the age, gender, and location of the patient. This page will then be sent to the CCNC, Blood Bank, OR, and Patient Flow Manager.
- C. The Massive Transfusion Protocol order set will be activated via Epic as follows:
 - a. In the ED, the Trauma Clinical Lead will place the order
 - b. In the operating room, the OR circulator will place the order
 - c. For all other areas of the hospital, the bedside nurse designated for the patient will place the order
- D. Two pink tubes will be drawn on patients who meet MTP criteria. Tubes will be labeled with the standard blood bank identification information including a typenex number on each tube.
- E. 2 units of O negative blood, 2 units O positive blood, and 2 units of plasma are kept in the trauma bay blood fridge for immediate transfusion. After these units have been exhausted, a "Red Tag Pack" with an additional two units of O negative blood or O positive blood and 2 units plasma can be picked up from the blood bank. All male patients ≥ 15 years of age and females > 55 years of age, or with a documented hysterectomy, should receive O positive blood, unless they are Rh negative and it is known that they have received O positive blood previously.
****Use of fresh whole blood will be limited to four units given during the first cycle of the MTP for any patient ≥ 15 years old. One unit of whole blood is equivalent to 1 unit PRBC and 1 unit plasma.****
- F. The cooler will be labeled with the cooler expiration date and time. After the expiration date and time the coolants will need to be replaced by blood bank.
- G. Upon activation of MTP, the CCNC or Charge Nurse in the unit will designate someone to be the blood courier.
- H. Close communication with blood bank personnel is essential to ensure effective and efficient use of products with minimal wastage. The CCNC will call the Blood Bank directly at #7265 and the Blood Bank will communicate with the CCNC via #805-5411/805-8308. If there is no answer to those numbers call #5184 for the ED bed 8 or #5580 for the OR runner depending on current patient location.
- I. 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.*) Once the blood type has been obtained, all subsequent products will be type and crossed or type specific. The Blood Bank will notify the CCNC as soon as the first cycle of blood products is ready for pick up. Blood Bank staff is to stay ahead of all requested blood products to ensure an uninterrupted supply of appropriate blood products.
- J. The Blood Bank will prepare the following:
 - a. Administration Schedule:

- i. **Cycle 1-** If fresh whole blood is indicated but unavailable, proceed with Alternative Cycle 1.
 1. Females \leq 55 years old
 - a. 4 units O negative fresh whole blood
 2. Females $>$ 55 or with documented hysterectomy and all Males \geq 15 years old
 - a. 4 units O positive fresh whole blood
- ii. **Alternative Cycle 1-** 6 PRBC, 6 plasma¹, one platelet² pheresis
- iii. **Cycle 2-** 6 PRBC, 6 plasma¹, one platelet² pheresis, 10 units cryoprecipitate
- iv. **Cycle 3-** 6 PRBC, 6 plasma¹, one platelet² pheresis

¹ FFP or liquid plasma may be used if available

² Pooled platelets, pheresis or an acridose unit may be used if available

If, after Cycle 3, patient is still requiring MTP start over at Cycle 2 and keep repeating Cycles 2 and 3 until source of hemorrhage has been controlled and MTP can be discontinued. Further blood product administration will be based on most current laboratory values at the trauma physician's discretion.

All males \geq 15 years of age and females $>$ 55 or with a documented hysterectomy may receive O positive blood.

Unless specified by the Trauma Attending, blood products will be released in a full cycle.

- K. PRBC and plasma will be given in a 1:1 ratio, one unit of plasma¹ for every one unit of PRBC.
- L. The blood courier from the appropriate unit will obtain the blood pickup ticket and will pick up the cooler of blood products.
- M. Blood Bank Cooler Rotation Schedule: For the 1st cycle and 2nd cycle the courier will receive separate coolers for each cycle. For the 3rd cycle to be picked up, the 1st cooler must be returned empty for a temperature check and restocking of the next cycle. This process will continue for any subsequent cycles with empty coolers being returned for restocking of blood product cycles. This process helps ensure proper storage and temperature control of blood products to alleviate any blood product wastage.
- N. The CCNC will track the number of units of the different blood products the patient has received and document on the MTP form.
- O. 1gm of Calcium Chloride will be given for every three (3) units PRBC and/or fresh whole blood unless otherwise contraindicated or as indicated based on lab value.
- P. Tranexamic Acid (Order set No. 10233) should only be given when a TEG shows fibrinolysis $>$ 3%. This can be administered through a central line or peripheral IV as long as blood is not being infused through the same line.
- Q. Warming measures will be initiated on any patient that requires the MTP.
- R. No routine labs should be done until the source of bleeding/hemorrhage has been definitively controlled, with the exception of ABGs and iStats run by resuscitative personnel.
- S. PT, PTT, TEG, CBC, calcium, and fibrinogen will be drawn at the conclusion of the MTP.
- T. The nurse in charge of the patient is responsible for communicating any lab results to the trauma surgeon in charge of the case IMMEDIATELY.
- U. CCNC, ED, ICU and/or Surgery staff are responsible for completing and returning any emergency blood request forms that have been issued with the blood.
- V. The CCNC is responsible for ensuring the cooler and any unused products are returned to the blood bank after MTP has been discontinued.

Specialty Locations with Immediate Access to Emergent Blood Products:

- Operating Room Blood Fridge:
 - 4 units of O negative blood and 4 units O positive blood
- ED Trauma Bay Blood Fridge:
 - 2 units of O negative blood, 2 units O positive blood, and 2 units liquid plasma
- Labor and Delivery Blood Fridge:
 - 2 units of O negative blood

Trauma Neurosurgical Consult Required Times and Encumbered Contingency Plan - Policy # 7135.6

Statement: To develop and provide a systematic and safe approach to the care of the adult trauma patient who requires neurosurgical consultation or neurosurgical intervention and to ensure neuro-trauma care is continuously available for all TBI and spinal cord injured patients.

Scope: Neurosurgical Attending, Trauma Attending

Response Procedure: Bulleted criteria for immediate neurosurgeon response in person, in 30 minutes or less, from time of neurosurgery consult for operative intervention:

The immediate neurosurgery consult will be placed by the trauma services physician directly to the neurosurgeon attending on call. Operative intervention will be determined by the neurosurgeon after review of the radiographic images.

- Any trauma issue in which a neurosurgeon is immediately requested by the trauma service
- Acute, operative epidural or subdural hematoma > 1cm thickness with 5mm or greater midline shift
- Survivable penetrating injury to the brain with exposed brain tissue
- Emergent spinal cord injury or spinal fracture

Non-urgent consults made by the trauma service will be seen by the neurosurgical subspecialty within 24 hours of consult placement.

Encumbered Contingency Policy/Procedure: When the on-call neurosurgeon is encumbered and a patient requires urgent neurosurgical intervention:

Neurosurgery Call Schedule

A published neurosurgeon call schedule is distributed monthly to facilitate easy identification of neurosurgeon availability.

Neuro-trauma Contingency Plan

The Neuro-trauma Contingency Plan will be implemented when the neurosurgeon on call becomes encumbered and is not available to see the neuro-trauma patient in a timely manner.

- I. The back-up neurosurgeon(s) will be called.
- II. If the back-up neurosurgeon is encumbered an attempt will be made to contact the remaining neurosurgeons from the call panel to provide the urgent neurosurgical intervention. This process will not exceed more than 30 minutes.
- III. If unable to obtain appropriate neurosurgeon response the trauma attending will initiate transfer of the patient to the nearest level 1 trauma center with which there is a transfer agreement in place for such events (Vanderbilt). The trauma team will directly contact the accepting facility to assist with an expeditious transfer.

Credentialing Requirements of the Trauma Surgeon to Provide Initial Evaluation and Stabilization of the Neuro-trauma Patient

- I. The Trauma Medical Director ensures the trauma surgeon meets the credentialing criteria to perform initial evaluation and stabilization of the TBI and spinal cord injured patient.
- II. Credentialing Criteria include:
 - i. Current ATLS certification
 - ii. Review of Guidelines for Initial Management of TBI from the Brain Injury Foundation
 - iii. Review of the institution's Guidelines on Trauma Spine Assessment and Cord Injury
 - iv. Actively Participates in Trauma Call

Monitoring of the Efficiency of the Neuro-trauma Contingency Plan

The Performance Improvement Patient Safety program reviews instances when the Neurosurgeon was not at the patient's bedside within 30 minutes of a critical response consult.

Trauma Orthopedic Consult Required Response Times Policy - # 7135.7

Statement: To develop and provide a systematic and safe approach to the care of the adult trauma patient who requires consultation from the orthopedic surgical subspecialty.

Scope: Orthopedic Residents, Orthopedic Attendings and Orthopedic Trauma Fellow

Procedure: Criteria for immediate response (in person 30 minutes or less from time of consult):

- Open fractures/suspected open joints
- Hemodynamically unstable pelvic fractures
- Limb ischemia associated with fractures or dislocations
- Impending compartment syndrome

Any non-urgent consult made by the trauma service will be seen by the orthopedic subspecialty in 24 hours or less.

Pelvic Fracture PMG - #7135.12

Statement:

To develop and provide a systematic approach to the care of injured patients with pelvic fractures

Scope: Emergency Department Attending, Emergency Department Resident, Trauma Residents, Trauma Attendings, Orthopedic Residents, Orthopedic Attendings

Guidelines:

If a patient is found to have a pelvic fracture on xray they should have a TAP CT scan with contrast (if medically appropriate) to assess for pelvic hematoma. If pelvic hematoma is found on CT scan, trauma should be consulted.

Use of Post Radiology Procedure Medication Holding Protocol - # PC.200

Policy statement: Radiology Staff will fill out and send the Post Radiology Procedure Medication Protocol to Pharmacy at the time of the procedure for all patients on metformin therapy who receive intravascular contrast media.

