UAMS Trauma Surgery
Guide to Trauma Service
Designed for the Trauma Interns

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1. Introduction to the Trauma Service

The trauma service is one of the busiest surgical services here at UAMS. The patient census is highly variable, but at times can approach 30+ patients. We care for patients with a wide array of mechanisms, from farming accidents, to MVCs, to penetrating trauma. While on this service you will have the opportunity to learn how to manage complex polytrauma patients. The trauma team consists of a chief resident (usually PGY-4), one or both of our trauma APRNs, whichever attending is staff for a given day, and 1-3 trauma interns. This service is fast paced, but you will have the support of your team to help you effectively manage these patients. This guide was designed by an intern, specifically for the trauma interns, to help you navigate your basic roles and responsibilities while on the trauma service.

Home base for the trauma team is the F-4 workroom. F-4 serves as the trauma floor and ICU-step down (progressive care) area. This is most times where you will chart review patients and make the list. Hand off for interns also takes place in the F-4 work room. See chart below for checkout times and morning report times.

Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
am: 0500 mr: 0630 pm: 1800	am: 0500 mr: 0615 pm: 1700	am: 0500 mr: 0630 pm: 1700	am: 0500 mr: 0630 pm: 1700	am: 0500 mr: 0630 pm: 1700	am: 0600 mr: 0700 pm: 1700	am: 0600 mr: 0700 pm: 1700

It is expected that you will have EPIC access prior to the first day of your rotation and familiarize yourself with the basic concepts/ orientation listed below. If you do not have EPIC access, you will not be able to be an effective part of the team. For days you do not have EPIC access, you will be dismissed and required to make up those days.

This guide is meant to be a resource for you to reference, as well as an introduction to the service. Inevitably, questions not addressed here will arise. It is encouraged and appropriate to ask for clarification. Your co-interns that have been on trauma previously can help, as can the chief or attending. Most importantly perhaps, our Trauma APRN's (Britney Beumeler and Audra Arant) provide the most continuity of care for patients and will be an invaluable resource for you.

Our website contains many of our agreed-upon trauma algorithms. Please use this link to access and save the website for easy reference during your time on the trauma team.

https://medicine.uams.edu/surgery/divisions/trauma/guidelines/

Welcome to the Trauma Service!

2. Morning Workflow

After picking up the pager in the morning your next step is to start looking over your patients and preparing for rounds. When chart checking your patients in the morning you should:
- ❏ Review vitals and I/Os
- ❏ Review any imaging, like morning CXRs
- ❏ Review labs and replace electrolytes
    - ❏ see electrolyte replacement protocol in helpful resources section
- ❏ Review any notes from consulting services
- ❏ Review any scheduled procedures or studies for the day
- ❏ Update the trauma surgery handoff panel in epic
- ❏ Change the attending for all patients on service to the trauma attending for the day shift

Making the list is very chief-dependent, so you will need to get in touch with your chief ahead of time to be aware of their expectations and preferences. There are two different lists commonly used on this service. One is just a simple list with basic information and the other is the trauma handoff. You should prepare a basic list for the attending on service that you will give them at morning report. Bring a few extra copies of the list for our APRNs and whoever else may need them. As with chiefs, some attendings will print their own list, but you will quickly figure out who wants what after your first few days. Always err on the side of being over rather than under prepared.

After chart checking and making your list, you should pre-round on your patients unless told otherwise. Important things to know for chief rounds include, but are not limited to:
- ❏ Urine and drain outputs and what the drain output looks like (serosanguinous vs serous vs purulent)
- ❏ Any acute events overnight
- ❏ Pain control; are they on a full multimodal pain regimen (MMPR)? See acute pain control protocol for outline of the MMPR used on the trauma service.
- ❏ PO intake (tolerating diet?, n/v?); were they NPO since midnight for a scheduled procedure today?
- ❏ Are they ambulatory (how much did they walk?)
- ❏ How much are they pulling on Incentive spirometry (IS)? This is especially important for those with rib fractures, pulmonary contusions, chest trauma
- ❏ What is the plan for the day? Example: are they going to OR with ortho today?
- ❏ Updated recs from consulting teams.
- ❏ Are they on appropriate DVT ppx based on our algorithm and what is the anti-Xa level?

When possible, you or one of your co-interns should try and grab one of the rolling computers to put in orders and pull up info/images during rounds. This will help streamline the process and make the team more efficient. Your chief will dictate the time resident rounds will start each day so you will need to be in contact with them. It's safe to be ready to go no later than 0530 for resident rounds to be completed in time for morning report. Morning report occurs on

the 7th floor of the Shorey Building in the surgery library. At morning report the EGS, Trauma, and Night teams will discuss the new patients that were admitted over the last 24 hours, any cases in the OR for the day, and the SICU will present any patients that came out of the unit over the last 24 hours.

After morning report, we will typically table round with whichever attending is staff on Trauma for the day in the same surgery library or the Terry Library (across the hall). Please log into the computer and be prepared to pull up results and imaging, as well as place orders during that time. Following table rounds the attending will round with the whole team or just the chief and APRN depending on their preference and the amount of other work to do. After team rounds you will then be working on getting your notes done and reaching out to consulting services for rec updates and plans.

