

# UW General Critical Care Primer

This document is not intended to be all-inclusive but to provide tips/tricks/insights into the usual care of these patients. Hyperlinks to existing protocols have been noted where available. If you have any questions or concerns, please contact your ICU Lead. (Updated 4.2.20)

## ROUNDING TIPS

- Utilize Critical Care Team Workflow List
- Include bedside nurse for each patient
- Review AM CXRs (NOT every patient needs one every day)
- Ensure transfusion goals and electrolyte repletion are complete
- Utilize pharmacists when available
- Prioritize discharge out of ICU as soon as possible

## NEURO

Evaluate along w/ nurses frequently. Changes may indicate Delirium, Critical Illness Encephalopathy, Seizure, Stroke/Bleed, Sepsis, Hypercarbia/Hypoxia, Drug Effect, or Withdrawal (EtOH/ drugs)

- Minimize sedation**, daily holiday, orient pt, day/night cycle.
- Dexmedetomidine or propofol**, rarely both (risks low BP + HR)
- Pain** Assessment: CPOT (treat for > 2)/ Visual Analog Scale.
- Agitation** Assessment: RASS (goal -1 to +1)
- Delirium** Assessment: CAM-ICU

## CARDIOVASCULAR

- Typical MAP goal >65 mmHg**
  - Continue home beta-blockade if able.
  - Discuss MAP goal w/ surg team (Vasc, NSG, Spine) if indicated
- Trend lactate & troponin if needed
- Follow **SEPSIS-3 Bundle** & guidelines
- Assess fluid status at least daily and treat accordingly
  - Physical exam, UOP, I/O (*note, in ICU mIVF rarely required*)
  - Advanced (pulse pressure variation in art line, IVC size, CVP)
- Atrial fibrillation** (most common arrhythmia in ICU)
  - Work-up: Volume shift, new infection, electrolytes, pain?
  - Treatment: Fix above, then beta block vs amiodarone vs diltiazem; Call cardiology if unsure
  - Cardiovert: hemodynamically unstable and refractory to meds
- Diagnose & Treat Shock States** (formal TTE if needed)
  - Distributive: septic, neurogenic, anaphylactic, or vasodilation caused by sedation
  - Hypovolemic: resuscitate then determine cause (bleeding?)
  - Cardiogenic: CAD, MI, CHF – RV or LV, arrhythmia, viral myocarditis
  - Obstructive: PTX, Hemothorax, PE, Tamponade
  - Mixed
- Vasoactive infusions** (*note, hypocalcemia (low iCa <4.8) can worsen hypotension*).
  - Norepinephrine (0.02 --2 mcg/kg/min), Sepsis 1<sup>st</sup> line.
  - Phenylephrine (0.25 – 5 mcg/kg/min)
  - Vasopressin (typically fixed 0.03 units/min)

## AUTHORS (ALPHABETICALLY LISTED)

M. Beninati, MD; J. Fish, PharmD; A. French, NP; A. Ingraham, MD; M. Long, MD; M. MacDonald, MD; R. Rahal, MD

## CARDIOVASCULAR (CONT.)

- Less common vasoactives** (Consult ICU or Cards first)
    - Epinephrine (0.01-2 mcg/kg/min)
    - Dobutamine (2-20 mcg/kg/min)
    - Milrinone (0.125 - 0.5 mcg/kg/min)
    - Dopamine (2-20 mcg/kg/min)
- \*Drips may be administered peripherally for short duration, if shock state is resolving, follow TLC policy. Central access is safer\**

