Trauma Doc Primer
Department of Emergency Medicine
University of Washington
Harborview Medical Center

https://em.uw.edu/
@UWashEM

2018 Revision
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INTRODUCTION

Welcome to your role as the trauma doctor at Harborview Medical Center. Working successfully as a trauma doctor requires organization, anticipation, sound clinical judgment, and a firm understanding of ATLS. Management of a trauma patient is a team sport. Some residents complain that managing trauma patients is based solely on protocol. Indeed, ATLS was born in response to the lack of protocol surrounding trauma care, and requires one to evaluate patients in a detailed, step-wise fashion. However, blindly following protocols without careful clinical consideration can create problems of its own. The objective of this brief text is to provide you with an overview of Harborview and how to approach trauma care as well as offer some insight in how to be effective in your roll. We encourage you to review your ATLS and use this as a supplement.

PEARLS TO MAKE YOU A SUCCESSFUL TRAUMA DOCTOR

<table>
<thead>
<tr>
<th>Start of Shift</th>
<th>During Shift</th>
<th>Post-Shift</th>
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<tbody>
<tr>
<td>* Arrive 15 minutes early.</td>
<td>* Run the board frequently.</td>
<td>* After sign out, stick around to help finish procedures or call consults.</td>
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<tr>
<td>* Introduce yourself to your team members - know their names and skill sets.</td>
<td>* Prior to full trauma activations, prepare your team, assign roles, anticipate issues / needs.</td>
<td>* Debrief with your attending or EM R4 to identify areas for improvement for your next shift.</td>
</tr>
<tr>
<td>* Use IPASS for sign out</td>
<td>* Have a plan (and contingency plan) for each Medic/ALNW patient prior to their arrival.</td>
<td>* Complete any documentation on patients you saw primarily or procedures you conducted.</td>
</tr>
<tr>
<td>* Ask clarifying questions during sign out.</td>
<td>* Mobilize resources when the ED gets busy (discuss strategies with your attending).</td>
<td>* Identify at least one topic you are going to read about after each shift.</td>
</tr>
<tr>
<td>* Meet and reassess all patients you received sign out on.</td>
<td>* Reassess patients frequently.</td>
<td></td>
</tr>
<tr>
<td>* At 7a and 7p you will &quot;run the board&quot; with the entire ED trauma team. Be ready.</td>
<td>* Stay organized - document to-do's on the tracking shell for every patient.</td>
<td></td>
</tr>
<tr>
<td>* Assess equipment shortages.</td>
<td>* Consider dispositions and barriers to dispositions early.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>* Answer medic one pages immediately.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>* Use evidence based decision rules on shift at MDcalc.com (i.e. PECARN and Canadian CT Head, etc)</td>
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</tr>
<tr>
<td></td>
<td>* Perform closed loop communication with your team, RNs and attending.</td>
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ED WORKFORCE

**Attendings:** There are 3 emergency department attendings on the trauma side every day with 8 hour shifts that begin at 6 AM, 2 PM, and 10 PM. All ED patients must be staffed with the attending.

**R4 Supervisors:** These residents perform as junior attendings. Their responsibilities (staffing patients, supervising procedures) are similar to the EM attending with the exception of answering incoming transfer center phone calls.

**Trauma doctor:** This is an EM R2, EM R3, General Surgery R2, or pediatric EM fellow. Responsibilities include answering Medic One and Airlift Northwest pages, leading the trauma team through all major resuscitations, receiving all trauma team presentations, physically examining all patients, ensuring plans are appropriate and complete, and confirming task completion and dispositions. They report to the ED attending or EM R4 (when present).

**Trauma team members:** The trauma team is composed primarily of interns, however, at times also includes advanced practice providers (PA, ARNP), residents, and fellows. Team members’ home training programs vary and include emergency medicine, general surgery, family medicine, OMFS, podiatry, orthopedics, and pediatric emergency medicine. We often receive visiting residents from Madigan, Virginia Mason, Swedish and Seattle Childrens. Likewise, their training levels may range anywhere from an R1 to an R4. Teams change on a daily basis as does the team’s skill set. Trauma team shifts are 12 hours and usually start at 6a or 6p. Occasionally there may be a “swing” resident from 12p to 12a.

**Charge Nurse:** This is the RN who is responsible for overall ED flow amongst many other important tasks. Introduce yourself to this person at the start of your shift and run the board with them regularly. It is important to notify them of all admissions (admitting team, location and diagnosis).

**Nursing:** There is one nurse per zone plus a float nurse. Verbal communication with nursing is critical to excellent patient care. During trauma activations or sedations, STAT nurses from within the hospital will arrive to assist with patient care.
Medical assistants (MAs): There is one for the trauma side. They can draw blood (but not start IVs), perform EKGs, set up chest tubes, gather supplies, do crutch training, and other patient oriented tasks.

Social Workers: They work closely as a liaison between the ED, families, patients, and social resources. Involve them early for any patients who may need immediate help with housing, transportation, substance abuse, mental health referrals, child protective services referrals, sexual assault nursing evaluations, filing police reports, or providing safe havens for domestic abuse survivors. For critically ill patients, they will accompany you to the family room to provide updates and answer questions after you leave.

Physical therapy: A physical therapist is available in the ED during normal working hours to help with musculoskeletal complaints including back pain and neck strain. During after hours, place referrals in ORCA and put the printout in their basket at their desk.

Physicians in the ED: Poly-trauma patients may have many services involved in their care. Two of the most frequent consulting services include General Surgery and Orthopedics. As such, they both have dedicated workstations in the ED fishbowl.

RESOURCES TO HELP SAFELY DISCHARGE A PATIENT

Result Follow Up:

If you send a test that needs follow-up after the patient leaves (i.e. STD testing, urine culture, wound cultures, etc) you need to flag the chart for follow-up by our nursing team. In FirstNet under “ED Disposition” go to “ED Review needed” and select “yes.” This will give you a text box to provide details on what needs be done. This function is only for following up test results and not things like “need a PCP.”

Follow up appointments for patients without a PCP:

For patients seen in the emergency department who need follow-up but do not have a primary care provider, go to the back desk and request an “Aftercare” appointment. This clinic should not be used for
establishing primary care, but rather as a means to follow up for a specific injury or illness.

**Referrals to UW providers:**

If your patient needs follow-up with a specialty provider (i.e. neurology, urology, orthopedics, etc) fill out a UW Medicine referral sheet and place it in the basket near the patient services specialist box (AKA “the back desk”). Ensure a functional phone number for the patient is included on this form.

**SIGN OUT PROCEDURES**

Team sign-out is a critical time for patient safety. Therefore it is imperative that signout happens on time, efficiently and accurately. Thus, if you are the oncoming resident you must arrive 15 minutes early, meet your team, and be ready to take sign out on time. If you are the off going resident, prior to sign out, you should have a clear understanding of the plan for all patients. Loose ends should be tied up and clear algorithms for disposition should be communicated. We have adopted the IPASS system for patient sign out (see chart below).

<table>
<thead>
<tr>
<th>I</th>
<th>Illness Severity</th>
<th>Sick, Stable, Potentially Sick</th>
</tr>
</thead>
<tbody>
<tr>
<td>P</td>
<td>Patient Summary</td>
<td>Patient one-liner, Results, Interventions</td>
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<tr>
<td>A</td>
<td>Action Items</td>
<td>Results or consults to follow up on</td>
</tr>
<tr>
<td>S</td>
<td>Situational Awareness</td>
<td>If/then statements regarding next steps in patient care</td>
</tr>
<tr>
<td>S</td>
<td>Synthesis by receiver</td>
<td>Receiver summarizes action items, Questions answered</td>
</tr>
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</table>
PRE-HOSPITAL CARE

Medics

The trauma doctor provides medical control for medics from throughout the region who are transported to Harborview. You will receive a page with either a “T” (telephone) or “R” (radio). Immediately go to the radio room to await the call. Seattle medics usually contact the trauma doctor via the radio and outlying medics (i.e. King County Medics) may contact you via the telephone in the radio room. When communicating with the medics, be aware that different units carry different medications and are limited in person-power. Keep all communication brief, professional, and patient oriented. Refrain from asking long questions however, always obtain the following information:

- Age, gender
- Vital signs (including lowest BP and GCS)
- Broselow color (if pediatric)
- Intubated? Any challenges with it?
- IV access?
- Mechanism (height of fall, speed of collision, etc.)
- Pelvis stable/sheeted (if blunt mechanism)?
- Injuries

If using the radio, patient names will not be used as people outside of the medical system often monitor these radios.