3.   Your Role during a Trauma Activation

The trauma surgery team responds to Level 1 and Level 2 traumas. The activation level is determined by many factors including mechanism, vital signs, GCS, presence of life threatening bleeding, use of a tourniquet, and a multitude of other factors. Level 1 is the highest level of activation and allows for the gathering of multiple different teams and resources to respond to the severely injured patient.

You will receive a page on the trauma pager alerting you to a new trauma activation. The page should give you the level of activation and a brief overview of the patient (MOI, vitals, and ETA). Of note, the intern pager seems to be slower in getting the page so when your pager goes off you usually have lost about 3-5 minutes of response time. When you do get the pager, you should attempt to make it to the trauma bay before the patient arrives so that you can log into the computer and be ready to put in orders and take notes when the patient roles in. After logging in and the patient arriving, your next steps are to:

- ❏ Open the order set called 'IP/ED Trauma resuscitation I'. Please save this to your favorites for easy access.
- ❏ Order all 'trauma resuscitation labs': iStat, Rotem (non-heparinized), type and screen, cbc, bmp
- ❏ Order imaging. All patients will get a STAT portable CXR unless you are told not to order one. Otherwise the necessary imaging studies will be called out to you by your chief and/or attending. The usual trauma scan (i.e. the boxes you should check by default) are the CT Head without contrast, CT cervical spine without contrast, CT chest abdomen pelvis with contrast. CT maxillofacial if there is obvious facial trauma. The chief or attending may add a CTA of the head and neck or any other CT's they deem appropriate.
- ❏ This is also a good time to start your H and P. Open a blank note and use the 'Trauma H&P UAMS'.   You can keep notes in the first section based on the report from EMS, what happens in the trauma bay, etc and then complete the H and P later.

❏ Order any other labs needed based on the patient's blood thinner status. To find the specific test to order, look at the orange sheet taped under the computer in each trauma bay or see the helpful resources section.
❏ After CT imaging is complete (unless the patient is going directly to OR or IR), you will return the patient to the trauma bay to complete the work-up. Open 'IP/ED Trauma Resuscitation II' (again, save this to your favorites) and order the appropriate extremity x-rays for anything injured, any antibiotics needed for open fractures (the antibiotics and dosing is posted underneath the computer in the trauma bays), and keppra if they have a TBI.
❏ Next, you will place an order in the computer for any consultant services needed. This is found in the same 'IP/ED Trauma Resuscitation II' orderset. You will then need to pull up the on call schedule and page the first call pager for that person. Texting or calling cellphones can sometimes be faster for those with personal knowledge of the individual on call, but is NOT a substitute for paging the consultant. If they don't respond quickly, please page them again and escalate the situation to your chief if needed.
❏ It is your responsibility to follow up on the tests and consultations that you order. If the patient is stable enough to leave the bedside, you should go to radiology to obtain reads (sometimes the chief, APRN's, or midlevel will do this step for you but don't rely on them to do it). If the patient is not stable, do not leave the bedside unless instructed to do so by the chief or attending.

There has to be full circle communication with consultants. A plan is not finalized until it has been discussed with the chief or attending level, then either communicated between trauma and consultant team on a senior level discussion or documented in the medical record. A CONSULTANT's plan is a recommendation - the final say rests with the trauma attending. For example, if a consulting resident says to order blood products or medications, you must discuss this with the trauma chief or attending before doing it. This doesn't necessarily apply to simple things such as "we need some additional x rays" or "he's nauseous, can we give zofran?" etc. When in doubt - ASK someone above you. In this case, it is better to ask permission than forgiveness.

For traumas that are transferred to UAMS, it is vital that we obtain the outside hospital images as soon as possible - ideally before the patient arrives so we can be mobilizing plans as quickly as possible. The state has a 'Trauma Image Repository' for sharing imaging. See the Helpful Resources section on TIR for tips on using this.

4. Your Role in Caring for Floor Patients

Besides responding to traumas, caring for the trauma patients on the floor will be a large part of your day. They will be expounded on below, but in general some of your duties are:
❏ Execute plans made from morning rounds
• Make sure all orders discussed are placed

- If labs, imaging, or procedures are to be done, CALL!
  - Communicate with consultant teams, bedside RN
  - ❏ Notes
    - update the problem list first
    - use 'Trauma Progress Note' template
    - avoid copy and pasting
  - ❏ Tertiary surveys
    - Medical history
    - Subjective complaints
    - Thorough physical exam
    - Review images and final reads
    - Use the 'Trauma Tertiary Survey UAMS' smarttext template
  - ❏ C Collar clearance
  - ❏ Recognize, anticipate, and manage complications
  - ❏ Discharge planning
  - ❏ Transitioning patients from ICU to floor
    - See the patients on arrival to floor and write a brief note

After morning rounds, you will usually have less regimen to your day. Your first move should be to execute on any time-sensitive plans that were made during morning rounds. This usually means following up to ensure all orders discussed were placed, the bedside RN and patient are aware of the daily plan, communicating with consulting services on the phone.   Sometimes there are specific action items such as "remove chest tube on the left for a patient" or "contact IR to get them on the schedule today" etc. These are the easy boxes to check and do those first.   Next, make sure the plan of the day is reconciled to what consultant physicians are recommending. When in doubt, ask someone above you.   Finally, you should finish and sign all notes for the day (co-signing the attending that you rounded with on all of them). Use the 'Trauma Progress Note' template. Make sure that your notes have only ACCURATE information in them. Do not copy and paste outdated, useless, information please. This helps no one.