Scope: Pharmacy Personnel, Nursing, Radiology, Physicians

Procedure:

For patients receiving intravascular contrast media who are taking metformin or a metformin containing medication, order set 10052 Post Radiology Procedure Medication Holding Protocol will be filled out and scanned or faxed to the Pharmacy at the time of the procedure by Radiology Staff and then placed on the chart in the medication orders. The Pharmacy will hold the medication for 48 hours or as directed post contrast administration.

Medications containing metformin include:

Glucophage®	Glucophage XR®	Riomet®	Jentaducto®
Glucovance®	Avandamet®	Janumet®	Janumet XR®
Fortamet®	Kazano®	Metaglip®	Jentaducto XR®
Glumetza®	Invokamet®	Prandimet®	Synjardy®
Actoplus Met®	Xigduo®	Kombiglyze XR®	Actoplus Met XR®

Post-splenectomy Vaccination PMG - #7135.13

Guideline Statement: Patients who require a splenectomy, or significant splenic embolization following trauma need lifetime monitoring and health-maintenance. Information will be provided to these trauma patients to allow for proper follow-up and healthcare maintenance by the Trauma Service.

Who should read this PMG: Trauma Attending, surgery residents, Trauma NP

Process:

A. Background

A patient who has his spleen removed (or had a significant portion embolized, as determined by the attending trauma physician) as a result of trauma, is more susceptible than the general population to certain serious infections. It is recommended that a specific group of immunizations be given immediately following and at specified times throughout the patient's life to help protect him against those infections.

B. Recommended Vaccination Schedule:

The following schedule is in accordance with Erlanger's current formulary

Vaccine	In-hospital	2 month follow-up	Long-term
Pneumococcal 13-valent conjugate (Prevnar 13)	X	-	-
Pneumococcal polysaccharide (Pneumovax 23)	-	X	Every 5 years after initial vaccination
Meningococcal (A,C, Y, W-135) (Menactra/Menveo)	X	X	Every 5 years
Meningococcal serogroup B (Bexsero)	X	-	1-time booster 1 month after initial vaccination (Bexsero)
Haemophilus influenza type B (PedvaxHIB)	X	-	-

C. In-Hospital Vaccinations

While an in-patient on the trauma surgery service, the patient will receive his initial round of vaccinations. These are contained in Order set #7135_XX. They will be given once it is determined the patient is likely to be discharged in the next 24 hours. They will be given in varying sites, at 2-4 hour intervals to monitor for any signs of local or generalized reaction to the individual vaccine.

D. At Discharge

At the time of the patient's discharge, they will be provided with verbal and written information regarding the recommended vaccination schedule. The patient's After-Visit Summary (AVS) will be populated with the dot phrase ".SPLENECTOMY" which will attach the following information to the patient's discharge paperwork:

"Post-splenectomy long-term management:

While in the hospital, you received vaccines to help prevent certain infections. These vaccines were for pneumococcal, meningococcal, and H. flu bacteria.

It is recommended that you get the following additional vaccines to help prevent infections long-term through your primary care provider or local health care center:

THIS IS YOUR RESPONSIBILITY

- Pneumococcal and meningococcal vaccines should be repeated in 2 months and every 5 years thereafter
- Tetanus/diphtheria vaccine should be repeated every 10 years
- Influenza vaccine should be repeated annually"

E. Post-surgery or hospitalization office/clinic follow-up

The recommended vaccination schedule will be reviewed with the patient at his follow-up visit in the trauma clinic or office, usually within 2 weeks of surgery or discharge. At that time, a pre-printed flyer with the vaccination schedule clearly contained will be provided to the patient for home use and reference.

Pregnant Trauma PMG - #7135.217

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

Process:

1. The pregnant trauma patient will be managed according to established trauma service protocols, policies, and patient management guidelines.
2. When a pregnant trauma patient meets trauma activation criteria (Level 1 or 2) the ED unit clerk, or designated person, will send text page out to the "Trauma OB" group. The L&D desk will receive this page. The obstetrical team on call including the OB Chief Resident and an obstetrical nurse will report to the Trauma bay. After their initial assessment by the obstetrical team, the Maternal Fetal Medicine (MFM) service on call attending will be notified to assist with further management.
3. The patient will be upgraded to a level 1 trauma if an emergent Cesarean is needed.
4. The Trauma Chief or Trauma Attending will notify the Pediatric surgeon on duty should an emergency Cesarean become necessary.
5. When practical, the gravid trauma patient ≥ 20 weeks gestational age will be placed in a 15 degree left lateral rotation.
6. Intravenous fluids (LR or NS) will be given to maintain the volume status. Volume assessment monitoring is encouraged for critically injured patients including urine output, acid base status, CVP or echocardiography.
7. PT, PTT, Fibrinogen and D-Dimer will be added to the trauma labs.
8. Doppler fetal heart tones will be obtained with the initial vital signs and will be monitored throughout the resuscitation at the same frequency as the maternal vital signs. When the fetus is ≥ 23 weeks gestational age, continuous fetal monitoring should be initiated and maintained by the obstetrical team until the workup is complete and patient disposition determined.
9. Radiographic imaging necessary to adequately assess the patient will be performed. The gravid uterus will be shielded whenever possible.
10. Focused Abdominal Sonography for Trauma (FAST) should be employed to evaluate hypotensive patients for evidence of intra-abdominal injury. Diagnostic peritoneal lavage (DPL) can be performed in the unstable patient when interpretation of the FAST exam is in question. An open technique with the incision made above the umbilicus and above the gravid uterus is necessary.
11. If a pregnant trauma patient shows signs of non-reassuring fetal status, uterine contractions, decreased fetal movement, uterine tenderness, and/or uterine bleeding, an urgent fetal ultrasound will be obtained and managed by MFM as part of the ongoing workup.
12. Tocolytics will be used at the discretion of the obstetrical or MFM consultant.
13. The patient's private obstetrician will be notified of patient's arrival per obstetrical or MFM service.
14. In addition to all Level 1 and Level 2 trauma activations, all pregnant Level 3 trauma patients and pregnant Trauma Consults will be evaluated by the Obstetrical Team including the OB Chief Resident and by MFM as indicated. A formal consult note will be provided.

Continuous Fetal Monitoring (CFM)

Admission Status of Pregnant Trauma Patient ≥ 23 weeks Gestational Age:

- I. Non-critical obstetrical patients requiring admission following trauma requiring CFM as deemed by the obstetrical evaluation will be admitted to High Risk Pregnancy Unit (HRPU) and Trauma and other services consulted as indicated. A D-Dimer may be obtained every 6 hours.
- II. Critically injured pregnant trauma patients requiring ICU admission will be admitted by Trauma Services and the Obstetrical/MFM services will be consulted. CFM (if ordered by MFM) in the ICU will be coordinated by the obstetrical Charge Nurse on duty each shift

Rapid Sequence Induction PMG - #7135.111

Procedure Statement: To facilitate endotracheal tube placement for definitive airway management utilizing chemical paralysis 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:

Steps:

1. Administer IV sedation/pain medication: Versed, Fentanyl, Ketamine, Etomidate, or Propofol.
 2. Administer paralytic: Succinylcholine or Rocuronium
 3. Tube placement and confirmation
 4. Administer long-term paralytic – Vecuronium Bromide (Norcuron)
- *Always administer sedation before paralytic agent

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 or extensive denervation of skeletal muscle or paralysis.
4. Known hyperkalemia
5. Penetrating eye injury or acute angle glaucoma

**If patient requires continued paralytic use or a paralytic drip utilize BIS to monitor sedation levels

Rapid Weaning PMG - #7135.200

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 – $50 + 2.3 [\text{height (inches)} - 60]$
 - Female – $45.5 + 2.3 [\text{height (inches)} - 60]$
- Set ventilator to SIMV Mode.
- Set V_T to 4-6 ml/kg PBW.
- Set initial rate to comfort (not > 35 bpm).
- Set PSV to support spontaneous V_T , keeping volumes at 4-6 ml/kg
- Set FiO_2 to maintain a SpO_2 of $\geq 92\%$.
- Set initial PEEP at 5-10cm H_2O .
- Adjust V_T and RR to achieve appropriate pH and P_{plat} goals (see below)
- If patient doesn't have at least a #7.5 size airway, and is expected to be intubated > 24 hours, recommend changing airway to at least a size #7.5 if the clinical status poses no contraindications.

Oxygenation Goal: PaO_2 60-70 mmHg or SpO_2 90-95%

- If PEEP \geq 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 \geq 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 \geq 35 and PaCO₂ \leq 30, patient needs NaHCO₃ (Make recommendation to the physician).
- If pH < 7.15 and RR \geq 35, notify physician

Alkalosis Management: (pH > 7.45)

Decrease vent rate if possible.

Prevention of Volutrauma: Ideal P_{plat} \leq 30 cmH₂O (-PEEP)

- If P_{plat} \leq 30cm H₂O: V_T < 6 ml/kg, may increase V_T by 1 ml/kg until P_{plat} > 30cm H₂O or V_T = 6 ml/kg
- If P_{plat} > 30cm H₂O: decrease V_T by 1 ml/kg steps (min. = 4 ml/kg), may consider APRV or PCV with inverse I:E Ratio. (Consult with patient's physician prior to any ventilator mode changes)
- If P_{plat} < 20cm H₂O & breath stacking occurs: may increase V_T in 1 ml/kg increments (max 8 ml/kg), may decrease T_{insp} to achieve appropriate I:E ratio

I:E Ratio goal:

Maximum T_{insp} 1.2 seconds; adjust I_{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 :
 - Hemodynamically stable
 - Spontaneous Respiratory Rate (RR) < 30
 - Spontaneous tidal volume > 6ml/kg (may adjust pressure support as needed)
 - Negative Inspiratory Force (NIF) < -20
 - Rapid Shallow Breathing Index (RSBI) <100
- Individuals who do not meet above criteria will have their weaning strategy modified to best suit their unique clinical situation.

III. Criteria for Weaning Failure

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

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

IV. Extubation

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

NOTE: Extubation orders must be obtained prior to extubation.

NOTE: Transport patient on ventilator per Department Protocol

Rapid Weaning ARDS PMG - #7135.208-1

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 in EPIC. Patients will typically include individuals intubated for intoxication, agitation or post-operative patients.