## RESPIRATORY

- Intubation Indications:** Intubate COVID patients early
  - Airway protection ( $\Delta$ MS, GCS<8, secretions)
  - Hypoxia (failed PPV/NIV or high support)
  - Hypercarbia (failed PPV/NIV or high support)
- Ventilator:** Round with RT for ventilated patients
  - ARDS-Net Vent Guidelines for ARDS management
  - Typically: RR 15, Vt 450-500 (6-8 mL/kg IBW), PEEP 5-10.
  - Lung protective: Vt 4-6 mL/kg IBW. Goal plateau pres < 30.
- Metrics & Adjustments**
  - Goal sat >88-92%, use  $\uparrow$  PEEP & lowest possible F<sub>O2</sub>
  - Goal pH >7.3, tolerate higher CO<sub>2</sub>, adjust via RR > V<sub>tidal</sub>
  - Follow Driving Pressure, PF-Ratio, WOB & Synchrony. Ensure no air-trapping. Call ICU for any vent concerns.
  - Keep ET tube tip 2-5 cm above carina (per Xray)

## FLUIDS, ELECTROLYTES & RENAL

- "Maintenance" fluids may not be used in favor of IVF boluses PRN.
- Electrolytes** (K>4, Ph>3, Mg>2). Slowly correct sodium changes.
- Acid/Base:** Diuresis can cause alkalosis; sepsis/etc can cause acidosis. Generally, tolerate mild resp acidosis. Bicarb can be considered for pH <7.20 or for other select cases (call Renal/ICU)
- Calcium:** Ionized calcium >4.8 may be helpful in shock states.
- Pre- Post- Intrinsic AKI:** FE-Urea on Lasix, FE-Na otherwise. Review medications with pharmacy.
- Dialysis.** Consider with Acidemia, Electrolytes (HyperK), Toxins, Fluid Overload, Uremia. ICU places line. CRRT/CVVH common – can "run" patients even or negative.

## GI / NUTRITION

- GI Bleed:** Maintain high index of suspicion for GI bleeding in all ICU pts. Consult GI first for bleed (IR & surgery as 2<sup>nd</sup> line or if severe).
  - Transfuse to Hgb > 7 g/dL; if active/fast bleed and in shock, keep transfusing (don't wait for lab). Increase PPI to drip. Add Octreotide if variceal, and Ceftriaxone (for possible SBP)
- LIVER:** Check liver fxn (including coags/TEG) for shock, right HF, post-CPR. In liver failure: follow Na, albumin, fluid & mental status. Diurese cautiously w/Lasix +/- spironolactone. Consider para/thora if symptomatic. Treat encephalopathy with lactulose +/- rifaximin (2<sup>nd</sup> agent). See **Liver transplant** guidelines in SICU Manual

## GI / NUTRITION (CONT.)

- NUTRITION & REGIMEN:** Consider GI motility, bowel regimen and nutritional needs daily. For ileus, consider NGT and follow output and consider suction. ICU Stress increases caloric needs – consult nutrition liberally. Always discuss nutrition with surgeons.
- Prioritize early nutritional supplementation for:
  - Metabolic: Burn, TBI, Mechanical: TPN for bowel injury/discontinuity
  - Diarrhea? Consider C Diff (follow algorithm for tests & ABx)
  - Hold feeds w/ high pressor requirement (poor absorption)
  - OG tubes for all intubated pts unless contraindicated

## ENDOCRINE

- Glucose goal** 130-180, avoid High/Low/Variability. Check 4-6 times daily while critically ill, follow protocols & order sets. Diabetes Management Team can help. Use insulin drip when in shock.
- Steroids:** aim to prevent adrenal insufficiency. Consider stress-dose steroids (HC 50 mg IV q6h) for patients with long-standing steroid use or refractory shock.
- Consider HAT** (Hydrocortisone, Ascorbic acid & Thiamine) for septic shock. Administer early.
- Thyroid:** restart home meds ASAP (switch to IV w/in 4-5d). Monitor for myxedema coma & thyroid storm.