Please be sure to update the problem list daily on your patients. Initially, this should be done on admitting the patients and updated daily as new problems arrive. This will help you to write your notes as the problem list autopopulates for the plan to prompt you to address what problems we are managing. If you are unsure as to how to update the problem list, touch base with your chief, and they will run through it with you.

Every trauma patient gets a Tertiary Survey around 24 hours after arrival.   Usually this is done on whatever is Hospital Day 2.   Tertiary surveys should be divided amongst the interns/APRN's and accomplished in a timely fashion. Who is doing the tertiary should be discussed in the morning when patients are divided up.   A tertiary survey includes interviewing the patient to see if they have noticed any new/unnoticed injuries, taking a full medical/surgical/social history including home meds, and a full physical exam, including rolling the patient to look at their backside. It is not uncommon for missed injuries to be found in this fashion. Don't forget to

check the scalp thoroughly as scalp lacerations can commonly be missed when covered with hair. Next, you should review all of their imaging and obtain FINAL (i.e. attending radiologist signed) reads on their CT's and x-rays. If there are any new findings, alert someone above you. Your daily progress note for the patient should become a "tertiary survey note" and you should use the 'Trauma Tertiary Survey UAMS' smarttext template. The tertiary should ALWAYS include a full medical/social/surgical history and documentation of home medications. If the patient is unable to provide these details for whatever reason, you should contact family to help gather these details. In regards to the home medications, our trauma pharmacists are invaluable in helping you find this information. The current practice and expectation is that the ICU residents should do this for trauma patients under the care of the SICU, unless otherwise agreed upon between the teams. That being said, if a patient has come out to the floor without a tertiary, you may have to step up and get it done.

Once the C spine CT has been read and negative, you can then clear the collar with a standard physical exam clearance (i.e. no cervical spine tenderness or pain with motion of the cervical spine). If you remove a C collar, you must leave a separate note in the chart documenting the CT/ exam findings and that you removed the collar. You can use the template .collarclearance as a template note for clearing a c-collar.

Unlike many hospitals, UAMS trauma service chronically under-utilizes the ICU. It is consistently under a bed crunch so many patients that would usually end up in the ICU may come to F4 instead or either before they are fully ready. It is our responsibility to act in a surrogate ICU fashion and provide aggressive around the clock care.   If you, or another bedside provider, notice a problem or have concerns - please alert your chief ASAP!   That being said, many of the complications we see are preventable. Aggressive, early respiratory care is paramount. We should focus on mobilizing all patients as soon as possible. Every morning on rounds you should make your patients use their IS and any other respiratory treatments you deem necessary. Pay attention to VTE prophylaxis and anti-Xa levels. Assess your patients daily for skin breakdown or wound infections. Make sure the low air loss overlay is turned on for the bed. Make sure the SCD's are on the patient and turned on. Make sure foleys are removed as soon as possible. These prevention measures are the responsibility of the treatment team as a whole. No job is strictly a 'Nursing' or 'RT' job. Do not rely on the nurse, RT, pharmacist, etc to take care of the patient. If you are assigned a patient, take ownership and responsibility for that patient.

"Chat" happens every week day and is an invaluable opportunity to talk through the patients on service with social work, case management, and the charge nurses. It occurs at 9a in the F4 conference room. At the very least a representative from the trauma service should attend and be prepared to discuss discharge planning or other social work issues each patient is dealing with. If able, the trauma chief, APRNs, and trauma interns will attend this meeting. Trauma patients are routinely some of the most socially complex and underserved patient populations you will interact with. It is very important that you stay in close contact with the social work team and case management in order to coordinate the care and discharge planning of these

patients. We are lucky to have two APRNs to assist in this effort, but you are ultimately responsible for the care of the patients you are following.

Our most critically ill trauma patients will initially require care in the ICU, but when stabilized will be transferred out to the "floor" and placed under your care. It is expected that the SICU team will page you when transferring a patient out of the unit. There should be a detailed exchange between the SICU team and you as the trauma intern to handoff care of the patient being transferred. If the situation should arise that you do not receive a report, you should notify your chief. Lack of communication between teams can lead to errors in patient care and cause harm to the patient. This works in reverse as well. If a patient deteriorates and needs to be transferred to the SICU, you should be sure to communicate to the SICU resident on call to discuss the concerns that necessitate ICU transfer. When a patient is transferred out of the ICU, you should see the patient when they arrive on the floor and write a brief note about their arrival condition and vitals.