In Seattle, if contacted by medic 44, this is the Medical Supervising Officer (MSO). They will contact the trauma doctor if there are multiple casualties or significant trauma requiring extra resources. If there are 3 or more significant traumas, ask the MSO if he/she has activated an MCI (Mass Casualty Incident), and call the attending and charge nurse to the radio room.

Airlift Northwest

Airlift Northwest dispatcher’s will contact Harborview when they are en route with a patient. Similar to medics, ALNW reports will be brief and interventions limited. Also bear in mind that while in flight, procedures such as intubations can be extremely difficult. Other air medical transport companies such as (Life Flight and MedStar) also
transport trauma patients, but they do not usually contact the TD directly prior to arrival.

Be cognizant that when patients are transported by air that gas expands as pressure decreases (Boyles Law). Last, small pneumothoraces have the potential to become significant if not decompressed prior to flight. This is particularly true if flying over the mountains in which the helicopter will reach altitudes ranging from 8000 - 10,000 feet. Generally, in Western Washington the helicopters will fly less than 2500 feet and gas expansion is less of an issue. The fixed wing aircraft can be pressurized thus mitigating most of the effects of altitude. In short, strongly consider advocating for chest tube placement prior to flight if there is any suspicion for pneumothorax.

**Basic Life Support Ambulance Companies (i.e AMR, Tri-Med, etc)**

These are staffed by EMTs and have much less medical training than medics. They can monitor vital signs and start oxygen but they cannot start IVs, intubate or give medications. While the majority of the patients transported via BLS have low mechanisms of injury or are well appearing, sometimes these patients are sicker than originally billed - thus be vigilant, regardless of prehospital triage or mode of arrival.

**The Transfer Center**

All inter-facility transfers must go through the transfer center which is monitored by Harborview nurses on a recorded line. In the rare event you are contacted directly by a provider outside of the UW system, refer them directly to the transfer center. If a provider is desperate or dealing with a critically ill patient, contact your attending immediately for guidance.

**PREPARING FOR INCOMING TRAUMA PATIENTS**

Immediately after you receive report about an incoming patient from medics or ALNW, you should radio overhead a brief report to the ED team. The following information should be conveyed:

- ETA
- Medic Unit Number
- Patient’s Age, Gender
- Intubation status
- Mechanism of injury
- Trauma activation level (remember to identify if it is a pediatric or obstetric code)

Here is a sample script:

“Attention charge, triage and trauma team, in approximately X minutes, medic unit #X will be bringing a X year old [male/female] patient involved in a [X] accident [mechanism of injury] who [is / is not] intubated. Vital signs are X. This will be a [Full/modified trauma activation]. ETA X minutes”

Once you have conveyed this information, it is important to begin formulating a plan. You should ask the following questions.

1. Does the patient meet criteria for a trauma team activation (see below and reference you badge on shift)?
2. Which bed will this patient go to? Discuss this with your attending/R4 and the charge RN.
3. Does the patient have an established airway? Will they need one shortly after arriving?
4. Do you have enough resources? Are there other subspecialists that should be at the bedside upon arrival (i.e. Neurosurgery, Ortho, etc)?
5. Is there any equipment you need to have prepared for this patient? Things to consider include intubation equipment, chest tubes, central lines, sheet with Kocher clamps for an unstable pelvis, tourniquet, etc.
6. What are the roles and responsibilities of your trauma team members? Assign someone to write orders, perform a FAST, obtain an ABG, exposure / undress the patient, place box splints, etc.
7. If you have a pediatric patient, you should know their weight or Broselow color. Have all of your intubation and code drug doses written down and ready prior to the patient’s arrival.
8. For any unstable patient have the following equipment ready (your MA can help make sure these are all available).
   a. Ultrasound to perform a FAST
   b. Advanced airway equipment
   c. Rapid transfuser (known as the “Belmont”)
   d. Thoracostomy trays and 36 French chest tubes on both sides of the bed.
TRAUMA TEAM ACTIVATION CRITERIA

There are two types of trauma activations 1) Modified trauma team and 2) Full trauma team. Refer to your badge card while on-shift, and discuss with your R4/Attending if you are unsure.

Modified Trauma Team Activation Criteria:

1. All intubated trauma patients except those with confirmed isolated traumatic brain injury or gunshot wound to the head.
2. All stab wound injuries to the neck, chest, abdomen, pelvis, or groin.
3. All injuries to the extremities with pulse deficit
4. Trauma patients with altered mental status (i.e. head injury or intoxication) who require diagnostic evaluation of the abdomen.
5. Burns with associated trauma.
6. 2 or more proximal long bone fractures.
7. Amputation proximal to the ankle or wrist.
8. Pelvic fractures except isolated low energy acetabular fractures.
9. Multiple (3+) rib fractures, flail chest, hemo-/pneumothorax
10. Severe mechanism of injury:
   a. MVC with ejection, death of occupant
   b. Intrusion > 12 inches into patient compartment or > 18 inches into any compartment
   c. Adult falls more than 20 feet
   d. Child (<15 yo) falls > 10 feet or 2-3 times their height
   e. Auto versus pedestrian
   f. Auto versus bicycle with significant impact
   g. Motorcycle collision > 20mph or with separation of rider from the motorcycle.

Modified Trauma Team Activation - Pediatric Criteria
Any patient less than 18 years old who meets the above “modified” trauma activation criteria.

**Modified Trauma Team Activation - OB Criteria**

Any patient who is more than 20 weeks pregnant and meets any of the above “modified” criteria.

If gestational age is unknown, a modified obstetric trauma activation will apply to any pregnant patient whose uterine fundus is at the umbilicus or higher.

**Full Trauma Team Activation Criteria**

1. Trauma patient with hemodynamic instability in the field or HMC ED (SBP ≤ 90mmHg for age ≥ 5y or below min SBP for age ≤ 5y, see table).
2. All gunshot wounds/impalations the neck, chest, abdomen, pelvis, or groin.
3. Patients with high mechanism trauma event (Modified Trauma activation criteria #10) or with obvious polytrauma at initial report who were intubated in the field and transported directly to Harborview.
4. Trauma patient with difficult or unsecured airway in the field or ED (includes failed attempts at field intubation, all patient’s transported with airway rescue devices [king/LMA], all patients with field or outside hospital cricothyrotomy).
5. Trauma patients with obvious major vascular injury (active arterial hemorrhage, expanding hematoma).
6. All pediatric trauma patients ≤ 5 years of age requiring intubation in the field or emergency department.
7. Transfer patients requiring transfusion to maintain vital signs or any trauma patient in the ED for which a transfusion of PRBCs is initiated.
8. Mass casualty: 3 or more major trauma (modified TTA) patients expected simultaneously.

**Full Trauma Team Activation – Pediatric Criteria**

Any patient under the age of 18 meeting ANY of the Full Trauma Team Activation criteria.