1. **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

2. **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 V_T >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

3. **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.

4. **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	PaCO ₂	32-48
V _T > 6ml/kg	PaO ₂	>65
VC > 9ml/kg	Sat	>92%
RSBi <100		

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

5. **Extubation:**

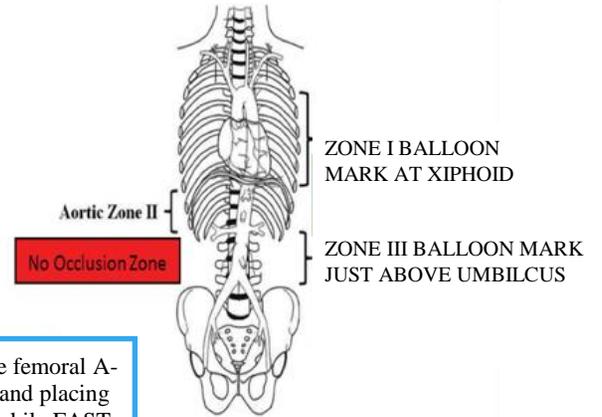
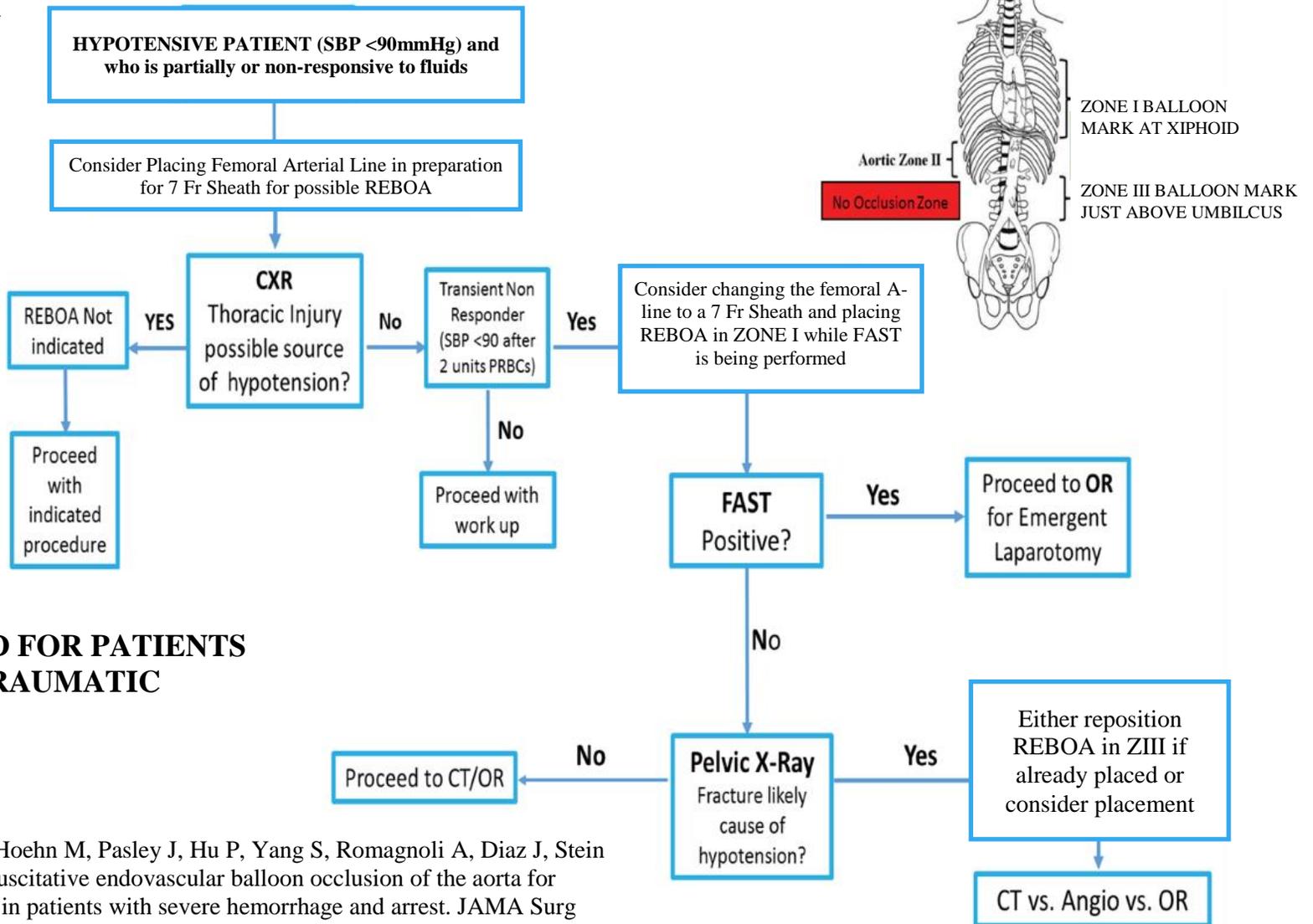
Notify physician of weaning parameters, ABG and presence/absence of cuff leak to obtain an extubation order.

NOTE: Extubation orders must be obtained prior to extubation.

6. **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)

ERLANGER REBOA ALGORITHM



***NOT INDICATED FOR PATIENTS WITH ACTIVE TRAUMATIC ARREST**

Brenner M, Teeter W, Hoehn M, Pasley J, Hu P, Yang S, Romagnoli A, Diaz J, Stein D, Scalea T. Use of resuscitative endovascular balloon occlusion of the aorta for proximal aortic control in patients with severe hemorrhage and arrest. JAMA Surg 2017. doi:10.1001/jamasurg.2017.3549

Moore LJ, Brenner M, Kozar RA, Pasley J, Wade CE, Baraniuk MS, Scalea T, Holcomb JB. Implementation of resuscitative endovascular balloon occlusion of the aorta as an alternative to resuscitative thoracotomy for noncompressible truncal hemorrhage. J Trauma Acute Care Surg 2015;79:523–32. doi:10.1097/TA.0000000000000809

Removal of Urinary Catheter by Nursing - # PC.217

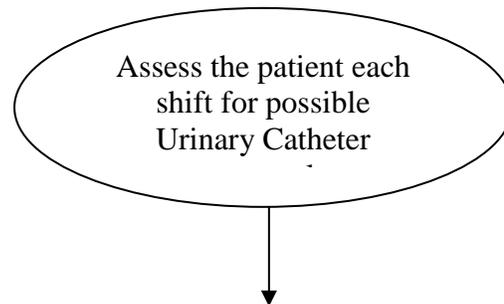
Policy statement: To provide direction for nursing to remove urinary catheters in a set time frame (exception noted in algorithm) and process to follow after catheter is removed.

Scope: Nursing Personnel, Medical Staff and Allied Health Professionals

Procedure:

See attached Algorithm

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



REMOVE the Catheter within 2 hours of the shift assessment UNLESS one of the following situations apply:

- The patient is healing from a Stage III or IV breakdown (perineal or sacral)
- Patient has an epidural
- Strict urine output monitoring is required
- The patient has acute urinary retention &/or a urinary obstruction
- Urology or transplant patient.
- The patient is here for "End of Life" care and a urinary catheter is requested for comfort

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

IF THERE IS A CONTINUED NEED FOR URINARY CATHETER:

- * Nurse documents the indication for continuation in the Shift Assessment
- * For SURGICAL (SCIP) patients, the MD MUST document indication for continuation in the progress noted or as an order by Post-op day 2

IF Urinary Catheter is removed:

- * Document the Date and Time of removal
- * Validate that the patient voids within 8 hrs
- * IF no void within 8 hrs, refer to **PC-181** (Note: MD order is required for in-dwelling catheter re-insertion)

Resuscitative Thoracotomy PMG - #7135.211

Background

Mechanism and down time are critical factors in the decision to perform a resuscitative thoracotomy because these factors are directly linked to survival. The following table developed from EAST's Practice Management Guide Line Committee Summarizes a meta-analysis of all relevant studies on RT. Signs of life include palpable pulse, respiratory effort, pupillary response and movement. Strong recommendation means you should perform RT, conditional rec means should consider and proceed if there are no extenuating circumstances.

Injury	Survival (%)	Neurologic outcome (%)	Recommendation
Penetrating Thoracic with Signs of Life	182/853 (21.3)	53/454 (11.7)	++
Penetrating Thoracic without Signs of Life	76/920 (8.3)	25/641 (3.9)	+
Pen. Extrathoracic with Signs of Life	25/160 (15.6)	14/85 (16.5)	+
Pen. Extrathoracic without Signs of Life	4/139 (2.9)	3/60 (5)	+
Blunt with Signs of Life	21/454 (4.6)	7/298 (2.4)	+
Blunt without Signs of Life	7/995 (0.7)	1/825 (0.1)	NR

++- strong recommendation +- conditional recommendation
 NR- Not Recommended

In patients that have little chance of meaningful survival, committing the resources and risk of exposure to blood-borne pathogens should be avoided. Finally, REBOA catheters should NOT be used in pulseless trauma patients or patients that may have a cardiac injury at EMC.

Incidence of Blood Borne Pathogens in the Trauma Population			
Mechanism	HIV	Hepatitis B	Hepatitis C
Blunt	3.7%	Not Reported	12.3%
Penetrating	1.9%	0.6%	9.9%

Guideline:

1. Confirm absence of pulse upon presentation to the trauma bay and ascertain in your own mind the validity that the patient was truly pulseless prior to arrival. If patient was receiving CPR upon arrival and you detect pulse or feel patient was not in cardiac arrest, proceed aggressively with ATLS and RT as indicated.
2. Patients sustaining **penetrating** trauma with CPR underway < 15 min may be considered for RT.
3. Patients sustaining **blunt** trauma with a witnessed arrest on the grounds (e.g., ambulance bay, helicopter pad) at EMC may be considered for a RT.
4. Blunt trauma patients without cardiac activity on the heart windows of a FAST exam *may* be pronounced deceased and no further intervention performed.
5. Patients that have exceeded the time limit for RT, consider performing the ATLS primary and secondary surveys before pronouncing patient deceased looking for some correctable cause of death other than exsanguination, e.g. tension pneumothorax.
6. Any patient with blunt or penetrating thoracoabdominal trauma that has a witnessed arrest in the trauma bay and that does not have exposed gray matter **should be strongly considered** for RT.
7. Patients found down with no external signs of trauma, normal FAST exam, normal chest and pelvic plain film brought in as a trauma activation should be returned to the care of the emergency medicine attending on duty.