5. Trauma/EGS Thursday Clinic

Every Thursday from 9am to 4p there is Trauma/EGS Clinic. On any given clinic day there may be 50+ patients to be seen. Due to the high patient volume, clinic days are all hands on deck. EGS APRNs and EGS/trauma residents (including upper levels if not operating or seeing consults) are expected to be present for clinic. White note cards are placed in the resident work room with the information of patients ready to be seen. You should chart review the patient, see and examine the patient, and present your plan for the patient with the clinic attending. Afterward you should communicate with the clinic nurses the orders to be entered and the follow up plan for the patient so that their care can be coordinated. In most cases the clinic nurses will put in orders for you, but it is your responsibility to ensure the orders get placed. You are responsible for writing a clinic note for the patient, being sure to assign the note to the correct clinic attending. Medical students are able to see patients and write clinic notes for their own education, but you should have them cosign notes to you and still write your own note for each patient you see with the students. Medical students can/should present their patients to the attendings, but should not do so on their own. You should be prepared to help them if they are struggling and provide feedback to improve their next presentations. Please do not send patients out of their exam rooms until you have spoken with clinic nurse administrators (Kim and/or Stephanie) to ensure that the patient does not leave before they have received any information or care they require. Thursday Clinic can be a bit busy and chaotic sometimes. To keep patients flowing, if an attending is busy with another patient/resident, you should be prepared to see another patient who is waiting. This means you will need to be ready to present multiple patients when the attending becomes available.

6. Helpful Resources: Trauma Guidelines

https://medicine.uams.edu/surgery/divisions/trauma/guidelines/

These guidelines were prepared by the UAMS Trauma Service. They are intended to serve only as a guideline based on current review of the medical literature and practice. They are neither policies nor protocols. Their use is at the discretion of the managing physician.

Please save the above link on your phone for easy reference.   On Iphone, once the above website is accessed, click the 'Share' button at the bottom of the browser. Then scroll down to the 'Add to home screen' function (looks like a plus symbol). This will create a direct link from your app section of the home screen for quick access. Some of the most commonly used guidelines will be included in this guide for quick reference.

ROTEM LINK:

From EPIC, click the 'UAMS Clinical Resources' tab. Then click the link for ROTEM.

OR

Open up any web browser and type this in the URL bar: 172.20.4.72

This will usually come up with a warning that it is an unsecure website - click 'advanced', then 'continue to website anyway'.

Login: uams

Please ask a member of the trauma team for the password

Copy and paste the patient MRN (including the leading zeros!) into the patientID line. This will allow you to view the ROTEM as it is running in real time.

Trauma Image Repository (TIR):

TIR is an image sharing program for the state designed to allow outside hospitals to upload images that can then be downloaded into our own imaging system for review.   This process is fairly automated by this point in time and does not require your active management to happen. HOWEVER, you should be aware of the system and process to help expedite this if necessary.

For access to the TIR, email cbaldwin@uams.edu or cdduncan@uams.edu

Website: tir.uams.edu

Username: your epic username

Password: your epic password

Hit enter. Then enter the trauma band number (starts with a B then numbers) that is included in the "head's-up" page from the ED charge nurse. This should show you a series of images so

we can see what has been scanned (they are usually listed under the patient's name and you have to open them to see exactly what body part they are).

The primary use for us now is to see if the images are in the process of being pushed and what images were obtained. These images will then be pushed into Sectra (our imaging system). You can search for them in the patient name box with the trauma band number or the patient name. Once the images are merged and you can see them under the MRN in sectra the INTERN needs to enter these orders:

- "CT NEURO outside film read request" - this is for the ct head/cspine
- "CT neuro outside film read request"- this is for maxface
- "CT outside films read request". (Chest abdomen pelvis)
- "outside plain films read request" (for xrays)

The radiologists don't review or type their impressions if you don't place this. You should still call the radiologists to review the images also once they are in sectra.

A couple of troubleshooting points:

1. If the patient is not registered to a MRN in the ED (found on the epic ED expected board) then there is no way to enter an order for these to be read. Options are to wait, or to gently ask them to assign a MRN.   Can ask the ED charge nurse for help with this process.
2. If a patient is registered - then the ED charge nurse emails **pacssupport@uams.edu** (if you don't want to wait or if you have trust issues....email them yourself). The email should include band number and MRN with the words "please merge".
3. As these images are merging it can take a few minutes or have some hiccups in the process... DON'T PANIC**...** give it about 3-5 minutes and try again.

If all else fails, most transfer traumas will come with a CD containing the images that can then be uploaded after arrival.

Acute Pain Management Guidelines - Inpatient

PURPOSE:
To provide guidelines for the management of acute pain via a multi-modal approach that improves outcomes while minimizing adverse events related to opioids

DEFINITIONS:
Acute Pain: Any pain suffered as a direct result of soft tissue or bony damage sustained through a traumatic injury or operation.

