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)

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**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, hypocalemia (low iCa <4.8) can worsen hypotension).
    - Norepinephrine (0.02 – 2 mcg/kg/min), Sepsis 1st line.
    - Phenylephrine (0.25 – 5 mcg/kg/min) 
    - Vasopressin (typically fixed 0.03 units/min)

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**RESPIRATORY**

- **Intubation Indications:** Intubate COVID patients early
  - Airway protection (∆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 ↑PEEP & lowest possible FIO2
  - Goal pH >7.3, tolerate higher CO2, adjust via RR > Vtidal
  - Follow Driving Pressure, PRatio, WOB & Synchrony. Ensure no air-trapping. Call ICU for any vent concerns.
  - Keep ET tube tip 2-5 cm above carina (per Xray)

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**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. CART/CVVH common – can “run” patients even or negative.

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**GI / NUTRITION**

- **GI Bleed:** Maintain high index of suspicion for GI bleeding in all ICU pts. Consult GI first for bleed (IR & surgery as 2nd 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 Ocreotide or v镭can, and Cefeťan (for possible SPB)
  - **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/thor if symptomatic. Treat encephalopathy with lactulose +/- rifaximin (2nd agent). See Liver transplant guidelines in SICU Manual

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**ENDOCRINE**

- **Glucose goal 130-180, avoid High/Low/Variable.** 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.

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**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.

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**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.
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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

- 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

<table>
<thead>
<tr>
<th>Condition</th>
<th>First line antibiotics</th>
<th>Special pathogens/considerations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Community acquired pneumonia</td>
<td>Ceftriaxone 2g IV q24h + Azithromycin 500 mg IV q24h</td>
<td>Calculate DRIP score for further risk stratification</td>
</tr>
<tr>
<td>Hospital acquired pneumonia</td>
<td>Vancomycin (weight-based) + Cefepime 2g IV q8h</td>
<td>Consider tobramycin for high suspicion of pseudomonas</td>
</tr>
<tr>
<td>Ventilator associated pneumonia</td>
<td>Vancomycin (weight-based) + Cefepime 2g IV q8h</td>
<td>All aspiration events do not warrant antibiotics</td>
</tr>
<tr>
<td>Undifferentiated septic shock</td>
<td>Vancomycin (weight-based) + Cefepime 2g IV q8h</td>
<td>Consider addition of iHAT therapy</td>
</tr>
<tr>
<td>Intra-abdominal sepsis</td>
<td>Vancomycin (weight-based) + Fiperacillin/tao 3.375g IV q8h</td>
<td>Discuss need for metronidazole and/or anti-fungal with Pharm/EGS</td>
</tr>
<tr>
<td>Bacteremia (gram pos stain)</td>
<td>Vancomycin (weight-based) until culture speciation available</td>
<td>Consult infectious disease as long-term treatment will be required</td>
</tr>
<tr>
<td>Bacteremia (gram neg stain)</td>
<td>Cefepime 2g IV q8h until culture speciation available</td>
<td>Consult infectious disease as long-term treatment will be required</td>
</tr>
<tr>
<td>Urinary sepsis</td>
<td>Meropenem 500mg IV q6h + Vancomycin (weight-based)</td>
<td>Rule out other causes of sepsis first. ID consult required for Mero</td>
</tr>
<tr>
<td>Necrotizing soft tissue infection (severe/necrotizing fasciitis)</td>
<td>Vancomycin (weight-based) + Fiperacillin/tao 3.375g IV q8h</td>
<td>Include clindamycin 600mg IV q8h until source control achieved</td>
</tr>
</tbody>
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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
  - Trialyisis (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 (>0.5 increase/6 hours)
  - Increased lactate (new elevation or >0.5 above prior)
- Respiratory
  - Pre-intubation: Escalating FiO2/PEEP/support needs
  - Vent: ↑ work of breathing, persistent vent dysynchrony 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
- Infestation
  - 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