## HEME

- Transfusion goals** Standard thresholds: Hgb < 7 g/dL; Plt < 20k.
- Specific populations:** Liver transplant, NSG / Brain hemorrhage, Vasc Surg, Cardiology / acute ischemia.
- TEG** can help assess coagulopathy
  - Long R time → FFP
  - Long K time or low Alpha angle → FFP/Cryo
  - Low maximum amplitude → Platelets or Cryo
  - Quick lysis → TXA, Amicar®, Treat cause of DIC
- Home Medications:** Determine need for continuing home anticoagulation or reversing home anticoagulation.
- DVT/PE:** Determine lab trend in conjunction with pharmacy.

## PROPHYLAXIS

- General:** Mobilize early & often. Ventilator ≠ strict bedrest. Utilize SCDs for all patients w/o contraindication. Remove lines early, especially femoral/urgently placed CVLs. D/c Foley & use Purewick/condom cath when able. Elevate head of bed 30 deg.
- Heparin:** 5000 unit SQ q8h. Clear/discuss dosing with trauma/NSG after TBI, brain bleed, trauma, or surgery. Preferred if AKI.
- Lovenox:** 30 mg SQ daily (up to 80 mg BID per BMI). Preferred in trauma pts (except TBI). Avoid in AKI.
- GI ulcer prophylaxis.** Generally, use with risk factors (e.g., vent >48h), in some populations (e.g., TBI, burn), or if home med.
- Spinal Cord Injury.** Review the protocol.

# UW General Critical Care Primer

This document is not intended to be all-inclusive but to provide tips/tricks/insights into the usual care of these patients. Hyperlinks to existing protocols have been noted where available. If you have any questions or concerns, please contact your ICU Lead. (Updated 4.2.20)

## INFECTIOUS DISEASE – See other resources specific to COVID

See routinely used antimicrobial tables to right →

- Maintain a high suspicion for development of infectious complications. Always review prior cultures to ensure no resistant organisms. Consider iHAT therapy (Sepsis order set in EPIC)
- **Labs:** CBC, CMP, lactate/ABG, cultures (serial if positive)
- **Secondary tests** to consider:
  - MRSA swabs x2 (r/o MRSA for cellulitis and pneumonia only)
  - C. Diff toxin assays
  - Resp: BAL, mini-BAL, tracheal aspirate
  - Fungal: 1,3 beta-glucan; galactomannan
  - Inflammatory: ESR, CRP
  - Imaging, lumbar puncture
- **Unique Infections** / consult ID if needed for:
  - Intra-abdominal feculent contamination
  - Open or grossly contaminated fractures/skin wounds
  - Foregut injury/perforation (fluconazole)
  - Immunocompromised patients
  - Post-transplant patient prophylaxis
  - Necrotizing soft tissue infections
- Again, **remove lines / foleys** ASAP

\*UW Health EPIC order set #6474 provides many current resources

\*Check IDSA guidelines for further recommendations

## OTHER CONSIDERATIONS

- **MSK:** Early mobilization, PT/OT, TLC Mobility Protocol.
- **Skin/Wounds:** Check and consult wound team if needed
- **Stooling:** Consider fecal pouch / dignashield.
- **Commonly Missed Orders:**
  - Activity orders (Spinal Precautions), PT/OT consult,
  - Orthotics consults for braces, PRAFO boots)
  - Wound Team consult for wounds
  - Electrolyte replacement protocols.
  - Swallow study for prolonged intubation, spinal injury and more
- **Family:** Check code status early and review with changes. Update family daily or more. Goals of care meetings should include all involved teams.
- **Plan intubations early** – page anesthesiology when needed
- **Overhead call for emergencies.**

## RESOURCES – See separate COVID resources

- ARDS Vent Protocol: [www.ardsnet.org/files/ventilator\\_protocol\\_2008-07.pdf](http://www.ardsnet.org/files/ventilator_protocol_2008-07.pdf)
- SICU Manual – Uconnect
- Internet book of critical care
- PulmCrit / EMCrit Online
- SCCM Modules for learning critical care medicine
- Surviving Sepsis Campaign Guidelines
- American Thoracic Society clinical resources