Multi-modal therapy: Multiple drugs employed simultaneously to prevent some of the more serious adverse effects associated with extreme dosing, allowing each medication to portend its best characteristics and providing synergistic effects.

INITIAL SCREENING:
For all patients suffering from acute pain, one must consider age, weight, allergies, renal/hepatic function, and prior opioid use when determining a proper multi-modal treatment plan. Based on patient response, dosing adjustments may be necessary. Multi-modal pain management therapy should be initiated as early as possible.
- Do not restart home analgesic medications, but take them into consideration when initiating inpatient dosing
- Multi-modal therapy should be initiated in the ED and continued throughout hospital stay
- Physician should be called for unrelieved pain
- Transition from IV pain regimen to oral regimen as soon as feasible
- All IV pain medications should be discontinued at least 24 hrs before discharge

PROTOCOL:
All Patients:
Tylenol (caution in patients with hepatic dysfunction - Child's Class B and C)
Acetaminophen 975 mg PO q6 hrs (preferred)
　If no enteral access or complete bowel rest: Ofirmev 1000 mg IV q6 hrs (do not exceed 4 grams/24 hrs)
　　*Can only be ordered for 24 hrs max in Epic – must reorder if needed beyond 24 hrs
　　*Also consider acetaminophen suppository 650 mg per rectum q6h in these patients
NSAID (hold if eGFR<30) (limit to 2 weeks in patients with long bone fractures)
Ibuprofen 400-600 mg PO q6-8 hrs (max dose 2400 mg/24 hrs)
　　If no enteral access or complete bowel rest: Toradol 15mg q6-8 hr
　　　　*Can only be ordered/continued for 5 days max; do not renew order after 5 days of therapy

Gabapentinoid (hold if patient is too somnolent)

Gabapentin 300 mg PO q8 hrs (may titrate up to max 1200 mg PO q8 hrs)
> If renal dysfunction (eGFR<30): Gabapentin 100-200 mg PO q12 hr (max 400 mg PO q12 hr)

Lidocaine

Lidoderm 5% topical patch, apply 12 hrs on/12 hrs off
> Apply between spine and area of pain or proximal to injury on extremities
> May apply 3 patches in 24 hrs. Must specify location for each patch

Breakthrough Pain (PRN)

Oxycodone (immediate-release) 5 mg PO or 5 ml Elixir (1mg/ml) via NG/NJ q4-6 hrs PRN

For Patients with Laparotomy, Thoracotomy, or Muscle Pain

Muscle relaxer

Methocarbamol (Robaxin) 500-1500mg q8 hrs
> Consider lower doses for patients > 60 y/o and titrate up as tolerated

For Severe, Refractory Pain (at the discretion of the rounding attending)

Ketamine infusion
> -Patient must be monitored in ICU or on F4 (does not require progressive status). All other patients requiring ketamine must be managed by anesthesia pain team.
> -0.1 to 0.25 mg/kg/hr continuous infusion (an initial bolus of 0.1-0.5 mg/kg can be provided at the discretion of the attending physician, if he or she is present)
> > Avoid if poorly controlled cardiovascular disease, significant psychiatric history, or severe hepatic disease (e.g., cirrhosis)

Pain team consult for:
> -Regional blocks
> -Management of chronic pain patients (palliative care may manage these patients)

Methadone 5 mg q8 hrs (may advance to 10mg at attending discretion)
 Avoid if respiratory issues (because of long half-life - 96 hrs) or elevated QTc (>500 msec)
 **Do not prescribe at discharge **

Patient with multiple rib fractures: refer to rib fracture management protocol

HOW TO PERSONALIZE MULTIMODAL THERAPY:
- Always maintain a PRN pain medication (does not have to be an opioid)
- Each morning the number of PRN medications given should be determined:
  o If ALL allowable PRN medications were given and the patient is still having uncontrolled pain, schedule the
    PRN medication and add another PRN (e.g. an additional 5mg
  Oxycodone PRN q4-6 hrs) o If a few of the PRN medications were given,
  keep the same dosage

- o If NO PRN medications were given, remove that medication and make something else PRN (e.g. ibuprofen, Tylenol)
- Enlist the assistance of the APRNs, chief residents, team pharmacist, or attending with prescribing pain medications until you are comfortable with this protocol

** Increasing levels of pain with dosing adjustments need to be reported to attending physician on daily rounds **

Acute Pain Management Guidelines – Discharge and Follow-up

<u>At discharge:</u>
- For all medications: do not prescribe if patient has not been using in hospital
- Acetaminophen 975 mg PO q6 hrs (do not exceed 4 grams/24 hrs)
- Ibuprofen 600-800 mg PO q8 hrs (do not exceed 2.4 grams/24 hrs)
- Gabapentin Rx for 15 days
- Oxycodone 5 mg (Prescribe 5x the number used in the 24 hrs prior to discharge)
- Recommend purchasing Salonpas patches if using lidocaine patches during hospitalization (these are a lot cheaper and can be found over the counter at Walmart, Target, etc.)