**Full Trauma Team Activation – OB Criteria**
Any pregnant patient (gestational age >= 20 weeks) that meets ANY of the Full Trauma Team Activation criteria

Pregnant trauma patient with fetal distress on fetal monitor

**Resources that respond during trauma team activations**

<table>
<thead>
<tr>
<th>Modified Trauma Activation</th>
<th>Full Trauma Activation</th>
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<tbody>
<tr>
<td>- ED attending</td>
<td>- ED attending</td>
</tr>
<tr>
<td>- ED Trauma doctor</td>
<td>- ED Trauma doctor</td>
</tr>
<tr>
<td>- General Surgery Chief Resident (R5 or R4) or fellow</td>
<td>- General Surgery Chief Resident (R5 or R4) or fellow</td>
</tr>
<tr>
<td>- General surgery R3</td>
<td>- General surgery R3</td>
</tr>
<tr>
<td>- Respiratory Care Practitioner (for intubated patients)</td>
<td>- General surgery attending</td>
</tr>
<tr>
<td>- Radiology Technologist</td>
<td>- Anesthesiologist</td>
</tr>
<tr>
<td></td>
<td>- Respiratory care therapist</td>
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<tr>
<td></td>
<td>- Transfusion services technician</td>
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<tr>
<td><strong>Pediatric (all of the above plus)</strong></td>
<td><strong>Pediatric (all of the above plus)</strong></td>
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<tr>
<td>- Pediatric R3</td>
<td>- Pediatric R3</td>
</tr>
<tr>
<td></td>
<td>- Pediatric ICU attending</td>
</tr>
<tr>
<td><strong>Obstetric (all of the above plus)</strong></td>
<td><strong>Obstetric (all of the above plus)</strong></td>
</tr>
<tr>
<td>- OBGYN resident</td>
<td>- OBGYN resident</td>
</tr>
<tr>
<td></td>
<td>- OBGYN attending</td>
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<tr>
<td></td>
<td>- Pediatrics</td>
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**A note on calling trauma codes**

All patients meeting criteria for a trauma code will later be reviewed at trauma council. Calling trauma codes for the appropriate patients is required as part of maintaining our state’s trauma designation. Always err on the conservative side when deciding to call a trauma code as this will give you more time to prepare your team. Late activations are always more challenging to manage.

**PREPARING YOUR TEAM & RUNNING A CODE**

For trauma activations especially, it is crucial to assemble your team before the patient arrives. Inform your team - provide details on the mechanism of injury and treatments the patient received in the field.
Assign roles to all team members. Make sure you know your team members’ names, where each team member will physically be at the bedside, and who will be able to do each task in both anticipated events as well as if there are unforeseen events. For example - who will intubate if the ETT is pulled out? Who will place chest tubes? Who will place a central line? Who will prep the chest? Team role assignment should be detailed down to the MA who will put the patient on the monitor and the RN who will run the Belmont.

When the patient arrives

Upon patient arrival, stand at the head of the bed and let the Medics or ALNW give their report before you begin talking. Ensure the room is quiet for report. Immediate priority should be the primary survey (ABCs), getting the patient on the monitor, assessing access. Often, the adjuncts to the primary survey can happen simultaneously: blood draw, ABG, etc. Once the primary survey is performed you can move onto other tasks such as calling for a trauma series and FAST.

As part of the primary survey, pay particular attention to the airway (is it secured? Where is the ET tube), the chest (breath sounds, palpate for crepitus), the abdomen (including looking for seatbelt sign, distension and tenderness), and the pelvis (checking for instability). Do not let more than one physician check the pelvis if there is question of instability.

Call out your exam. Be loud and firm so the team, including the documenting trauma team member and nurses can hear you. Never un-sheet a pelvis until the AP pelvis is back and there is no significant fracture. That said, never leave a patient sheeted for prolonged period without examining their perineum and anterior soft tissues (to look for open components, genital trauma, etc.) Do not take down a traction splint of the femur unless pain meds are on board and ortho is ready to place a Steinman pin. Other types of splints should be removed and replaced with box splints to facilitate radiology.

Expose early and restrain as needed (especially intubated patients).

All trauma patients should be fully exposed, rolled, spine palpated, and board removed. Apply warm blankets immediately. Never leave a patient on a backboard board for a prolonged time.
If a rectal exam is indicated (i.e. spine injury or significant pelvic fracture), make sure the rectal is done by an MD. If a foley is needed, a rectal exam should precede foley placement to evaluate for urethral trauma.

Do not let a patient leave the resus bay for CT until the trauma series is read, proper access is obtained, all steps in ABCDE are complete, and the patient is deemed to be stable enough for transport to CT.

**Work-up for Trauma Codes**

Trauma codes should be run in accordance with ATLS. Review your ATLS prior to your first shift. During the code, the most important thing is to keep the room calm and make sure your team members have pre-established roles. The primary survey is critical and should be clearly communicated. Summarize your findings and clearly communicate task priorities as you go.

*The key to a good trauma code is trauma code is preparation!*

Here is a brief summary on how to perform an initial evaluation of the unstable blunt trauma patient.

Adopted from OCCAM “Initial Evaluation of the Unstable Blunt Trauma Patient” - updated 23 March 2017

A. **Primary Survey**

1. **AIRWAY**
   A. If intubated confirm tube placement, if not assess need for intubation.
   B. Continuous end tidal CO2 monitoring for all intubated patients, ETCO2 should be documented q15min until stable.
   C. NG/OG tube for all intubated patients.

2. **BREATHING**
   A. Listen for bilateral breath sounds call out results.
   B. Monitor oxygen saturation.
   C. If clinical concern for hemo/pneumothorax place chest tube prior to CXR.
   D. Send ABG, adjust ventilator to maintain normocapnea, repeat ABG for each vent change until stable, do not adjust vent based on ETCO2.
   E. CXR as part of trauma series.

3. **CIRCULATION**
A. Confirm 2 large bore IVs, if inadequate peripheral access then place central access if time permits, if not use EZ IO.
B. Evaluate for external hemorrhage, apply direct pressure, use tourniquet for significant extremity hemorrhage.
C. Determine amount of prehospital fluid given and consider early blood transfusion. Activate the **Massive Transfusion Protocol** when blood products initiated. If within 3 hrs of injury consider tranexamic acid
D. FAST exam, if nondiagnostic then perform DPa for persistent instability (see algorithm for BAT).
E. Pelvic Xray as part of trauma series, if unstable sheet pelvis.
F. Send trauma labs* including Type & Cross.
G. Check Base deficit
H. Serial Hemoglobins at least 15 min apart until stable, do not delay diagnostic studies waiting for HgbS.
I. Place Foley catheter, dip for hematuria.

4. **DISABILITY**
   A. Assess GCS, pupillary response, neurologic exam.
   B. If concern for herniation call Type A Neurosurgery Activation.
   C. Consider Lateral C-spine if unexplained shock and concern for high C-spine injury (Lateral C-spine no longer part of routine trauma series).

5. **EXPOSURE**
   A. Remove all clothing and restrain as needed.
   B. AVOID hypothermia: All IV fluids given are warmed, blood products given on Level 1 with active warming. Warm blankets placed on patient as soon as feasible, Bair Hugger if time permits.

6. **DISPOSITION**
   A. If evidence of intra-abdominal hemorrhage, major thoracic hemorrhage, or ongoing extremity hemorrhage: TO OR.
   B. If pelvic fracture with no major intra-abdominal hemorrhage to Interventional Radiology (Consider REBOA placement: **see protocol**).
   C. If patient stabilizes and no immediate indication for OR/IR then proceed to Secondary Survey and CT imaging (see imaging protocols).
   D. Patient with metabolic acidosis or ongoing instability should receive only essential imaging and be admitted rapidly to the ICU. (**see Rapid Trauma ICU Admission protocol**.)

B. **Secondary Survey (When stable)**
   1. Head to Toe Exam: results are called out.
   2. Patient log rolled to exam back and perform rectal exam, backboard removed with full spine precautions maintained.
   3. Splint extremity fractures, notify orthopedics.
   4. Imaging studies ordered.
5. Patient sent for imaging if stable.