Screening, Brief Intervention and Referral to Treatment (SBIRT) PMG (for alcohol abuse) - # 7135.15

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

Scope: Staff nurses will complete age based AUDIT and CRAFFT screenings in Epic as a part of patient's admission. Case managers will provide the interventions and complete the required documentation for SBIRT.

Definitions:

- **SBIRT-** Screening, brief intervention and referral to treatment
- **Screening** quickly assesses the severity of alcohol use and identifies the appropriate level of treatment.
- **Brief intervention** focuses on increasing insight and awareness regarding alcohol use and motivation toward behavioral change and should include:
 - Clear information about their use based on their risk assessment score
 - Advice and encouragement to decrease or stop alcohol intake
 - Teaching behavior skills that will reduce alcohol use and limit negative consequences
- **Referral to treatment** consists of encouraging the patient to stop or decrease alcohol consumption. The patient will be given information for local resources that may assist in voluntary in-patient or out-patient alcohol rehabilitation as these patients have been identified as needing more extensive care. The patient may explore these options independently or with the help of the social worker or case manager.
- **AUDIT-** Alcohol Use Disorders Identification Test (developed by the World health Organization [WHO]).
- **CRAFFT-** Screening Test is a short clinical assessment tool designed to screen for substance-related risks and problems in adolescents. **Car, Relax, Alone, Forget, Friends, Trouble.**

Procedure: Nursing staff will complete Audit and CRAFFT screenings in Epic as a part of every patient's admission assessment. If positive, Case Management will complete the "brief intervention and referral to treatment" part of SBIRT.

Note: It may be helpful to explain to the patient that 12 oz. of beer, 9 oz. of malt liquor, 5 oz. of wine and 1.5 oz of hard liquor have equal value and are considered a single drink.

Positive Screening Score:

AUDIT- Any male patient age 20-65 who scores 8 or above, any male 66 years (and older) of age or any female >20 who scores 7 or above on the AUDIT is considered **positive** for moderate to severe alcohol behavior and will need a brief intervention and referral to treatment per Case Management prior to discharge. Should the patient be discharged without a brief intervention and/or referral to treatment, every effort will be made to contact the patient by phone to ensure its completion.

CRAFFT- For all patients ages 12-19. SCORE 0-1 No problems = No action at this time. Score 2+ Potential of significant problem = Intervention required.

Patients who are unable to participate in the SBIRT due to injuries and/or medical problems may be excluded from the process; such as those with TBI, intubated or Dementia. However, should their medical condition improve, AUDIT or CRAFFT assessments should be performed.

Documentation:

- AUDIT and CRAFFT assessments will be completed by nursing staff as a part of the admission assessment and should be completed within 24hrs. Patient must be alert and able to answer questions themselves; nurse can't complete assessment by asking any family or friend present. If

patient isn't alert at the time the admission assessment is completed, the nurse will then choose the "unable to assess" option and the assessment will need to be completed once the patient is alert and oriented.

- Case Management will educate patients who screen positive with an SBIRT pamphlet and document this in a progress note in Epic. Go to Notes, create New Note. Under type place progress or nurses note, and in the insert SmartText box type in "BIRT". It will generate an automatic note. Case Management must see 100% of all referred patients. If Case Management is not able to provide an intervention due to mental status they will need to place a progress note in patients Epic explaining as to why. If patient at any time becomes alert, an intervention will be then be provided by Case Management.

Sepsis Definition and Treatment Guidelines per CMS

Severe Sepsis	Septic Shock
<p>All three must be met within 6 hours:</p> <ol style="list-style-type: none"> Documentation of a suspected source of infection Two or more manifestations of SIRS criteria: <ol style="list-style-type: none"> Temperature >38.3 C/101 F or <36 C/96.8 F Heart rate >90 Respiratory rate >20 WBC >12 or <4 or >10% bands Organ Dysfunction, evidenced by any one of the following: <ol style="list-style-type: none"> SBP < 90 or MAP <65, or a SBP decrease of more than 40 pts Cr >2.0 or urine output < 0.5 cc/kg/hour for 2 hours Bilirubin >2 mg/dL (32.4 mol/L) Platelet count < 100 INR >1.5 or PTT > 60 Lactate >2 mmol/L Or if a provider documents severe sepsis, r/o sepsis, possible sepsis, or septic shock 	<ol style="list-style-type: none"> There must be documentation of septic shock present and Tissue hypoperfusion persisting in the hour after crystalloid fluid administration, evidenced by: <ol style="list-style-type: none"> SBP < 90 MAP < 65 Decrease in SBP by >40 points from the patient's baseline Lactate ≥4 Or if the criteria are not met, but there is provider documentation of septic shock or suspected septic shock

	Severe Sepsis	Septic Shock
Performed by Hour 3	<ol style="list-style-type: none"> Initial lactate level Broad spectrum antibiotics administered intravenously Blood cultures prior to antibiotics 	<ol style="list-style-type: none"> Initial lactate level Broad spectrum antibiotics administered intravenously Blood cultures prior to antibiotics
Performed by Hour 6	<ol style="list-style-type: none"> Repeat lactate if the initial lactate is elevated (>2mmol) 	<ol style="list-style-type: none"> Resuscitation with 30 cc/kg of crystalloid fluid Vasopressors if the shock is refractory to resuscitation If hypotension is refractory to the fluids or initial lactate is ≥4 the following must be documented: <ol style="list-style-type: none"> Repeat volume status and tissue perfusion assessment consisting of: <ol style="list-style-type: none"> A focused physical exam performed by the provider including vital signs, cardiopulmonary exam, capillary refill evaluation, peripheral pulse evaluation, and skin exam Any two of the following: <ol style="list-style-type: none"> Central venous pressure measurement Central venous oxygen saturation Bedside cardiovascular ultrasound Passive leg raise exam by provider or fluid challenge exam

Radiology Policy for Solid Organ Injury Grading of Trauma Patients Policy # 7135.3

Policy Statement

To develop and provide a systematic and safe approach to the care of the adult trauma patient who requires CT scans for his/her injury.

The Policy

Spleen injury Scale		
Grade*	Injury Type	Description of Injury
I	Hematoma	Subcapsular, <10% surface area
	Laceration	Capsular tear, <1cm parenchymal depth
II	Hematoma	Subcapsular, 10%-50% surface area intraparenchymal, <5 cm in diameter
	Laceration	Capsular tear, 1-3cm parenchymal depth that does not involve a trabecular vessel
III	Hematoma	Subcapsular, >50% surface area or expanding; ruptured subcapsular or parenchymal hematoma; intraparenchymal hematoma \geq 5 cm or expanding
	Laceration	>3 cm parenchymal depth or involving trabecular vessels
IV	Laceration	Laceration involving segmental or hilar vessels producing major devascularization (>25% of spleen)
V	Laceration	Completely shattered spleen
	Vascular	Hilar vascular injury with devascularization of spleen

*Advance one grade for multiple injuries up to grade III.

From Moore et al. [4]; with permission

Liver injury scale		
Grade*	Injury Type	Description of Injury
I	Hematoma	Subcapsular, <10% surface area
	Laceration	Capsular tear, <1cm parenchymal depth
II	Hematoma	Subcapsular, 10%-50% surface area intraparenchymal, <10 cm in diameter
	Laceration	Capsular tear, 1-3cm parenchymal depth, <10 cm in length
III	Hematoma	Subcapsular, >50% surface area of ruptured subcapsular or parenchymal hematoma; intraparenchymal hematoma > 10 cm or expanding
	Laceration	>3 cm parenchymal depth
IV	Laceration	Parenchymal disruption involving 25% to 75% hepatic lobe or 1-3 Couinaud's segments
V	Laceration	Parenchymal disruption involving >75% of hepatic lobe or >3 Couinaud's segments within a single lobe
	Vascular	Juxtahepatic venous injuries; ie, retrohepatic vena cava/ central major hepatic veins
VI	Vascular	Hepatic avulsion

*Advance one grade for multiple injuries up to grade III

From Moore et al. [4]; with permission

Kidney injury scale		
Grade*	Injury Type	Description of Injury
I	Contusion	Microscopic or gross hematuria, urologic studies normal
	Hematoma	Subcapsular, nonexpanding without parenchymal laceration
II	Hematoma	Nonexpanding perirenal hematoma confined to renal retroperitoneum
	Laceration	<1.0 cm parenchymal depth of renal cortex without urinary extravasation
III	Laceration	<1.0 cm parenchymal depth of renal cortex without collecting system rupture or urinary extravasation
IV	Laceration	Parenchymal laceration extending through renal cortex, medulla, and collecting system
	Vascular	Main renal artery or vein injury with contained hemorrhage
V	Laceration	Completely shattered kidney
	Vascular	Avulsion of renal hilum which devascularizes kidney

*Advance one grade for bilateral injuries up to grade III

From Moore et al. [7]; with permission

TBI (Traumatic Brain Injury) PMG - #7135.216

Summary: Traumatic brain injury (TBI) is a potentially lethal injury across all age groups with mortality rates as high as 30%. Patient outcomes following severe TBI (defined as a post-resuscitation Glasgow Coma Score (GCS) \leq 8) are significantly improved when such patients are managed according to a comprehensive TBI protocol. Primary endpoints in the management of severe TBI include minimizing cerebral edema and intracranial pressure (ICP) while simultaneously optimizing cerebral perfusion pressure (CPP) (CPP=MAP-ICP) and tissue oxygenation to reduce secondary ischemic injury. This protocol will use tiers of therapy as recommended by the Brain Trauma Foundation (BTF), Neurocritical Care Society and ACS TQIP Best Practices in the Management of Traumatic Brain injury guidelines.