<u>At follow up</u>:
- **NO** narcotic refills
- May consider 1-time refill of gabapentin until patient establishes with PCP
- If unrelieved or becomes chronic patient will need referral to specialty pain clinic

PURPOSE: To provide guidelines for the resident-driven management of electrolyte abnormalities and replacement in floor and progressive trauma and emergency general surgery patients based on daily routine morning labs

PROTOCOL: Electrolyte abnormalities will be assessed by surgery residents when morning labs return and will be replaced according to the following guidelines

PATIENTS INCLUDED: All floor and progressive trauma and emergency general surgery patients

EXCLUSIONS: Patients requiring any of the following:
- Dialysis (iHD) or Renal replacement therapy (CRRT)
- Calculated eGFR or CrCl < 30 mL/min
- Rhabdomyolysis (serum CK >8000 or >5000 and trending up)
- Unable to administer enteral medications

SPECIAL POPULATIONS: Some patient populations may require more aggressive electrolyte replacement than recommended in this protocol. **These patients can still be managed by this nursing-driven protocol, but will likely require additional electrolyte replacement**. These patients should be discussed with the attending and/or clinical pharmacist to determine electrolyte needs.
- Patients at risk for refeeding syndrome (those with prolonged inadequate enteral or parenteral nutrition) ⬚   Patients with thermal and/or inhalation injury
- Patients with DKA/HHS or those on an insulin drip for hyperglycemia
- Patients on high-dose Lasix (40 mg IV BID or higher), Bumex (2 mg IV BID or higher), or continuous diuretic infusions
- Patients on electrolyte replacement at home

Low Potassium (< 3 mmol/L) and Phosphate (< 1.5 mg/dL)
- When potassium and phosphate are both low, utilizing IV potassium phosphate replacement can decrease the amount of electrolyte replacement products required
- Goal potassium level: 3.8 – 5 mmol/L
- Goal phosphate level: 3 – 4.5 mg/dL

Current Potassium Level	Replacement	Monitoring
2 – 2.9 mmol/L	K Phosphate 30 mmol IV x 1 dose (~44 mEq K) + Neutraphos packs – 2 packs PO/PT BID x 2 days	Recheck Chem10 two hours **after end of last** infusion
< 2 mmol/L	K Phosphate 30 mmol IV x 2 doses (~88 mEq K) + Neutraphos packs – 2 packs PO/PT TID x 2 days	
PO: By mouth; **PT**: Per feeding tube (e.g., NGT, OGT, DHT, PEG, etc.)		

Potassium

- If IV potassium phosphate is ordered and serum potassium > 3, do not give additional potassium ▯   Goal level: 3.8 – 5 mmol/L
- If patient is consistently hypokalemic despite appropriate replacement, check magnesium level and replace as indicated in magnesium replacement chart
- Hyperkalemia o Serum potassium > 5.5 mmol/L: monitor q2h until level < 5 mmol/L
    - o Serum potassium > 6.5 mmol/L: monitor q2h until level < 5 mmol/L and call an attending for further hyperkalemia management

Current Potassium Level	Replacement	Monitoring
3.5 – 3.7 mmol/L	KCl 40 mEq PO/PT x 1 dose	Recheck Chem10 the following day with AM labs
3 – 3.4 mmol/L	KCl 40 mEq PO/PT x 2 doses	
2 – 2.9 mmol/L	KCl 40 mEq IV x 1 dose + KCl 40 mEq PO/PT x 2 doses	
< 2 mmol/L	KCl 40 mEq IV + KCl 40 mEq PO/PT **BOTH** x 2 doses[*]	Recheck Chem10 two hours **after end of last** infusion
[*]The PO/PT doses should be given at the start of each IV dose (e.g., 1st PO/PT dose + 1st IV dose given at the same time; then four hours later, 2nd PO/PT dose + 2nd IV dose given at the same time)		
PO: By mouth; **PT**: Per feeding tube (e.g., NGT, OGT, DHT, PEG, J tube – if liquid formulation, etc.)		

Phosphate

- Goal level: 3 – 4.5 mg/dL
- IV replacement choice will depend on patient's potassium level

o If serum potassium ⬚ 3.6 mmol/L, use
potassium phosphate o If serum potassium
> 3.6 mmol/L, use sodium phosphate

Current Phosphate Level	Replacement	Monitoring
2.5 – 3 mg/dL	Neutraphos packs – 2 packs PO/PT BID x 1 day	Recheck level the following day with AM labs
2 – 2.4 mg/dL	Neutraphos packs – 2 packs PO/PT BID x 2 days	
1.5 – 1.9 mg/dL	Neutraphos packs – 2 packs PO/PT TID x 2 days	
1 – 1.4 mg/dL	K or Na Phosphate 30 mmol IV x 1 dose + Neutraphos packs – 2 packs PO/PT BID x 2 days	Recheck Chem10 two hours after end of infusion
< 1 mg/dL	K or Na Phosphate 45 mmol IV x 1 dose + Neutraphos packs – 2 packs PO/PT TID x 2 days	
PO: By mouth; **PT**: Per feeding tube (e.g., NGT, OGT, DHT, PEG, etc.)		