*Trauma labs:

1. CBC
2. Chem 7
3. Emergency Hemorrhage panel (EHP)
4. Lipase
5. Serum Alcohol level
6. Beta HCG (women between 12 and 60 yrs)
7. LFTS (children under age 13)
8. Urine toxicology screen for all patients > age 12, Urine dipped for blood and sent for UA
9. ABG for all patients intubated or unstable or with respiratory compromise or with concern for occult shock.
10. Type & Cross (for full trauma codes)

**TRAUMA INTUBATIONS**

All intubations are performed by Emergency Medicine at the discretion of the ED attending. The exception to this are full trauma team activations where intubations are a shared responsibility with Emergency Medicine and Anesthesia. Anesthesia is present for full trauma activations and the procedure can be performed by EM or Anesthesia after an attending level discussion. We recommend agreeing upon a plan with anesthesia prior to the patient's arrival. If a patient needs an emergent intubation the airway should be secured by the most experienced appropriate provider trained in the procedure as determined by the attending.
Activate MTP for patients with:
1. Evidence of significant hemorrhage from trauma, upper GI hemorrhage, ruptured aortic aneurysms and/or similar clinical scenarios.
2. Acute blood loss:
   a. 1500 mL measured blood loss
   b. Documented substantial blood loss and a likelihood that substantial blood loss will continue over the short term (minutes to hours)
   c. Any clinical sign of acute blood loss and hemodynamic instability.
3. Transfusion of three or more blood components within one hour, and require additional blood products.

Target a “balanced transfusion” ratio:
1. Alternate transfusion of Plasma and PRBCs in a 1:1 ratio.
2. Transfuse 1st unit of platelets early. Subsequent platelet transfusions are based on either 1) lab results or 2) to maintain balanced resuscitation with 1 unit (“6-pack” of platelets) for every 6 units of PRBCs
3. Transfuse cryoprecipitate if fibrinogen levels less than <175 mg/dl

Administer TXA (tranexamic acid) for hemodynamically unstable trauma patients only AND if < 3 hours from initial injury:
1. Bolus dose: 1 g IV over 10 minutes
2. Maintenance dose: 1 g IV over 8 hours

*NOTE: Patient may have received TXA pre-hospital. Clarify with medics if patient requires maintenance dose.*

Achieve Hemostasis (clinical and laboratory criteria)
1. Bleeding controlled
2. Symptomatic anemia subsides
3. Platelet count > 100K/μL
4. INR < 1.7
5. Fibrinogen > 175 mg/dL
6. Core Temperature > 35° C
INDICATIONS FOR HEAD IMAGING

There are validated clinical decision rules to help us make decisions about who needs head CT imaging in trauma. For Adults, the three most reference rules are the Canadian CT Head Rule\(^1\), New Orleans\(^2\), and NEXUS II. We typically reference the Canadian CT head rule. For children, we reference the PECARN rule\(^3\). You should use these evidence based clinical decision rules while on shift and review them prior to your first shift.

On shift you can apply these rules using mdcalc.com. You should review these rules prior to your first shift.

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\(^1\) [Canadian CT Head Rule](https://www.mdcalc.com/canadian-ct-head-rule)

\(^2\) [New Orleans](https://www.mdcalc.com/new-orleans)

\(^3\) [PECARN rule](https://www.mdcalc.com/pecarn-rule)
Patients who may need emergent craniotomy are “Type A” herniation patients. The criteria for Type A Herniation Patients includes:

1. Unequal, or bilaterally dilated (blown) pupils
2. Trauma patient with observed neurologic deterioration:
   a. pupillary change, or lateralizing motor signs
   b. posturing (decorticate or decerebrate)
   c. change in mental status not attributable to other causes (ie sedation)
3. Transfer patient with known mass lesion (acute SDH or EDH) with "midline shift" or obscured basal cisterns or neurologic deterioration as defined above.
For such patients, call the Herniation Phone at 206-910-2743

For Field Transports with concern for herniation:

1. Alert the Herniation Phone at 206-910-2743
2. Neurosurgery resident carrying the herniation phone will notify chief resident and attending of Type A activation.
3. ABCs will be assessed per ATLS protocols and managed by trauma team and then head CT will be expedited.
4. Neurosurgery resident will be expected to be present in the ED shortly after arrival of the patient to HMC ED. This will constitute a neurosurgical code, and he/she will accompany patient to CT to determine the need for a “CT trauma series” in consultation with Neurosurgery attending/chief resident. A “CT Trauma Series” is a limited information CT scan of the torso that is done in conjunction with a non-con head CT. It does not replace a formal CT chest, abdomen or pelvis for trauma but helps inform decision on timing of crash to OR.
5. If plan is made for emergent operative intervention then CT trauma series will be done, if no immediate plan for operative intervention then patient will complete conventional work up and CT imaging with the ED / trauma team.

Transfer patients with concern of herniation:

1. Transfer calls will go to the ED attending via the transfer center. Transfer center will notify neurosurgery using the Type A activation cell phone that a potential type A patient is en route. They will provide an ETA and make outside VPN images available to the neurosurgery team.
2. NS will review the images and discuss with the neurosurgery attending/chief resident. If NS deems the patient will need emergent operative intervention, neurosurgery resident will coordinate with the ED attending/trauma doc so that there is no delay upon patient arrival. OR will be notified of plan for crash craniotomy.
3. Upon arrival ABCs will be assessed per ATLS protocols and managed by trauma team.
4. If repeat head CT is required this will be expedited and plan for CT trauma series as above.
5. If repeat CT is not required, the patient will go emergently to the OR with additional assessment as needed in the OR by general surgery team.


**CERVICAL SPINE EVALUATION**

**Adult c-spine evaluation**
In any trauma patient you should always ask the question, “does this patient need cervical spine imaging?” There are some patients we can “clinically clear” based on evidence based clinical decision tools. The two most widely-accepted, well-validated rules are NEXUS\(^4\) and the Canadian C-spine rule.\(^5\) On shift, apply these rules using MDcalc.com.

Once you have determined the need for c-spine imaging, CT should be the test of choice in most adult patients and in all patients >64. Many studies have shown that c-spine x-rays fail to identify a significant percentage of important injuries, especially in the elderly, patients with DISH and/or osteopenia. For select patients who you may consider getting an x-ray on, please see OCCAM protocols for inclusion/exclusion criteria.

**NEXUS**
All of the following criteria must be met to clinically clear a C-spine:
1) No midline tenderness
2) No focal neuro deficit
3) Normal alertness
4) No Intoxication
5) No painful distracting injury.

**Canadian C-Spine Rule**
see image on next page
The Canadian C-Spine Rule
For alert (GCS-15) and stable trauma patients where cervical spine injury is a concern

1. Any High-Risk Factor Which Mandates Radiography?
   - Age > 65 years
   - Dangerous mechanism**
   - Paresthesias in extremities
   **No
   - Radiography

2. Any Low-Risk Factor Which Allows Safe Assessment of Range of Motion?
   - Slight rearend MVC **
   - Slight forward MVC
   - Sitting position in ED
   - Ambulatory at any time
   - Delayed onset of neck pain***
   - Absence of midline c-spine tenderness
   **Yes
   - No Radiography
   ***No
   - Radiography

3. Able to Actively Rotate Neck?
   - 45° left and right
   - Yes
   - No Radiography
   - No
   - Radiography

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Cervical Spine Injury Algorithm Adult (age 13-64)

**Suspected Cervical Spine Injury**
- Apply C-collar
- Assess using Clinical Decision Rule

**Clinical Decision Rule**
- Clear
- Meets Criteria for X-rays **
- NO
- CT of C-Spine
- Abnormal, Inadequate or Can’t clear Clinically after normal film
- YES
- C-Spine X-rays

**Clinical Decision Rule NOT Clear**
- NO
- CT suggests acute injury, or persistent neurologic abnormality
- CT with no acute injury and Patient obtunded / intubated
- CT Normal or non-acute findings, unable to clear clinically
- CT with no acute injury, and no neurologic abnormality

**X-rays if all of the following:**
- No head CT is required.
- No less DOD.
- C-spine hardware, DISH or ankylosing spondylitis.
- Able to cooperate.
- No known or suspected TLS spine injury.
- Does Not meet NMC High Risk Criteria.
- Normal neuro exam.