Condition	First line antibiotic	Special pathogen/considerations
Community acquired pneumonia	Ceftriaxone 2g IV q24h + Azithromycin 500 mg IV q24h	Calculate DRIP score for further risk stratification
Hospital acquired pneumonia	Vancomycin (weight-based) + Cefepime 2g IV q8h	Consider tobramycin for high suspicion of <i>pseudomonas</i>
Ventilator associated pneumonia	Vancomycin (weight-based) + Cefepime 2g IV q8h	All aspiration events do not warrant antibiotics
Undifferentiated septic shock	Vancomycin (weight-based) + Cefepime 2g IV q8h	Consider addition of iHAT therapy
Intra-abdominal sepsis	Vancomycin (weight-based) + Piperacillin/tazo 3.375g IV q8h	Discuss need for metronidazole and/or anti-fungal with Pharm/EGS
Bacteremia (gram pos stain)	Vancomycin (weight-based) until culture speciation available	Consult infectious disease as long-term treatment will be required
Bacteremia (gram neg stain)	Cefepime 2g IV q8h until culture speciation available	Consult infectious disease as long-term treatment will be required
Urinary sepsis	Meropenem 500mg IV q6h + Vancomycin (weight-based)	Rule out other causes of sepsis first. ID consult required for Mero
Necrotizing soft tissue infection (severe/necrotizing fasciitis)	Vancomycin (weight-based) + Piperacillin/tazo 3.375g IV q8h	Include clindamycin 600mg IV q8h until source control achieved

## VENOUS ACCESS

- **Peripheral IV (PIVs)** will be sufficient for many patients
  - Aim for at least 2, largest bore feasible
- **Central venous catheters (CVCs):** start to consider for patients in shock, GI bleed or other hemorrhage, need for dialysis, etc.
  - **Triple lumen:** Administration of pressors and other centrally-delivered meds. Good for running multiple drips. Can be used to assess central venous pressure (CVP)
  - **Introducer:** Better for volume resuscitation in hemorrhage; can also accommodate Swan Ganz catheter
  - **Trialysis** (temporary dialysis line): easiest in R int jugular
  - **PICC:** Generally safe alternative when not urgently needed. Most common uses: TPN and long-term antibiotics
  - **Use ultrasound to place central lines**
  - **Remove them as soon as no longer needed**

## ARTERIAL ACCESS

- **Arterial line:** Most commonly placed in radial artery; femoral artery also feasible
  - Useful in severe shock states for close BP monitoring
  - Use ultrasound guidance for placement
  - Do not place or keep in place solely for ABGs/lab draws
  - Remove as soon as no longer needed
  - May utilize pulse pressure variation to assess fluid status

## ICU MUST CALL LIST

- **Hemodynamics**
  - New diagnosis of shock or hypotension
  - Starting a new pressor/dual pressor
  - Increasing a pressor (>0.05 increase/6 hours)
  - Increased lactate (new elevation or >0.5 above prior)
- **Respiratory**
  - Pre-intubation: Escalating FiO<sub>2</sub>/PEEP/support needs
  - Vent: ↑ work of breathing, persistent vent dyssynchrony or bronchospasm; Plateau pressure >30; driving pressure >18
  - Worsening of PF ratio by 50
  - Consideration of prone positioning
  - Extubation if not discussed on rounds
- **GI & Heme**
  - Any new acute GI bleed or other symptomatic bleeding
  - Transfusion of any blood product
  - A drop in Hgb >1.5 in any shift
  - Any new platelet count <50k or acute drop in platelet count
- **Renal & Electrolytes**
  - Hyperkalemia > 6 (start therapy and then call ICU)
  - Oliguria >6 hrs (<0.5 mL/kg/hr)
  - Consideration of initiating dialysis
- **Infection**
  - Starting new antibiotics (including anti-viral/fungals)
  - Changing antibiotics
  - New positive culture results
- **Neuro**
  - Any acute change in mental status or new seizure
- **Any Procedure**