Magnesium

- Goal level: 1.7 – 2.2 mg/dL
- Enteral magnesium **not recommended** due to lack of efficacy and high rates of adverse GI effects

Current Magnesium Level	Replacement	Monitoring
1.3 – 1.6 mg/dL	Magnesium sulfate 4 g (32 mEq) IV x 1 dose	Recheck level the following day with AM labs
⬚ 1.2 mg/dL	Magnesium sulfate 8 g (64 mEq) IV x 1 dose	Recheck Chem10 two hours after end of infusion

Calcium

- Goal level (ionized): 0.8 – 1.25 mmol/L
- Only **ionized** calcium levels should be replaced; if serum calcium on Renal Chem 10 < 6.5, order ionized calcium and replace as indicated below
- **Calcium replacement exceptions** (where ionized calcium not required and/or calcium chloride should be utilized): patients undergoing massive transfusion

protocol (will get calcium gluconate 3 g IV for each cooler used), hyperkalemia treatment, code situations, and those with cardiac dysfunction

Current Calcium Level	Replacement	Monitoring
0.65 – 0.79 mmol/L	Calcium gluconate 24 g IV x 1 dose	Recheck iCa level the following day with AM labs
< 0.65 mmol/L	Calcium gluconate 46 g IV x 1 dose	

PURPOSE:

Standardize practices for the treatment of trauma and emergency general surgery patients and establish guidelines for the administration of venous thromboembolism (VTE) prophylaxis in high-risk patients

Establish a consensus for administration of chemical VTE prophylaxis in patients who are to undergo invasive procedures or have high-risk injuries

DEFINITIONS:

High-risk patients: those anticipated to be hospitalized for >24h and have one or more of the following risk factors:

- Multiple system trauma
- Traumatic brain injury with GCS <12
- Major vascular injury to neck, thorax, abdomen, or extremities
- Multiple rib fractures
- Pelvic fracture
- Long-bone fracture
- Spinal fracture
- Anticipated immobilization >24 hours
- History of VTE (DVT/PE)
- History of hypercoagulable disease
- History of or current diagnosis of cancer
- Obesity (BMI > 30)
- Tobacco use within one month
- Critical illness

PROCEDURES:

1) **Sequential compression devices (SCDs) should ONLY be used for patients not receiving chemical VTE prophylaxis**
   a. SCDs are contraindicated in legs with fractures prior to fixation
   b. SCDs are contraindicated in legs with external fixators or large open wounds
   c. SCDs may be used on fractured lower extremities following open reduction and internal fixation

2) **Relative contraindications to INITIAL chemical VTE prophylaxis include:**
   a. Uncontrolled blood loss
   b. Coagulopathy
   c. Non-operative management of liver, spleen, or renal injuries
   d. Intracranial hemorrhage
   e. Spinal cord hematoma

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3) **All high-risk patients who do not have a contraindication should be started on enoxaparin (heparin is reserved for GFR <30 mL/min and/or patients with epidurals):**
   a. GFR > 30 mL/min: enoxaparin (Lovenox) 0.5 mg/kg SQ q12h (maximum starting dose is enoxaparin 60 mg SQ q12h)
   b. GFR < 30 mL/min:
      i. Weight < 90 kg: heparin 5000 units SQ q8h ii. Weight > 90 kg: heparin 7500 units SQ q8h

4) **Management of enoxaparin (Lovenox) dosing for trauma and emergency general surgery patients:**
   a. An Anti-Xa Assay should be ordered 4h AFTER the 3rd dose of enoxaparin (either 0100 or 1300 depending on when enoxaparin was started)
      i. <u>If < 0.2</u>, increase the enoxaparin dose by 10 mg and recheck an anti-Xa after three doses of the new regimen
      ii. <u>If 0.2 – 0.4</u>, no adjustment necessary and no further anti-Xa levels needed unless there is a change in renal function or patient clinical status
      iii. <u>If > 0.4</u>, reduce the enoxaparin dose by 10 mg and recheck an anti-Xa after three doses of the new regimen

5) **Patients with a history of HIT/HITT – Fondaparinux is preferred**
   a. If weight > 50 kg and GFR > 50 mL/min: 2.5 mg SQ daily
   b. If GFR 30-50 mL/min: use with caution (consider dose reduction)
   c. If GFR <30 mL/min: use is contraindicated

6) **IVC Filters**
   a. **IVC INSERTION:** Filters will be placed within 48h of time of consult in patients who meet the following criteria:
      i. The patient has a documented DVT and cannot be fully anticoagulated
      ii. The patient cannot receive VTE prophylaxis for at least five days (rare)

   b. **IVC REMOVAL:** When it is medically appropriate to start VTE prophylaxis:
      i. If there is no contraindication, perform a bilateral lower extremity venous duplex. If negative for DVT, schedule retrieval of the IVC filter during the current admission. ii. If the patient is cleared for VTE prophylaxis, but doses are being held for frequent trips to the OR, the IVC filter may be left in place. When the series of operations are complete, a bilateral lower extremity venous duplex should be performed. If negative for DVT, schedule retrieval of the IVC filter during the current admission.