**NMC High Risk Criteria**
Presence of any of the following criteria indicates a patient at risk (≥5%) for C-Spine injury and should warrant imaging with CT.
1. High energy mechanism (high speed > 35 mph MVC or MVO, MVC with death at scene, fall from > 10 ft.)
2. High risk clinical parameter (significant head injury, unconscious in ED, focal neurologic symptoms, tenderness to cervical spine, pelvic or multiple extremity fractures.

**Collar Off Cleared C-Spine**

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Pediatric c-spine evaluation
Adopted from: “C-Spine Evaluation (Protocol)” - OCCAM - 07 June 2018

Most injuries in patients age 8 and younger occur at C3 or above, whereas injuries in those older than age 8 occur most often at C5-6. Children have a lower incidence of cervical spine injuries but a higher incidence of spinal cord injury compared to adults. This is because of the size of the child’s head relative to their bodies as well as lack of development of the bony structures of the spine. For this reason, the neurologic examination is essential in detecting spinal cord injuries. Likewise, pediatric patients are at risk for SCIWORA (see section on SCIWORA) and thus even if radiographic imaging is negative, they may need further imaging or evaluation if they have a persistent neurologic deficit. There is no consensus in the literature on how to clear pediatric c-spines. Most authors advocate applying the Nexus criteria along with the child’s ability to cooperate and communicate exam findings as the basis of the need for imaging. Harborview’s protocol for pediatric c-spine evaluation is presented below. This protocol can be found on OCCAM.

**Pediatric patients YOUNGER than 3**
Pediatric trauma patients under the age of 3 or who cannot communicate/cooperate with the clinical clearance commands should not be clinically cleared. Such children should be imaged according to the HMC pediatric c-spine algorithm (see below or on OCCAM). Because most pediatric c-spine injuries occur at C1-2, HMC radiologists protocol head CTs for pediatric trauma to extend through C2. Plain films of C3-T1 should then be obtained. If the patient does not require a head CT, plain films should be the initial test for kids under 13. Age 13 was chosen because the literature suggests that injury patterns start to approximate those of adults at this age. This is also roughly the age that radiation exposure risk drops sharply.

**Patients OLDER than 3**
Clinical decision rules should be used in an effort to avoid unnecessary imaging (and thus radiation). NEXUS can be used in patients ≥3 y/o who are able to cooperate and communicate.
A note about Ankylosing Spondylitis and DISH patients

Patients with Ankylosing Spondylitis or DISH are at increased risk for unstable fractures and thus require immobilization and maintenance of full spine precautions.

Patients often have chronic deformities and thus cannot be immobilized using the traditional C collar and are prone to hyperextension when placed supine. Thus patients should be immobilized in their position of comfort with extra padding added to the back of the head as needed to prevent hyperextension. If the traditional cervical collar will cause undo extension then the head should be immobilized in the position in which they present or in which they are the most comfortable, with padding in place of the C collar.

Movement of the patient should be minimized as much as possible with attention paid to appropriate padding and maintenance of full spine precautions during imaging. Log rolling of the patient needs to
be carefully coordinated with ED attending or spine service involvement to prevent disruption of the immobilization.

An abbreviated motor/sensory neurologic exam should be completed and documented before and after all position changes and patient transfers.

My patient has had negative c-spine imaging, can I remove the collar?

The answer is “it depends.”

The first step is always to re-examine the patient after imaging. The patient must be awake, alert and sober to participate in your re-examination (otherwise stop and wait to remove their collar when they are sober and awake). Next ask - Is the patient pain free (no midline c-spine tenderness)? Is their repeat neuro exam normal?

If the answer is “yes” to ALL questions, and the imaging is negative, then yes, you can remove the collar. If the answer is NO to any of those questions, then pursue the following:

If x-rays were performed (and negative) but patient has:
- Persistent midline c-spine tenderness → keep collar on & order CT c-spine.
- Abnormal neuro exam → keep collar on & order CT c-spine.

If CT C-spine was performed (and negative) but patient has:
- Abnormal neuro exam → keep collar on and order MRI.
- Persistent tenderness and/or has high risk for occult injury (this includes patient with severe DJD, DISH, ankylosing spondylitis, or previous C-spine surgery) → keep collar on and order MRI.
- Patient is intubated or obtundended and being admitted → C-spine clearance of intubated patients should be deferred to the surgical admitting service, especially if unable to assess gross motor function. When in doubt, keep in full spine precautions. If the patient is being admitted to the MICU, there is good evidence that intubated patients with a negative CT scan (as read by an attending radiologist) and grossly
symmetric motor function of the extremities can be safely cleared. If the patient is being admitted to the MICU, refer to the inpatient spine clearance protocol on OCCAM.

Take home C-spine PEARLS:

All intoxicated patients must be re-evaluated prior to discharge.

Anyone who has a persistent neurologic deficit despite CT imaging that is negative needs an emergent MRI and their c-collar should remain in place.

The ED attending must approve clearance of any patient with persistent pain/tenderness. Lack of an attending radiologist over-read during off hours is a factor to be considered in these cases.

Patients with severe DJD, DISH, ankylosing spondylitis, or previous C-spine surgery are high risk and require extra care.

Spinal Cord Injury without Radiographic Abnormality (SCIWORA)

SCIWORA is neurologic symptoms attributable to the spinal cord, following trauma, with normal plain films and/or normal CT. The symptoms may be transient, and typically include paresthesias or weakness. The onset may be delayed after the trauma, even days later. If a patient has such symptoms, they may need an MRI. Lesions visible by MRI include cord contusion, ligamentous injury, disk herniation, and epidural hematoma. If the patient has neurologic symptoms that are difficult to explain or an exam that does not make sense, you can consider consulting Neurology to help determine what, if any, further work-up is needed.

EVALUATING THE THORACIC AND LUMBAR SPINE
There are no published decision rules on how to clinically clear the thoracic and lumbar spines in trauma. Generally, if there is a high risk mechanism, the entire spine should be radiographically examined. If the patient is receiving a CT of the chest, abdomen and pelvis, the images can be reformatted to look at the spine, obviating the need for dedicated radiographs. Some physicians will argue that if the patient does not have midline tenderness when rolled, even in high risk mechanisms, they do not need any imaging of their spine. This approach has not been validated by clinical studies.

In patients sustaining low mechanism trauma, plain films of the thoracic and lumbar spines are only necessary if, when rolled, the patient has significant bony pain, or an obvious step-off.

Other Spine Considerations

All patients should be removed from the backboard once they arrive in the ED. Keep everyone in full spine precautions (flat, supine) until you clear their spine either clinically (using clinical decision rules) or radiographically (imaging is negative in conjunction with a normal neurologic exam).
For any vertebral fracture (except isolated spinous process and transverse process fractures), the spine service should be consulted. Coverage of the spine service alternates between Orthopedics and Neurosurgery.

Depending on the mechanism of injury, the presence of any vertebral fracture may require imaging of the entire spine. You can discuss this with your consultants.

Remember that plain films may be difficult to interpret in elderly patients. If that patient has a XR with fractures of unknown age, consider obtaining a CT scan for further evaluation.

Calcaneal fracture should trigger consideration for hip and spine films as the axial load can cause associated injuries.

If a vertebral fracture is noted on plain films, the area should be further evaluated by CT to characterize fracture pattern. Remember, CT is more sensitive than plain radiographs for detecting spine injuries.

Isolated transverse process or spinous process fractures are low risk and do not require intervention. However, the presence of > 2 contiguous TP fractures necessitates consultation of the Spine Service.