TIER ZERO: The following interventions should be implemented in all patients admitted to the ICU and ICRU with TBI:

- Maintain target MAP \geq 80mmHg if no ICP monitor is in place
- Administer supplemental oxygen to maintain SpO₂ >90%
- Elevate head of bed to 30 degrees
- Maintain head in neutral position to avoid jugular vein compression
- Maintain serum sodium \geq 140 mEq/L with isotonic intravenous fluids (no dextrose)
- Correct coagulopathy with the appropriate reversal agent in life-threatening bleeds
 - Four factor PCC (Kcentra-refer to Guideline for Reversal of Anticoagulation and Antiplatelet Therapy (PC-242) for dosing) for Coumadin and Anti-Xa agents (Xarelto (rivaroxaban), Eliquis (apixiban), Savaysa (edoxaban))
 - Platelets for Plavix (clopidogrel), Brilinta (ticagrelor), Effient (prasugrel), Aggrenox
 - Praxbind (2.5 G IV x 2 doses) for Pradaxa (dabigatran)
- Obtain TEG with platelet mapping on all patients with SDH, EDH, IPH & IVH
 - If ADP or AA inhibition is >60% transfuse 1 unit (5 pack) of platelets and repeat TEG with platelet mapping
 - Transfusion of platelets can be repeated up to three times
 - If platelets are unavailable DDAVP 0.4 mcg/kg should be given IV (Max dose 20mcg)
 - Repeat TEG with platelet mapping 1 hour after transfusion of platelets

- Maintain normothermia (temperature 36-37 Celsius)
 - Tylenol 650 mg PO/PR q4 hours scheduled if temperature > 37 Celsius
 - Consider Ibuprofen 800 mg PO/PR q6 hours (if unable to control with Tylenol)
 - Consider cooling device if unable to maintain normothermia
- Maintain serum glucose \geq 70mg/dl and \leq 180 mg/dl
- Ensure early appropriate nutritional support with gastric tube feeds within 24 hours
- Consider post-pyloric tube feeds in patients that do not tolerate gastric feeds
- Ensure early deep venous thrombosis (DVT) treatment – initiate DVT prophylaxis within 48 hours of a stable CT brain
- Initiate gastrointestinal stress ulcer prophylaxis in mechanically ventilated patients
- Prevent skin breakdown/decubitus ulcer formation with early (<24 hours) Mepilex padding

TIER ONE: The following interventions should be added in all patients with a GCS \leq 8 (with a motor score below 6)

- Ensure all physiologic goals from Tier Zero are met
- AIRWAY/BREATHING
 - Intubate patient if GCS \leq 8 and as needed to protect airway
 - Maintain PaCO₂ 35-40 mmHg
 - Consider obtaining arterial blood gas to correlate with end-tidal CO₂
 - Maintain PaO₂ 80-120 mmHg
- SYSTEMIC PERFUSION
 - Insert an arterial line
 - Maintain MAP \geq 80 mmHg
 - Ensure adequate volume resuscitation
 - Ensure hemoglobin > 9 g/dl during patient's acute resuscitation phase
 - Consider vasopressors to keep Map \geq 80 mmHg or CPP \geq 60 mmHg
- CEREBRAL PERFUSION
 - Place intracranial pressure (ICP) monitor if GCS \leq 8 after resuscitation AND concern for elevated ICP on imaging or exam (GCS motor score \leq 5)
 - The decision to use an ICP with external ventricular drainage vs. an ICP monitor alone should be made in collaboration with neurosurgery.
 - Maintain cerebral perfusion pressure (CPP) \geq 60
 - If CPP < 60
 - Ensure adequate volume resuscitation
 - Consider vasopressors (levophed 0.05mcg/kg/min – titrate to keep CPP >60)
 - Management of sustained ICP >22 for 10 min
 - Verify correct ICP waveform
 - If waveform is incorrect, notify critical care resident or neurosurgery (if ICP obtained via EVD)
 - If ICP > 22 mmHg for 10 min and EVD clamped – open EVD at 0 mmHg for 15 minutes
 - If EVD is opened more than 3 times within 90 minutes, leave EVD open at 0 mmHg continuously and notify surgery critical care or neurosurgery
 - Consider osmolar therapy
 - First line therapy of ICP >22 mmHg for \geq 10 min
 - 250 ml IV bolus 3% Sodium Chloride over 15 minutes x1 if serum sodium < 160 mmol)
 - Then start 3% Sodium Chloride drip per hypertonic saline infusion protocol
 - For persistent ICP > 22
 - Mannitol 25 g q4 hours
 - Hold hypertonic saline therapy for serum sodium >160 mEq/L
 - Hold mannitol therapy for serum sodium >160 mEq/L and/or serum osmolality >320 mOsm/L
- PROTECT THE BRAIN
 - Provide judicious analgesia and sedation to control pain and agitation
 - Fentanyl 25-500mcg/hr IV infusion
 - Bolus with dose increased for elevated ICP
 - Bolus patient with 50% current rate before increasing infusion rate for acute increases in ICP
 - If paralyzed and BIS is <40, boluses should not be used for elevated ICP

- Propofol 10-50 mcg/kg/min
- Must fill out propofol order set
- Monitor for signs of propofol infusion syndrome
- Seizure prophylaxis
 - Keppra 500mg IV/PO every 12 hours for 7 days (stop after 7 days if no seizure activity)
 - Consider EEG monitoring to rule out non-convulsive status epilepticus
- Avoid
 - Hypotension (SBP <100mmHG) or CPP < 60 mmHg
 - Hypoxemia (SpO₂ <92%)
 - Hypercarbia (PaCO₂>45 mmHG)
 - Hyponatremia (serum sodium <140 mEq/L)
 - Hypoglycemia or hyperglycemia (serum glucose <70 mg/dl or >180 mg/dl)
 - Hypovolemia
 - Fever
 - Anemia

TIER TWO: The following interventions should be considered if ICP is persistently >22 mmHg for more than 60 minutes and after discussion with neurosurgery and surgery critical care:

- Ensure all applicable elements from Tier One are met
- Continuous 3% sodium chloride drip as long as serum sodium <160 mEq/L
- Consider repeat head CT to rule out space-occupying lesion
- Consider continuous EEG monitoring to rule out non-convulsive status epilepticus
- Consider bolusing and then increasing sedative and analgesic therapy
- Paralysis
 - Ensure RASS -5 before initiation of paralytic
 - Start rocuronium and titrate to train ²/₄
 - BIS monitors should be used with all paralyzed patients
 - Target BIS is 40-60 and should be obtained before starting paralytics
- Prophylactic hypothermia is currently NOT recommend for patient with diffuse injury
- Mild hyperventilation
 - Begin mild hyperventilation with goal PaCO₂ 30-34 mmHg

TIER THREE: The following interventions should be considered if ICP remains >22 mmHg despite all Tier two goals being met

- Ensure that medical therapy with hypertonic saline is maximized (serum sodium 155-160 mEq/L)
- Consider revised ICP threshold of 25 mmHg with strict adherence to CPP >60mmHG
- Initiate continuous EEG
- Surgical decompression
 - Craniectomy solely for management of ICP does not improve long-term neurologic outcome but may be consider as a rescue therapy
 - Consider decompressive craniectomy/craniotomy in patient with a surgical lesion
- Barbiturate Coma
 - If not a surgical candidate and refractory to all the above intervention consider pentobarbital coma
 - Pentobarbital 10mg/kg IV over 10 minutes, then 5mg/kg/h x 3 hours, then 1mg/kg/hr IV infusion
 - Titrate pentobarbital to the minimal dose required to achieve EEG burst suppression – 3-5 burst/minute
 - Discontinue all other sedative agents and paralytics after pentobarbital loading doses complete (4 hours)
 - Consider invasive hemodynamic monitoring (such as pulmonary artery catheter) due to the negative inotropic effects of pentobarbital
 - Once ICP< 22mmHg for 48 hours, wean pentobarbital dose of the next 48-72 hours
 - Discontinue or decrease tube feeds to trophic rate (10-20 ml/hr)

Tertiary and Discharge Trauma Surveys Policy - #7135.508

A. Background

The ACS requires that all trauma patients have a tertiary survey completed within 24-48 hours of admission. In addition, a discharge survey will also be completed on all trauma patients prior to discharge from the facility. If a patient is admitted for less than 24 hours, the discharge survey will meet the requirements for the tertiary survey; it is not necessary to complete both. The goals of these surveys are to identify previously unknown injuries, re-evaluate known injuries, and ensure review of lab/radiology results, while confirming medical history and prior medications have been addressed. The discharge survey also includes a verification of acknowledgement and management of incidental findings.

B. Tertiary Trauma Survey

6. The tertiary trauma survey is to be completed within 24-48 hours of admission to the trauma surgery service.
7. The trauma surgery resident is responsible for completing the tertiary trauma survey.
8. The tertiary trauma survey process includes:
 - a) Review and update patient history.
 - b) Review and reconcile home meds if available.
 - c) Perform an exam for previously unidentified injuries and re-evaluation of known injuries.
 - d) Ensure all consulting services have evaluated the patient and note plan if known.
 - e) Review all lab results and final radiology reads.
 - f) List any additional labs or studies ordered based on survey findings.
9. The tertiary trauma survey will be documented in the daily progress notes using the shared accepted form in the electronic medical record (dot-phrase TRAUMATERTIARY). It will be added at the bottom of the daily progress note on hospital day 2 or 3.
10. All required elements must be addressed.