7) **Initiation of anticoagulation for at-risk patient populations:**
   a. **Solid Organ Injury**
      i. In the non-operative management of liver, spleen, and renal injuries, VTE prophylaxis may be initiated:
         1. Day of injury for grade I injuries

       2. 24h without significant blood loss for grade II/III injuries
       3. 48h without significant blood loss for grade IV injuries

  b. Traumatic Brain Injury
     i.   Chemical VTE prophylaxis should be initiated 24h following stable head CT
     ii. Chemical VTE prophylaxis should be initiated 48h following craniotomy
     iii. VTE prophylaxis should NOT be held for EVD/ICP monitor placement or removal

  c. Spinal fractures and spinal cord injuries (SCI)
     i.   Patients with spinal fractures or SCI may be started on VTE prophylaxis once the spine surgeon has deemed that there is no emergent need for surgical decompression or stabilization (usually within 24h – an attending discussion is required for a 48h delay)
     ii. Patients with spinal cord hematoma may be started on VTE prophylaxis once cleared by the spine surgery team (usually within 24h – an attending discussion is required for a 48h delay)
     iii. If surgery is planned, VTE prophylaxis will be held the night before the operation and resumed 24h post-operatively

  d. Chemical VTE Prophylaxis should not be held for non-spinal musculoskeletal injuries or procedures

  e. Regional anesthetic catheter placement for pain control (e.g., epidural) or lumbar drain

     i.   Before Puncture:
        1. Prophylactic enoxaparin (Lovenox) should be held for 12h
        2. Therapeutic enoxaparin (Lovenox) should be held for 24h
        3. IV heparin should be held for 4-6h
        4. SC heparin should be held for 8-12h
        5. Fondaparinux should be held for 36-48h
        6. INR should be < 1.6 ii. While epidural or lumbar drain is in place: *Appropriate weight-based dosing of heparin should be used (section 3b) *Enoxaparin (Lovenox) should NOT be used if epidural or lumbar drain is in place
     iii. After removal of epidural or lumbar drain:
        1. Enoxaparin (prophylactic or therapeutic) should be held for 4h
        2. Heparin (IV or SQ) should be held for 1h
        3. Fondaparinux should be held for 6-12h
        4. Warfarin (Coumadin) or novel anticoagulants should not be started until after epidural/lumbar drain removal

Pronouncing and discharging deceased patients/E-RAVE:

Every Resident rotating on the trauma service will need ERAVE access ahead of coming onto service. Unfortunately, you are likely to have to use the system to pronounce and discharge a deceased patient. After performing the death exam there are a few bits of information to remember. These include time of death, family members present, and if known the funeral home the family wishes to use.

Your first step after informing your attending of the patient's death (if it was expected, ie comfort care) is to call the Pulaski County Coroner at (501)-340-8355. Due to the fact that these are trauma patients, the coroner must be contacted to release the body. Do not remove any lines or other tubes before the coroner releases the body. You will also need to contact ARORA at (501)-907-9150 to report the death. They MUST provide you with a reference number in order for you to complete your documentation in Epic.

After you have contacted the above-mentioned parties you will need to complete the death note and discharged as deceased discharge summary for the patient as well as complete the ERAVE form on the ERAVE database (https://adherave.arkansas.gov/erave/do/login). Filling out an ERAVE form for the first time can be confusing so ask a co-intern or other resident for help if you need it. The Erave and D/c summary must be complete for the patient's body to be moved to the morgue. There is a printed powerpoint guide that walks you through completing the ERAVE located on the clipboard in the trauma (F-4) workroom.

Personnel Phone Numbers

Attending	Phone Number	SICU	Phone Number
Ron Robertson, Chair Department of Surgery	5016266846	Leigh Anna Robinson, SICU fellow	2259381594
Avi Bhavaraju	4046682696	Rachel Rosenbaum, SICU APRN (Sun-Wed days)	5019129804
Nolan Bruce	4052292549	Erin Kindy, SICU APRN (Thur-Sat days)	5018043245

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Ben Davis	5017731424		
Kyle Kalkwarf	2104163207	**Trauma**	
Katie Kimbrough	3187808300	Audra Arant, Trauma APRN	5013525438
Melissa Kost	9416857334	Britney Beumeler, Trauma APRN	5018046389
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Anna Privratsky	8325455852	Stephanie Rohrer, RN Clinic Administrator	5016031745
Matthew Roberts	4176211868	Rebecca Smith, PharmD	5017724312

Body Radiology: (501)-296-1095
Neuro Radiology: (501)-686-7945
ED Docs: (501)-526-2075
Vocera: (501)-526-4100
    -Pro-tip: "Call ED CT tech" to call the CT workroom and get scans pushed through
To call any main hospital floor: 526-**00
    -first number is for the wing
        E-0, F-1, H-3
    -Second number is for the floor
    -ie to call F4: the number is 526-1400 to call the main nursing station on F4.