**INDICATIONS FOR CTA OF THE NECK**


Screening CT angiography should be performed in patients who have an increased risk of blunt cerebrovascular injury and / or signs or symptoms suggestive of blunt carotid or vertebral artery injury. These include patients with the following:

- Lefort II or III facial fracture
- Mandibular fracture with high risk mechanisms
- All skull base fractures (includes sphenoid, petrous temporal, clivis, ethmoid, occipital bone, and occipital condyle fractures)
- Any fracture of C1, C2, or C3 (except for type I/II dens fractures resulting from GLF)
- Traumatic cervical spine subluxation
- Cervical spine fractures extending into the transverse foramen
- Cervical spine fracture with thoracic or lumbar spine fractures
- Great vessel injury in the thorax (aorta, brachiocephalic, carotid, subclavian)
- Arterial hemorrhage from neck, mouth, nose, or ears
- Gunshot wounds to the head, face, or neck
- Near hanging resulting in cerebral anoxia
- Large or expanding cervical hematoma
- Carotid bruit in patient <50 years
- Cerebral infarction on CT or MRI
- Unexplained lateralizing neurological deficit, TIA, or Horner’s syndrome
- Diffuse axonal injury with GCS<6
- When recommended by radiology based on panscan findings

**EVALUATION OF HEMATURIA**


In the trauma patient, hematuria can come from injury to the kidneys, ureters, bladder or urethra.

**Renal or Ureteral trauma**
If a CT of the abdomen and pelvis is being ordered, the radiologist will look at images on the scanner and do delayed renal cuts if indicated. If a trauma CT is not already being obtained, the following signs/symptoms should prompt evaluation for renal/ureteral injury.

**Blunt Trauma**
- Gross hematuria (visibly blood tinged urine)
- Adult with microhematuria (≥ 1+ rbc on dipstick or > 30 rbc / hpf on UA) **AND** a period of hypotension (systolic < 90 mm Hg).
- Child (< 15 yrs) with ≥ 3+ rbc on dipstick **OR** > 50 rbc / hpf on UA

**Penetrating Trauma**
- Stable patient with any degree of hematuria and injury thought to be near urinary tract.

**Bladder Trauma**
Indications for CT Cystogram to evaluate for potential bladder injury include:

**Blunt Trauma:**
- Pelvic ring injury AND gross hematuria or dipstick RBC ≥ 3+ or microscopic UA > 30 RBC/HPF.
- Gross hematuria (visibly blood tinged urine) AND perivesical fluid and/or intraperitoneal fluid.

**Penetrating Trauma:**
- Penetrating injury of the pelvis with any degree of hematuria, and no other indications for exploratory laparotomy.

**Urethral Trauma**
Indications for retrograde urethrogram (RUG) or urethroscopy (see footnote below) to evaluate for potential urethral injury include:

**Blunt Trauma:**
- Blood at the meatus/vaginal introitus (except menstruating female where no other signs are present).
- Straddle injury with evidence of local trauma such as hematoma or fracture.
- Evidence of deep perineal laceration
- Suspected penile fracture (eg. penile or perineal hematoma).
- Urinary retention AND inability to pass Foley catheter
- Labial or vaginal injuries

**Penetrating Trauma:**
- Any penetrating perineal injury

*RUG is generally preferred in males. Urethroscopy is performed for females. If urethral injury is suspected based on the above criteria, attempting to place a Foley catheter should generally be withheld until case has been discussed with the Urology service. RUG can be delayed until the patient has been resuscitated and hemorrhage controlled. This study does not routinely need to be urgently obtained after hours, and can be performed during normal working hours unless required more urgently for patient care.

**HIGH RISK PATIENT POPULATIONS**

There are certain patient populations who are more prone to injuries or occult trauma that may require additional work up. Consider the following:
Geriatric patients

- Frail bones: easily fractured, easily injured
- Difficult to examine reliably
- Frequently have concomitant or underlying medical process that caused the traumatic injury
  - Ie. Work them up for syncope AND potential trauma from their fall
- Cerebral atrophy, high risk for SDH
- Age and use of antiplatelet or anticoagulants often preclude use of CT head decision rules
- More sensitive to narcotic analgesics, particularly regarding hemodynamics and mentation.

Pediatric patients

- Always consider non-accidental trauma (NAT). Does the pattern of injury match the story?
- Make sure you review any transfer paperwork to ensure you aren’t missing a critical part of the work up prior to arriving at HMC (i.e. referral to CPS)

Intoxicated patients

- Can be difficult to obtain an accurate and reliable history
- Exam may be unreliable
- Reassessment is key. If intoxicated, the patient should slowly become more alert. If the mental status trend is worrisome, escalate your workup.
- Always remember to check a fingerstick blood glucose (don’t mistaken intoxication for hypoglycemia or DKA!)
- Beware: If these patients metabolize too long, they may withdraw

Patient’s with hand injuries

- Patients with hand injuries, while may appear minor at first glance can have significant injuries resulting in serious functional disability (and likewise high litigious risk).
- All patients with hand injuries need meticulous detailed neurovascular exams.
- All hand wounds must be thoroughly explored for exposed / injured tendons.
- Any abnormal neuro exam warrants further work up and/or consultation.
FACIAL TRAUMA

Periorbital Trauma
In any patient with facial trauma, particularly if they sustain fractures, careful attention should be paid to the cranial nerve and ophthalmologic exam. Orbital floor (“orbital blowout”) fractures are associated with ocular injuries about 24% of the time. Sometimes lid swelling challenges the eye examination, so be sure to use the lid retractors to check visual acuity and extra-ocular movements. Lid retractors are available in Resus 2. Always anesthetize the eye prior to using lid retractors (order Tetracaine 0.5 % Eye Drops).

If there are facial fractures other than isolated orbital wall, consult craniofacial service.

For isolated orbital wall fractures, consult Ophtho if:
1. Patient is comatose (emergent consult if retrobulbar hemorrhage, proptosis, abnormal pupil, or optic canal fracture)
2. Decreased visual acuity
3. New onset complaints of decreased vision, diplopia (double vision), floaters, or flashes of light.
4. Obvious motility deficit of affected eye in isolated field of gaze, especially if associated with nausea and vomiting.
5. Significant eye pain (retrobulbar pain) on attempted eye movement.
6. Obvious proptosis or retrobulbar hemorrhage on imaging
7. Abnormal/asymmetric pupil exam
8. Despite attempts, inability to open eyes for adequate vision acuity and ocular exam
9. Lacerations of the eyelid margin or canaliculi
10. Pediatric patient
11. Hyphema present
12. Concern for open globe injury

Perioral & facial trauma
Always palpate the mandible and inspect the mouth looking for dental avulsion, luxation (tooth is displaced forward, backward, or up into gum), subluxation or concussion (tooth is loose), or fractures (of crown, root, or alveolar bone—diagnosed by films). OMFS should be consulted if any of the above is noted. If malocclusion, mandible
deformity, or significant mandible pain are noted, a fine cut maxillofacial CT should be obtained.

If a patient presents with an avulsed mature tooth and is not at risk of aspiration, it can be placed immediately into the socket until secured with dental splint. If however, there is a missing tooth and the patient is obtunded or intubated, imaging should be obtained to look for an aspirated tooth.

Obtain Maxillofacial CT if you are concerned about the mandible (malocclusion, deformity, significant pain). If these are not present, CT Head with facial screen is sufficient, and a full maxillofacial CT will be performed if fractures are seen by the radiologist.

If there is a frontal skull fracture that involves the sinuses, Neurosurgery should be consulted. The evidence as to whether or not these require antibiotics is variable and can be discussed with Neurosurgery.