C. Discharge Trauma Survey

6. The discharge trauma survey is to be completed prior to patient discharge.
7. The Trauma Nurse Practitioner (or trauma surgery resident if TNP unavailable) is responsible for completing the discharge trauma survey.
8. The discharge trauma survey process includes:
 - a) Review and update patient history.
 - b) Review and reconcile home meds if available.
 - c) Perform an exam for previously unidentified injuries and re-evaluation of known injuries.
 - d) Ensure all consulting services have cleared the patient for discharge
 - e) Review all lab results and final radiology reads.
 - f) Indicate if the patient had any incidental findings identified.
 - g) Any additional labs or studies should be listed.
9. The discharge trauma survey will be documented in the progress notes using the shared accepted form in the electronic medical record (dot-phrase TRAUMADCSURVEY).
10. All required elements must be addressed.

Trauma Center Encumbered Policy - # 7135.18

Policy statement: To develop and provide a systematic and safe approach to the care of the adult trauma patient when the resources of the trauma center are overwhelmed.

Scope: Trauma Residents, Trauma Attendings, All sub-specialty surgical services

Procedure:

When there are more patients requiring resources than are available the trauma center needs to have a plan for how to alleviate this problem. If there are more patients requiring surgical intervention than surgeons are available at any given time each subspecialty will refer to their backup call surgeon to see the additional patients. If the primary surgeon on call and the backup call surgeon are both encumbered, every attempt will be made to contact additional surgeons from the call panel to take the additional patients to the OR. If there is no one available and we have exhausted all surgeons from the call panel the trauma attending will find out how long the patient would wait for a surgeon to be available. If this time is longer than appropriate and exceeds the time it would take to transfer the patient, then a transfer will be made to an appropriate trauma center in which Erlanger has a transfer agreement.

If the trauma center is encumbered because the proper equipment to take care of trauma patients is not available, every attempt to obtain such equipment will be made. If it is found that the equipment cannot be made available in an appropriate time frame and it would take more time to obtain the equipment than it would to transfer the patient, then a transfer will be made to an appropriate trauma center in which Erlanger has a transfer agreement.

Trauma Orthopedic PMG - #7135.14

Process Guideline Statement: To develop and provide a systematic and safe approach to the care of the adult trauma patient requiring care from the orthopedic surgical subspecialty.

Scope: All adult patients admitted to the Trauma Service at Erlanger Medical Center that require care from the orthopedic surgical subspecialty.

Best Practices in the Management of Orthopedic Trauma:

- Patients with open fractures receive intravenous antibiotics within 60 minutes of presentation. (Optimal antibiotic regimen may vary based on extent of tissue damage and contamination.)
- Patients with open fractures are taken to the operating room for surgical irrigation and debridement within 24 hours of presentation.
- Patients with open fractures requiring wound coverage with skin grafting or soft tissue transfers have coverage completed within seven days of injury.
- All patients with femoral shaft fractures undergo fracture stabilization within the first 24 hours of presentation, including patients with multi-system trauma.

Trauma Registrar Interrater Reliability (IRR) Requirements Policy - # 7135.5

Policy Statement: To develop and provide a systematic approach to interrater reliability (IRR) audits done by the trauma registrars.

Scope: Trauma Registrars, Trauma Program Directors, Trauma Medical Directors

The Policy: Registrars will complete IRR audits monthly on at least 5% of the trauma charts done in the registry each month. 93% is the minimum acceptable score on the IRR. If at any time any registrars score is below 93% on any IRR form their individual percentage of charts they have completed will be increased to 10% for 6 months. After 6 months, if the same registrar would again have any IRR percentage less than 93% that registrar would be placed on a work improvement plan.

Charts are reviewed utilizing the departmental IRR form. The secondary review is completed by another registrar. Forms are then turned into the adult and pediatric trauma program directors. The directors will calculate a percentage on each form and hand them back to the registrars for corrections to be made. If two registrars have a disagreement on a data element the final decision on who is correct is made by the trauma program directors.

Trauma Spine Assessment and Cord Injury PMG - #7135.207

Process Guideline Statement: Develop a regimented approach to screening and treatment for spinal injuries in the trauma patient.

Scope: Emergency Department Attending, Emergency Department Residents, Trauma Residents, Trauma Attending

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

1. Awake blunt trauma patients can undergo clearance of the spine by physical exam and active range of motion exercises (AROME) if they have no distracting injuries, are not intoxicated or do not have altered sensorium from traumatic brain injuries (TBI) etc.
2. Patients with spine pain or tenderness are at risk for spine injury and require radiological evaluation.
3. Obtunded blunt trauma patients are patients who may be intubated or are otherwise unable to communicate or interact with a physical exam or range of motion exercise, require computed tomography (CT) under a set of specific requirements of clearance of the spine.
4. Patients with neurological deficits have motor and/or sensory deficits corresponding to specific nerve roots resulting in paresis, paraplegia and/or sensory deficits not explained by TBI or cerebral infarct.
5. Penetrating spine patients have a ballistic wound that has proximity or trajectory involving the spine.

Procedure:

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

- a. Due to overlap of anatomic zones and the high number of bony injuries in the thoracolumbar area, patients with tenderness anywhere in the back should undergo CT scanning of the entire T & L spine.
- b. If bony spine tenderness is detected after the patient has undergone a CT scan of the thorax, abdomen and pelvis (TAP), a “bony spine” series can be reformatted from the CT-TAP.
- c. Patients with step-off deformities or bony back pain detected on secondary survey should undergo a dedicated T & L spine series
- d. Awake patients with bony neck pain or fail cervical AROME require a CT scan of the cervical spine and a two-view active flexion-extension plain film series of the cervical spine.
 - i. Patients sit upright in a wheelchair.
 - ii. The cervical collar is removed.
 - iii. The patient flexes his head forward until neck pain limits motion or the chin touches the chest and an x-ray is taken.
 - iv. The patient then extends the head backwards until the patient experiences pain or the occipital skull touch the upper back and a second film is taken.
 - v. The collar is then replaced until the official x-ray report demonstrates stability.
 - vi. Patients who do not have visualization of the C7/T1 disc space or at least 30 degrees range of motion, should have the case reviewed with the trauma Attending and may require an MRI of the cervical spine.

- III. Obtunded blunt trauma patients present a management dilemma in that patients with TBI can have prolonged periods of AMS and cannot undergo AROME. Performing MRI of the cervical spine as a screening tool on this large group of patients is not cost efficacious. Leaving cervical collars on for extended periods of time can result in skin care problems and decubitus ulcers.
- a. A recent meta-analysis states that a high quality cervical spine CT as defined by <3 mm axial cuts, can be used as a screening tool to clear the cervical spine in Obtunded patients without further testing.
 - b. The 64 slice scanners on the first floor of EMC have the capability of performing 2.5 mm axial cuts and these machines therefore have the resolution necessary to meet criteria specific to this technique.
 - c. CT scans of the cervical spine from outside facilities that have axial slice listed on the study as < 3.0 mm, are sufficient for this purpose but should have an over-read by an EMC radiologist.
 - d. Outside CT scans that do not state the axial slice size **and** do not contain sagittal and coronal recons do not suffice to clear the obtunded patient’s spine.

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

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

Trauma Surgery Physician Back-up Call Plan Policy - # 7135.35A

Policy statement: To provide specific guidelines for the physician members of the Trauma Resuscitation Team.

Who Should Read This Policy: Trauma Services, Trauma Attending Physicians, Emergency Department, 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.

Purpose: To provide specific guidelines for the physician members of the Trauma Resuscitation Team.

Procedure:

1. Initial back-up call for trauma surgery needs will be met by calling in the post-call trauma surgeon
2. If the post-call trauma surgeon is unavailable, the attending surgeon on A service will be called to cover.

Trauma Transfer PMG - #7135.210

Process Guideline Statement: To develop and provide a systematic and safe approach to the care of the adult trauma patient requiring transfer from a referring hospital.

Scope: Trauma physicians, surgery residents, Adult Emergency Department, LifeForce, Med. Comm., Transfer Center

PROCESS GUIDELINE:

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.

Trauma Transfer to Ortho Service Policy - # 7135.34A

Policy Statement: To develop and provide a systematic and safe approach to the care of the adult trauma patient who requires transferring from the general trauma service to the orthopedic trauma service.

Reason for Policy: The need for a systematic and safe approach to the care of the adult trauma patient who requires transferring from the general trauma service to the orthopedic trauma service.

Who Should Read this Policy: Trauma Surgeons, Orthopedic Surgeons, surgery residents, and orthopedic residents and the associated midlevel providers.

The Policy: It is often difficult to reliably determine the patient's 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 all of the following are met:

1. General trauma issues are resolved.
2. Isolated orthopedic injuries require continued hospitalization.
3. Trauma attending deems patient cleared and ready for transfer to orthopedic service.
4. Orthopedic team writes order to transfer patient to their service.

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

- Trauma patients who have been evaluated by an Erlanger Emergency Department 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 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 service.
- If significant non-orthopedic related injuries or problems are identified during the course of evaluation and treatment by the Orthopedic Service, consultation by the Trauma Surgery Service should be requested if appropriate.
- 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 Surgery Service. If the patient's condition remains stable but they require ongoing hospitalization for pain control or rehab evaluation, then transfer to the Orthopedic Service is appropriate per above parameters.
- Service transfers will be approved by attending to attending or chief resident to chief resident direct communication before any change of admission is made in the medical record.

Traumatic Wound Closure PMG - # 7135.212

Process Guideline Statement: To develop a standard for closure of traumatic wounds

Scope: Trauma Residents, Trauma Attending

Process Guideline:

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 wound classification system to describe all wounds managed by the trauma service. All wound closures performed need a procedure note documented in EPIC.

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 be a 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 a separate anatomic location 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--should be sub-classified as follows:

1) chest	5) upper extremity
2) back	6) lower extremity
3) abdomen	7) foot
4) flank	8) hand
2. 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 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. A large amount 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 document an Operative or Procedure note as directed by the Trauma Attending Surgeon.)