Any open facial fractures should receive a single dose of antibiotics (ceftriaxone or moxifloxacin). For severely contaminated open fractures (farm, soil, dirty water), consult ID for antibiotic regimens. Don’t forget to update tetanus. Closed fractures do not require antibiotics (unless they are going to the OR). See below for OCCAM “Facial and Mandibular Fracture Antimicrobial Prophylaxis Guideline” (updated 12/2017) for more details.
PELVIC FRACTURES

If a patient arrives with known or suspected pelvic fracture and is sheeted, don’t remove the sheet until after the trauma series (AP pelvis) and type of fracture pattern is known. Pelvic fractures that require sheeting are limited to pelvic ring disruptions (AKA open book fractures). If your patient has a pelvic ring disruption, do not rock the pelvis more than once. If however, this is a known fracture being transferred to HMC, there is no need to rock the pelvis.

Most patients who will require sheeting will arrive with a sub-optimal compressive device, either pre-manufactured external binder or otherwise. When replacing with formal sheeting (need 4x large kelly clamps, located in Resus 2), be sure to inspect the perineum and buttocks.

Do not place a foley if there is blood at the urethral meatus, scrotal hematoma, or perineal hematoma. These patients need a RUG (retrograde urethrogram) first.
In unstable patients with pelvic fractures, control of hemorrhage may require interventional radiology versus packing in conjunction with exploratory laparotomy. These patients require good access, type and cross, often substantial resuscitation. Ensure early call to IR while working up for other sources of hemorrhage (FAST +/- DPA). Patients with positive FAST or DPA will go to the OR; if negative proceed to IR. See OCCAM for more details about this algorithm (below).
FEMUR FRACTURES

If a femur fracture is known or suspected, a portable AP knee and spot femur films should be taken along with AP pelvis (obtained as part of the trauma series). This will identify distal femur or knee fractures that could potentially contraindicate pin placement. All patients with femur fractures should have ABIs performed. Facilitating early pin placement for reduction/traction will improve pain and should be prioritized before undergoing less urgent aspects of work up.

In an tenuous or frankly unstable patient, Steinman pin placement may be deferred to obtain further studies or interventions. In such cases, at the very least, the affected leg should be placed in a box splint to prevent further movement and maintain in a neutral position. Hare splints can be obtained from Medics and are preferable to box splints.

Never take a patient with a femur fracture out of traction unless pain meds are on board AND Ortho is set up and ready to place a Steinman pin. Removing traction splints for improved radiographs is not acceptable. A femur fracture not in traction will not only lead to possible blood loss but will cause significant pain.

MRI POLICY

Many patients linger in the ED waiting for an MRI. Sometimes the decision to admit or not admit, or choosing an admitting service, hinges on the result. Also, admitting services have learned that MRIs happen quicker for ED patients than floor patients. To address this inefficient use of resources the following policy is written:

1. If the patient has an emergent problem that falls into the established and agreed-up guidelines for emergency MR (see below), the study will be obtained within that time irrespective of location.

2. If the patient is being admitted and does not fall into the established guidelines for an emergency MR
   a. Neurosurgery/neurology determine the MR is needed and place the order
b. Order is scheduled in radiology and noted as an ED-sourced order. This will be prioritized above routine MR exams already on the schedule.
c. Patient is then admitted to the appropriate unit irrespective of whether the MR has been obtained.
d. Patient will come back to MR from the floor/unit with the unit nurse/stat nurse monitoring. The admitting service will write the sedation orders if needed.

3. The goals are
   a. Perform the MR on these patients within 8 hours of the order/requisition being received in radiology.
   b. Send the patient and patient’s family to the admitting unit as rapidly as is feasible.

### Indications for Emergent MRI

<table>
<thead>
<tr>
<th>Condition</th>
<th>Time Frame</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute appendicitis in a pregnant woman</td>
<td>within 1 hr</td>
</tr>
<tr>
<td>Acute aortic dissection (thoracic or abdominal) and unable to go to CT</td>
<td>within 30 minutes</td>
</tr>
<tr>
<td>Acute stroke needing clarification (initial stroke imaging is CT)</td>
<td>5-10 minutes</td>
</tr>
<tr>
<td>Acute cord compression non-traumatic</td>
<td>within 1 hr</td>
</tr>
<tr>
<td>Acute cauda equina syndrome</td>
<td>within 1 hr</td>
</tr>
<tr>
<td>Cord injury-traumatic requiring operative reduction</td>
<td>within 30 –60 minutes</td>
</tr>
<tr>
<td>Deteriorating cord function under observation</td>
<td>within 30 minutes</td>
</tr>
<tr>
<td>Ankylosing spondylitis/DISH with neurologic deficit</td>
<td>within 1 hr</td>
</tr>
<tr>
<td>Ankylosing spondylitis DISH without neurologic deficit</td>
<td>within 4 hours</td>
</tr>
<tr>
<td>Possible epidural abscess with cord dysfunction</td>
<td>within 1 hr</td>
</tr>
<tr>
<td>Possible epidural abscess with back pain</td>
<td>within 4 hours</td>
</tr>
</tbody>
</table>

Notes: Patients with neurologic/spinal indications need to be seen by neurology, neurosurgery, and/or ortho spine prior to scheduling to facilitate accurate anatomic localization. All emergent patients must be discussed with a radiologist prior to scheduling.
DISCHARGING PATIENTS

ED discharge is a risky event. Be sure to review all vital signs, laboratory and radiographic studies. Discuss your discharge treatment plan (prescribed medications as well as wound care), specify return precautions with the patient, and respond to any remaining questions. Ensure incidental findings (eg. pulmonary nodules) are communicated with your patients as well as reflected in your diagnoses section. Finally, ensure the attending is aware and in agreement with disposition plan. Documentation should reflect resolution of signs or symptoms that may otherwise have prevented a safe discharge (i.e. ataxia, delirium, vomiting, etc.).

Ensure Referrals are placed and Aftercare Clinic appointments made prior to discharge. For details on these, refer to the above ‘Resources to help safely discharge a patient,’ as described earlier in this document.

Be exceptionally cautious if you discharge a patient transferred from another facility (especially if long distance) or Airlifted. Often, these patients have been sent specifically for subspecialty evaluation. Especially at night and on weekends, the patient may only seen by a resident, not by the subspecialty attending. While consult services may feel admission is not warranted, a brief admission to address pain control, exact management plan, scheduled follow up, and safe transportation home may best serve the patient. ED social work should be involved in these cases early on.

FirstNet Discharge Process
For all discharging patients, use FirstNet to generate discharge paperwork, patient instructions/education, prescriptions, and follow-up plan.

Whenever possible, insert specific discharge instructions (pencil icon next to “patient education.”) If there are no appropriate instructions in FirstNet, look for some in Micromedex Aftercare instructions (link from Healthlinks) or patient education sections of MD Consult or UpToDate. You can also free-text instructions under the discharge diagnosis.
Inform the nurse as soon as you decide to discharge the patient. After reviewing discharge plan with your patient, give the discharge instructions and prescriptions to the bedside nurse. He/she may have additional things to check before the patient actually leaves. Make sure patients’ IVs are removed before they leave.

Sobering Center, Medical Detox, Jail, or SNFs
Patients discharging to these facilities should have a copy of their note to accompany their discharge paperwork to the receiving facility. Other patients should be referred to medical records for a copy. Specific follow-up plans (date/time) should not be communicated directly with Jail patients. Instead, the staff at jail will schedule the appointment. Jail patient’s discharge instructions should be placed in a sealed white envelope and handed to the corrections officer.

Against Medical Advice (AMA)
Patients who are alert, oriented, and can communicate understanding of risks and benefits may sign out AMA. Keep your discussion with them non-confrontational and focus on their well-being. All attendings should be made aware of an AMA discharge before the patient leaves. Have them sign the AMA form and invite them to return at any time. Discuss all AMA discharges with the attending prior to discharge. Similarly, inform the attending of all patients trying to elope. If you sign a patient out AMA, document how they demonstrated their decisional capacity. If you restrain a patient, document why they lacked decisional capacity (intoxication, acute brain injury, psychosis, etc.). Note, patients who are intoxicated with drugs or alcohol, disoriented, suicidal, or on legal or psychiatric holds CANNOT refuse care.