CDI Tips Regarding Wound Closure:

For accurate code assignment/billing, the following criteria must be met for each listed procedure:

Debridement

- You must clarify if this is excisional or non-excisional debridement (**sharp debridement is NOT acceptable terminology**) and include what instrument was used.
- You must clarify the deepest layer being debrided-such as skin, subcutaneous tissue, muscle, fascia and the **total number of square centimeters** removed. Check with a more senior person for clarification if you aren't sure how much you have removed. **Don't forget to specify the location of wound and laterality if applicable.**

Laceration Repair

- Please indicate the deepest layer being repaired/sutured-such as skin, subcutaneous tissue, muscle, fascia
- Single layer repair such as skin is a “simple” repair, two layer repair such as skin and subcutaneous fat is an “intermediate” repair and three layer repair such as skin, subcutaneous tissue and muscle is a “complex” repair.
- If you suture/ligate a vessel please clarify if **artery or vein** AND specify the **specific vessel** if known- i.e. ligation of right radial artery, ligation of left scalp vein etc...
- Excisional debridement of devitalized tissue or ligation of a bleeding vessel **automatically** make repair of that laceration a complex repair even if it is otherwise a single (simple) closure.
- Stellate lacerations that have three or more lacs communicating into a central location or avulsion lacerations that have a significant flap component also qualify as complex lacs even if they don't require a three layer closure.
- Specify anatomic location/laterality in the pre and postop diagnosis, e.g., leg, thigh, abdomen, flank, forehead, scalp etc.
- Measure the total length for all lacerations and add them together for each anatomic area
 - If there are 3 scalp lacs 4cm, 5cm and 9 cm pre and post diagnosis would be: 1) 4 cm scalp lac, 2) 5cm scalp lac, 3) 9cm scalp lac
 - The procedure would be the total length added up: 16 cm intermediate repair (if 2 layer closure) of scalp lacerations
 - If there were different layer repairs in the same anatomic area, then they are listed separately by total of each layer repair in that anatomic layer, e.g. Procedure 1) 12 cm simple repair of right arm lac, 2) 7 cm complex repair of left arm lac

Urine with Reflex to Culture Protocol - #8316.1093

Policy Statement: It is the policy of Erlanger Health System that all healthcare providers follow the recommendations outlined in the following policy.

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

Purpose: To outline recommended best practice for use of urine cultures in diagnosing urinary tract infection for adult inpatients.

Definition: Flex urine is performance of a urinalysis including urine macroscopic with reflex microscopic exam and then a culture if indicated.

Procedure:

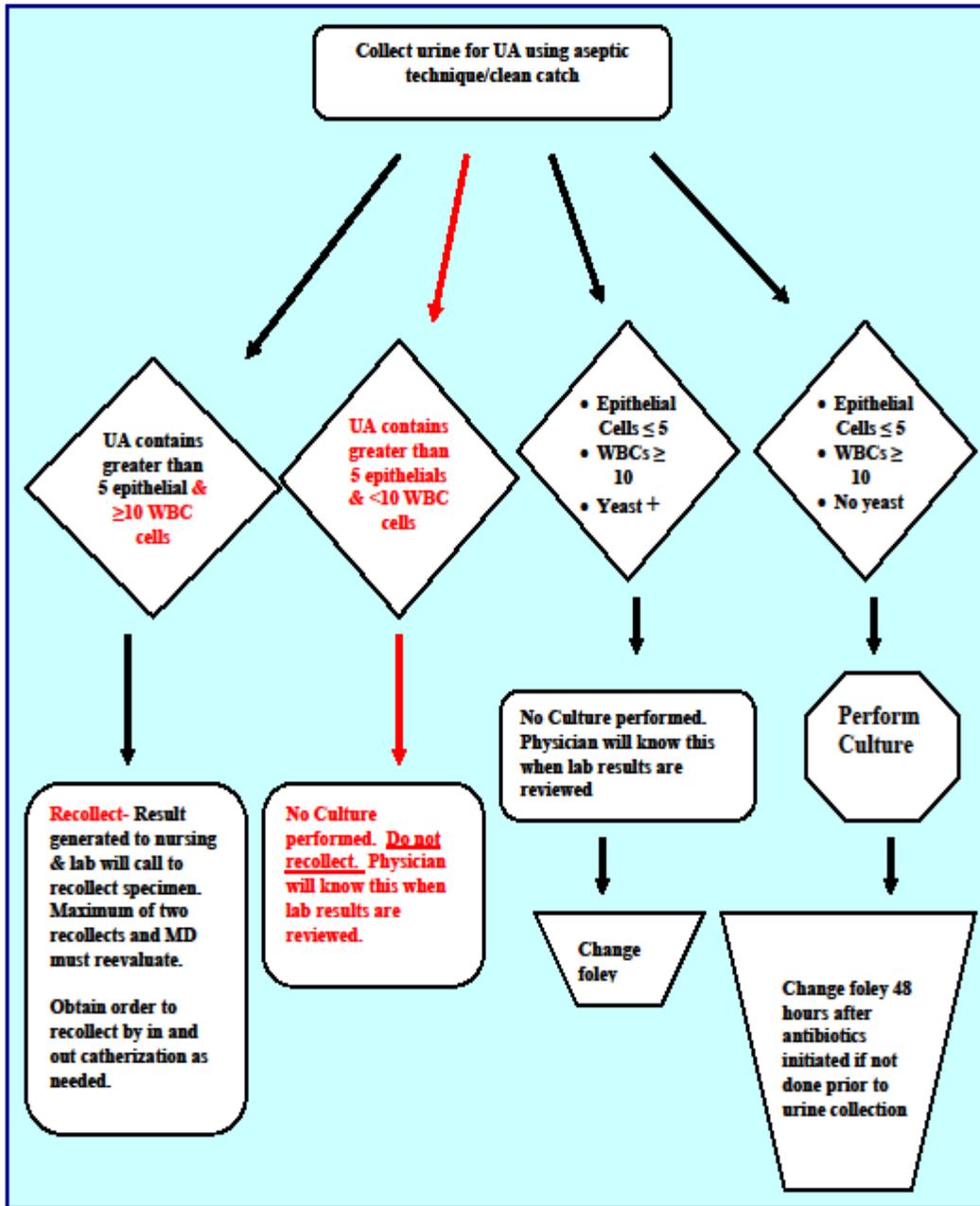
A. TESTING METHOD:

1. Hematology performs a urine macroscopic exam and microscopic exam is automatically performed if standard criteria are met. Specimen is handled using aseptic technique through testing procedure to prevent contamination.
2. Urine culture will only be performed as outlined in the protocol (Attachment A) with the following exceptions. A culture can be ordered regardless of the UA results by
 - a. Nephrology service for selected patients following kidney transplants;
 - b. Oncology service for febrile neutropenic oncology patients; and
 - c. Obstetric service for pregnant patients;
 - d. Others as approved by Infection Prevention Medical Director.

B. COLLECTION GUIDELINES:

1. Collect urine specimens for urinalysis and culture from foley catheters from the sampling port using aseptic technique. Do not collect from the foley bag or urine meter.
2. Voided specimens for urinalysis and culture are to be collected mid-stream after perineal area is prepped.
3. It is recommended that an order be obtained to recollect urine by catheterization after the first specimen collected results with greater than 5 epithelial cells. If two consecutive specimens result with > 5 epithelial cells, discuss with the physician.
4. Transport urine specimens to the laboratory within one hour or less after collected.

Urine Reflex Procedure Revised Jan 14, 2015
Use for Adult Inpatients & Adult Emergency Departments



APPENDIX A

Assessment and Injury Scales & Definitions

Glasgow Coma Score (GCS)

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

Best Eye Response (4)

1. No eye opening.
2. Eye opening to pain.
3. Eye opening to verbal command.
4. Eyes open spontaneously.

Best Verbal Response (5)

1. No verbal response
2. Incomprehensible sounds.
3. Inappropriate words.
4. Confused
5. Orientated

Best Motor Response (6)

1. No motor response.
2. Extension to pain.
3. Flexion to pain.
4. Withdrawal from pain.
5. Localizing pain.
6. Obeys Commands.

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

GCS & Head Injury:

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

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

Return to Sports after Concussion Guideline:

(according to the American Academy of Neurology, 2013)

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

Rancho Los Amigos Scale

- I. **No Response** - A person at this level will not respond to sounds, sights, touch or movement.
- II. **Generalized Response**- A person at this level will begin to respond to sounds, sights, touch or movement; respond slowly, inconsistently, or after a delay; respond in the same way to what he hears, sees or feels. Responses may include chewing, sweating, tachypnea, moaning, moving and/or increasing blood pressure.
- III. **Localized Response**- A person at this level will be awake on and off during the day; make more movements than before; react more specifically to what he sees, hears or feels. For example, he may turn towards a sound, withdraw from pain, and attempt to watch a person move around the room. The person will react slowly and inconsistently but begin to recognize family and friends; follow some simple directions such as "look at me" or "squeeze my hand"; and begin to respond inconsistently to simple questions with "yes" or "no" head nods.
- IV. **Confused-Agitated**- A person at this level will be very confused and frightened; not understand what he feels, or what is happening around him; overreact to what he sees, hears or feels by hitting, screaming, using abusive language, or thrashing about. Person must be restrained so he doesn't hurt himself; may not understand that people are trying to help him; may not pay attention or be able to concentrate for a few seconds; have difficulty following directions; recognize family/friends some of the time; and with help, be able to do simple routine activities such as feeding himself, dressing or talking.
- V. **Confused-Inappropriate, Non-Agitated**- A person at this level will be able to pay attention for only a few minutes; be confused and have difficulty making sense of things outside himself; not know the date, where he is or why he is in the hospital; not be able to start or complete everyday activities, such as brushing his teeth, even when physically able; become overloaded and restless when tired or when there are too many people around; try to fill in gaps in memory by making things up; may get stuck on an idea or activity (perseveration) and need help switching to the next part of the activity; focus on basic needs such as eating, relieving pain, going back to bed, going to the bathroom, or going home.
- VI. **Confused-Appropriate**- A person at this level will be somewhat confused because of memory and thinking problems, he will remember the main points from a conversation, but forget and confuse the details. follow a schedule with some assistance, but becomes confused by changes in the routine; know the month and year, unless there is a serious memory problem; pay attention for about 30 minutes, but has trouble concentrating when it is noisy or when the activity involves many steps. brush his teeth, get dressed, feed himself with help; know when he needs to use the bathroom; do or say things too fast, without thinking first; know that he is hospitalized because of an injury, but will not understand all the problems he is having; be more aware of physical problems than thinking problems; and associate his problems with being in the hospital and think he will be fine as soon as he goes home.
- VII. **Automatic-Appropriate**- A person at this level will follow a set schedule and be able to do routine self care without help, if physically able; have problems planning, starting, and following through with activities; have trouble paying attention in distracting or stressful situations. not realize how his thinking and memory problems may affect future plans and goals; continue to need supervision because of decreased safety awareness and judgment. He still does not fully understand the impact of his physical or thinking problems; think slower in stressful situations; be inflexible or rigid, and he may be stubborn; and be able to talk about doing something, but will have problems actually doing it.
- 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)				
Grade		Injury Description	ICD-9	AIS90*
I	Hematoma	Subcapsular, nonexpanding, < 10% surface area	864.01 - 864.11	2
	Laceration	Capsular tear, nonbleeding, < 1 cm parenchymal depth	864.02 - 864.12	2
II	Hematoma	Subcapsular, nonexpanding, 10 – 50% surface area; intraparenchymal < 10 cm in diameter	864.01 - 864.11	2
	Laceration	Capsular tear, active bleeding; 1 - 3 cm parenchymal depth, < 10 cm in length	864.03 - 864.13	2
III	Hematoma	Subcapsular, > 50% surface area or expanding; ruptured subcapsular or parenchymal hematoma; intraparenchymal hematoma > 10 cm or expanding		3
	Laceration	> 3 cm parenchymal depth	864.04 - 864.14	3
IV	Laceration	Parenchymal disruption involving 25 – 75% of hepatic lobe or 1-3 Couinaud's segments within a single lobe	864.04 - 864.14	4
V	Laceration	Parenchymal disruption involving > 75% of hepatic lobe or > 3 Couinaud's segments within a single lobe		5
	Vascular	Juxtahepatic venous injuries, i.e., retrohepatic vena cava/central major hepatic veins		5
VI	Vascular	Hepatic avulsion		6

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

AAST Spleen Injury Scale (1994 REVISION)				
Grade		Injury Description	ICD-9	AIS90*
I	Hematoma	Subcapsular, nonexpanding, < 10% surface area	865.01 - 865.11	2
	Laceration	Capsular tear, nonbleeding, < 1 cm parenchymal depth	865.02 - 865.12	2
II	Hematoma	Subcapsular, nonexpanding, 10 – 50% surface area; intraparenchymal, < 5 cm in diameter	865.01 - 865.11	2
	Laceration	Capsular tear, active bleeding; 1 - 3 cm parenchymal depth which does not involve a trabecular vessel	865.02 - 865.12	2
III	Hematoma	Subcapsular, > 50% surface area or expanding; ruptured subcapsular or parenchymal hematoma with active bleeding; intraparenchymal hematoma > 5 cm or expanding		3
	Laceration	> 3cm parenchymal depth or involving trabecular vessels	865.03 - 865.13	3
IV	Laceration	Laceration involving segmental or hilar vessels producing major devascularization (> 25% of spleen)		4
V	Laceration	Completely shattered spleen	865.04 - 865.14	5
	Vascular	Hilar vascular injury which devascularizes spleen	865.04 - 865.14	5

*Advance one grade for multiple injuries up to Grade III

AAST Duodenum Injury Scale (1994 REVISION)				
Grade		Injury Description	ICD-9	AIS90*
I	Hematoma	Involving single portion of duodenum	863.21	2
	Laceration	Partial thickness, no perforation	863.21	3
II	Hematoma	Involving more than one portion	863.21	2
	Laceration	Disruption < 50% of circumference	863.31	4
III	Laceration	Disruption 50 – 75% circumference of D2	863.31	4
		Disruption 50 – 100% circumference of D1, D3, D4		
IV	Laceration	Disruption >75% circumference of D2 Involving ampulla or distal common bile duct	863.31	5
V	Laceration	Massive disruption of duodenopancreatic complex	863.31	5
	Vascular	Devascularization of duodenum	863.31	5

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

AAST Pancreas Injury Scale (1994 REVISION)				
Grade		Injury Description	ICD-9	AIS90*
I	Hematoma	Minor contusion without duct injury	863.81 - 863.84	2
	Laceration	Superficial laceration without duct injury		2
II	Hematoma	Major contusion without duct injury or tissue loss	863.81 - 863.84	2
	Laceration	Major laceration without duct injury or tissue loss		3
III	Laceration	Distal transection or parenchymal injury with duct injury	863.92 - 863.94	3
IV	Laceration	Proximal (to patient's right of superior mesenteric vein) transection or parenchymal injury involving ampulla	863.91	4
V	Laceration	Massive disruption of pancreatic head	863.91	5

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

*Advance one grade for multiple injuries up to Grade III

AAST Kidney Injury Scale				
Grade		Injury description		
I	Contusion	Microscopic or gross hematuria, urologic studies normal		
	Hematoma	Subcapsular, nonexpanding without parenchymal laceration		
II	Hematoma	Nonexpanding peri-renal hematoma confirmed to renal retroperitoneum		
	Laceration	< 1.0 cm parenchymal depth of renal cortex without urinary extravasation		
III	Laceration	<1.0 cm parenchymal depth of renal cortex without collecting system rupture or urinary extravasation		
IV	Laceration	Parenchymal laceration extending through the renal cortex, medulla and collecting system		
	Vascular	Main renal artery or vein injury with contained hemorrhage		
V	Laceration	Completely shattered kidney		
	Vascular	Avulsion of renal hilum which devascularizes the kidney		

Head Injury Scale	
Grade	Injury Description
I	No changes on computerized tomography (CT)
II	Positive changes on CT
III	Nonsurvivable head injury

APPENDIX B

Documentation, Discharge, and Prescribing Tips

Trauma documentation and discharge process information:

- The Trauma Tertiary Survey is to be done when the patient has been here 24-48 hours. At the bottom of the daily progress note (hospital day 2 or 3), type the dot phrase “.traumatertiary” and complete the form. If done as a separate progress note, no co-sign is needed.
- The Trauma Discharge Survey is to be done when the patient is ready to have discharge orders signed (Trauma NP or resident). In a new progress note, type the dot phrase “.traumadcsurvey” and complete the form. This does not have to be co-signed.
- If the patient is discharged within first 24 hours, the Trauma Discharge Survey will meet the requirements of the Trauma Tertiary Survey; we do not have to do both forms.
- If incidental findings are identified on patient scans, put them in the “To Do” section of the patient handoff in the chart. (If none are present, type “none” so it is clear to the team.) When the patient is notified about the incidental findings, in a progress note, type the dot phrase “.incidentalprognot” and complete the form. Then, go to the discharge instructions box and type the dot phrase “.dcincidental” and complete the same information there. This will document the information in the medical record and for the patient to have at discharge
- When consulting services sign off, type or copy/paste their instructions, follow-up, limitations, etc into the discharge instructions box.
- Trauma NP will organize the discharge instructions, ensure completion of the Discharge Trauma Survey and sign all discharge orders when at all possible on floor/ICRU patients. Every effort will be made to organize and pend discharge instructions/orders on likely evening/weekend discharges as well. Any pended or outstanding discharge info will be in the handoff “To Do On Call” section in Epic and sent to the rounding group via Tiger Text at the end of each day.
- Chest tube removal is to be documented in the progress notes using “.traumaCTremoval”
- Writing more than the “purple card” limits on narcotic prescriptions should be documented in the progress notes using “.narcoticsexemption” after CSMD inquiry and order for RN to obtain narcotic consent/agreement.
- For follow-up purposes, the Trauma Clinic (1st and 3rd Tuesday each month) is for uninsured or minimally insured patients; 423-757-0880. Patients with private insurance or Medicare will follow-up in the USA Offices with their attending of record; 423-267-0466.

Documentation Pearls in E-Chart for Trauma

Trauma – Related Order Sets in EPIC E-Chart		
Order Set Description	Order ID	EPIC Title
Admission	1556	EPHS Trauma/Acute Care Surgery Admission
Brain Injury	1558	EPHS Traumatic Brain Injury Management
Post-op PEG	1834	EPHS PEG Tube Post-Op
Infection Workkup	1838	EPHS Surgical Critical Care Infection Workup
TXA Administration	2206	EPHS Administration of Tranexamic Acid for Trauma
Blood Product Administration	3040000316	EPHS Adult Blood Admin Routine (single unit)
Massive Blood Resus Protocol	191	EOHS Adult Blood Admin Emergent/Multi-Unit Orders
Trauma Discharge	1874	EPHS Trauma Discharge Addendum
General Surgery Discharge	691	EPHS General Adult Surgery Discharge
CRRT Citrate	1549	EPHS Initial Adult CRRT Citrate
CRRT Heparin	1550	EPHS Initial Adult CRRT Heparin
CRRT NO Anticoagulation	2456	EPHS Initial Adult CRRT NO Anticoagulation
Trauma – Related Templates and Shortcuts in EPIC E-Chart		
Template or Note Description	Dot-phrase	
Trauma History & Physical	.utsurgtraumahp	
Trauma Daily Progress Note	.utsurgtraumaprog	
Trauma Tertiary Survey	.traumatertiary	
Trauma Discharge Survey	.traumadcsurvey	
Incidental Findings Note	.incidentalprognot	
Incidental Findings for DC Instructions	.dcincidental	
Trauma Chest Tube Removal	.traumaCTremoval	
Progress note for exceeding 3 days narcotics	.narcoticsexemption	

Opiate Prescription Limitations

Maximum Prescriptions of Opiates		
Common Opiate Dosages		# of tabs
Hydrocodone	5 mg	36
(Norco)	7.5 mg	24
	10 mg	18
Oxycodone	5 mg	24
(Percocet)	7.5 mg	16
	10 mg	12