Discharge Pharmacy
From 0830-2230, the patient can take their prescriptions to outpatient pharmacy. After hours, if they want to leave with meds in hand, tube the prescription to the inpatient pharmacy and have them tube the meds back. However, this sometimes takes several hours. A list of 24-hour pharmacies is available. Jail patients cannot “pick up” over the counter medications (eg. ibuprofen) like most other patients. Be sure to write prescriptions for any medication your patients need who being discharged to jail.

Minors
Patients less than 18 years who are not emancipated cannot be discharged or sign out AMA unless a parent or guardian is present. Social work and Pediatrics should be involved in these cases.
ADDITIONAL RESOURCES

Important phone numbers

<table>
<thead>
<tr>
<th>Service</th>
<th>Phone Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Orca/Firstnet support</td>
<td>206-897-6722</td>
</tr>
<tr>
<td>HMC ED Doctor’s Line</td>
<td>4-4074</td>
</tr>
<tr>
<td>Transfer Center</td>
<td>4-3597</td>
</tr>
<tr>
<td>Psych Emergency Services (PES)</td>
<td>4-3076</td>
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<tr>
<td>Lab</td>
<td>4-3451</td>
</tr>
<tr>
<td>Pharmacy-Inpatient</td>
<td>4-3220</td>
</tr>
<tr>
<td>Pharmacy-Outpatient</td>
<td>4-3219</td>
</tr>
<tr>
<td>Code to battery room</td>
<td>3259</td>
</tr>
<tr>
<td>Radiology:</td>
<td></td>
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<tr>
<td>Trauma radiology</td>
<td>4-3346</td>
</tr>
<tr>
<td>CT scanner</td>
<td>4-6106</td>
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<tr>
<td>Neuro reading room (daytime only)</td>
<td>4-6143</td>
</tr>
<tr>
<td>Radiology resident</td>
<td>4-3651</td>
</tr>
<tr>
<td>Ultrasound</td>
<td>4-2812</td>
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<tr>
<td>Cell phones:</td>
<td></td>
</tr>
<tr>
<td>Charge Nurse</td>
<td>4-4025</td>
</tr>
<tr>
<td>ED pharmacist</td>
<td>206-948-9010</td>
</tr>
<tr>
<td>Poison Control</td>
<td>1-800-222-1222</td>
</tr>
</tbody>
</table>

Surrounding Hospitals and Capabilities

Adult and pediatric patients with substantial trauma are transported to Harborview Medical Center. Outside of trauma, certain patients should only be transported to selected specialty hospitals capable of providing specific care needs. Hospital capabilities are listed below:

**Trauma Center (Adults and Children)**

Harborview Medical Center:

*All major trauma patients. Patients with isolated injuries and low risk for serious injury may be transported to the hospital of their choice.*

**Pediatrics**
Seattle Children’s Hospital
Swedish First Hill
Harborview Medical Center (trauma)

**STEMI**
Harborview Medical Center
Northwest Hospital
Swedish Cherry Hill
University of Washington Medical Center
Virginia Mason Medical Center

**Major Stroke**
Harborview Medical Center
Swedish Cherry Hill
Virginia Mason Medical Center

**Labor and Delivery & Postpartum Emergency**
Northwest Hospital
Swedish Ballard
Swedish First Hill
University of Washington Medical Center

**AAA/Aortic Dissection**
Harborview
Swedish Cherry Hill
Virginia Mason Medical Center
## Seattle Medics Arsenal

<table>
<thead>
<tr>
<th>Medication</th>
<th>Indications</th>
<th>Procedures Performed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adenosine</td>
<td>Symptomatic, narrow complex PSVT</td>
<td>Intubation</td>
</tr>
<tr>
<td>Albuterol</td>
<td>Bronchospasm, Hyperkalemia</td>
<td>Subclavian and IJ central lines</td>
</tr>
<tr>
<td>Aspirin</td>
<td>Chest pain</td>
<td>Flutter valves for tension pneumothorax</td>
</tr>
<tr>
<td>Atropine</td>
<td>Symptomatic bradycardia, Organophosphate poisoning</td>
<td>Pericardiocentesis</td>
</tr>
<tr>
<td>Calcium Chloride</td>
<td>PEA, Asystole, Hyper K+, Calcium channel blocker OD</td>
<td>Sheeting the pelvis</td>
</tr>
<tr>
<td>Dextrose 50%</td>
<td>Hypoglycemia, Hyperkalemia</td>
<td>Femoralcentesis</td>
</tr>
<tr>
<td>Diltiazem</td>
<td>Atrial fibrillation/Flutter with RVR</td>
<td>Tourniquet placement</td>
</tr>
<tr>
<td>Diphenhydramine</td>
<td>Allergic reaction, Dystonic reaction</td>
<td>Needle cricothyrotomy</td>
</tr>
<tr>
<td>Epinephrine</td>
<td>Anaphylaxis, VF/VT, PEA, Asystole (IM and IV)</td>
<td>Surgical cricothyrotomy</td>
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<tr>
<td>Etomidate</td>
<td>Induction for intubation, Conscious sedation</td>
<td>Vaginal delivery</td>
</tr>
<tr>
<td>Furosemide</td>
<td>Pulmonary edema</td>
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</tr>
<tr>
<td>Ipratropium</td>
<td>Bronchospasm</td>
<td></td>
</tr>
<tr>
<td>Ketamine</td>
<td>Excited delirium syndrome, intubation, pain (IM and IV)</td>
<td></td>
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<tr>
<td>Lidocaine</td>
<td>VF/VT</td>
<td></td>
</tr>
<tr>
<td>Midazolam</td>
<td>Sedation following intubation, Anticonvulsant (IM and IV)</td>
<td></td>
</tr>
<tr>
<td>Magnesium Sulfate</td>
<td>Refractory VF/VT, Torsades, Preeclampsia, Eclampsia, Bronchospasm</td>
<td></td>
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<tr>
<td>Morphine</td>
<td>Pain relief, Chest pain, CHF</td>
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<tr>
<td>Naloxone</td>
<td>Opiate OD (IV and IM)</td>
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<tr>
<td>Nitroglycerin</td>
<td>Chest pain, CHF</td>
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</tr>
<tr>
<td>Norepinephrine</td>
<td>Cardiogenic shock, Hypotension</td>
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<tr>
<td>Ondansetron</td>
<td>Nausea or vomiting</td>
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<tr>
<td>Oxytocin</td>
<td>Post-partum bleeding</td>
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<tr>
<td>Phenobarbital</td>
<td>Refractory seizures</td>
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<tr>
<td>Procatamine</td>
<td>Refractory VF/VT, wide complex tachycardia</td>
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<tr>
<td>Rocuronium</td>
<td>Neuromuscular relaxant for intubation and following intubation</td>
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<tr>
<td>Sodium</td>
<td>Unwitnessed cardiac arrest, Metabolic acidosis,</td>
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<tr>
<td>Bicarbonate</td>
<td>Hyperkalemia</td>
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<tr>
<td>Succinylcholine</td>
<td>Neuromuscular relaxant for intubation</td>
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<tr>
<td>Hydrococobalamin</td>
<td>Cyanide antidote kit</td>
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</tbody>
</table>

**Acknowledgements:**

This primer is the product of many physicians who have dedicated their time, hearts and souls to the care of patients at Harborview. Authors who contributed to previous editions of this primer include:

Dr David A Baker, MD  
Dr Amy Baernstein, MD  
Dr Lisa Cooper, MD  
Dr Michael Copass, MD  
Dr Eileen Bulger, MD  
Dr Tina Yen, MD

In gratitude to Elizabeth Jarrett, who is instrumental in distribution of this primer year after year.

**References**


