

EM Basic- Sepsis 3.0- March 2017

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Recognizing Sepsis

Vitals- Fever, tachycardia, hypotension, hypoxia, tachypnea

- Triage respiratory rates frequently inaccurate
- Look at respiratory effort- fast or increased work of breathing?

History and Symptoms

Head to Toe recent symptoms/ROS- fever, headache, stiff neck, cough, shortness of breath, abdominal pain, urinary symptoms, diarrhea, new rashes or bumps, back pain

Recent procedures?- new port in an oncology patient? New nephrostomy tube? Recent surgeries?

Complete Past Medical and Surgical History

Ask about medications, allergies, recent admissions to the hospital, recent use of antibiotics

Exam- Full Head to Toe

- Don't forget neuro exam and walking the patient if there is headache, stiff neck or neuro deficits
- Examine every inch of the patient's skin (including axilla, groin, peri-rectal area) for abscesses or cellulitis
- Check lung sounds (pneumonia?)
- Check for abdominal tenderness (chole, appy, etc.)
- Overall perfusion- cap refill? Skin pale and/or cool?
- Overall picture of the patient- if any patient looks "sick" they could be septic!

New definitions of Sepsis (February 2016)

-No more "severe sepsis"- only sepsis and septic shock

-Sepsis- known or suspected source of infection with at least 2 out of 3 "qSC criteria

- Hypotension (Systolic BP <90)
- Altered Mental Status
- Tachypnea (Respiratory rate of 22 or higher)

PEARL: Remember this with the mnemonic "HAT". Technically also an allowance for an increase in the full SOFA score of 2 points or more- but not really useful in the ED. Also- don't stop a sepsis resuscitation just because Systolic BP is 95- this is trying to find the sickest sepsis patients

-Severe Sepsis- now defined as the need to use vasopressors to maintain a Mean Arterial Pressure (MAP) of less than 65 AND a lactate of greater than 4 after "adequate" fluid resuscitation AND

- "Adequate" is not defined- left up to your judgment
-Also- the "AND" statement should probably be "OR" to make sure that patients who are on pressors but clear their lactate are still treated aggressively- some patients will clear their lactate but still die!

Before resuscitating- consider if the patient would be better served by foregoing resuscitation and starting "comfort care" instead

- Check for advance directives, consider functional status, talk with the patient's family
- A healthy 20 year old with bacterial meningitis is much different than a 90 year old patient with dementia in a nursing home with a feeding tube- do the right thing for the patient and their family

Labs

- Standard large bore IV access
- CBC, CMP, UA, Urine Culture, Blood Cultures x2, VBG/ABG with lactate

Imaging

- Chest x-ray (screen for pneumonia)
- Non-contrast head CT/LP (if suspecting meningitis)

PEARL: Head CT is to look for mass, hemorrhage, and signs of increased intracranial pressure that could (in theory) cause herniation if an LP is done. Definitely do an CT before LP in patients who are altered, have an abnormal neuro exam, elderly, or immunocompromised.

Imaging (continued)

-Abdomen/Pelvis CT- if patient complains of abdominal pain and/or has abdominal tenderness- use contrast if the patient's kidney function can handle it, otherwise get a non-contrast CT

-Ultrasound- bedside US can help find cholecystitis quickly, but have a low threshold to get a CT to get the "whole picture" in the abdomen if needed

Old versus new sepsis guidelines

-Old guidelines for Early Goal Directed Therapy mandated central and arterial lines for all of these patients along with transfusing to hemoglobins of more than 10 (after initial volume resuscitation) as well as using dobutamine
-These interventions have been shown by the ARISE, PROCESS, and PROMISE trials to be unnecessary unless the clinician thinks they are needed

-No need for central access unless you need pressors (and these can be started peripherally first), no need for higher hemoglobin thresholds for transfusion (use 7 grams/dl)

Sepsis Treatment

Fluids

-Scott Weingart on the EmCrit podcast- "You don't have to do a lot of crap, you just have to give a crap"- give aggressive care!

-Immediate IV fluids- at least 30 mls/kg- 2 liters in a "typical" 70 kilogram male
-2 liters should be a starting point for most patients
-But are we giving too much fluids? Some experts say yes but no good evidence

-Re-evaluate patients frequently- the question is- would the patient benefit from more fluid? Did their heart rate come down, their blood pressure increase, or do they look more awake or better perfused?

-Fluid responsiveness- check the website for many resources

-Fluid choice- normal saline ok for the first two liters but risk of hyperchloremic metabolic acidosis with large volumes due to high sodium load- consider starting or switching to lactated ringer's (LR) or plasmalyte which are closer to actual physiologic levels of electrolytes

Antibiotics

-Unknown/unsure source

-Zosyn (piperacillin/tazobactam) and Vancomycin
-Zosyn 4.5 grams IV (3.375 grams ok if more readily available in the hospital)
-Give first- can be infused quickly over about 10 minutes
-Zosyn is a penicillin- keep that in mind with allergies
-Vancomycin- 15- 20 mg/kg IV of ACTUAL body weight, some advocate 25-30 mg/kg with a max of 2 grams IV
-Give second- takes at least 2 hours to give

PEARL: 1 gram of vancomycin is not enough unless patient weight 50kg

-Cefepime (cephalosporin) and Vancomycin
-Some evidence that Zosyn/Vanc leads to more acute kidney injury
-Cefepime- 2 grams IV

PEARL: Cefepime can be used in patients with PCN allergy since it's a 4th generation cephalosporin

Known or Suspected Source- LUCAS mnemonic- (Hat tip: Rob Orman from 1000 ErCast podcast)- if you know the source, we can be smarter about abx choice

- Lung
- Urine
- CNS
- Abdomen
- Skin

-Lung source- Pneumonia

-Non-ICU patients- Levaquin (levofloxacin) 750mg IV
-ICU and Healthcare Associated Pneumonia (HCAP)
-Zosyn/Vanc or Cefepime/Vanc
-HCAP criteria- admitted to the hospital for more than 2 days in the last 90 days, resident of a nursing home or long term care facility, patients on dialysis or chemotherapy

PEARL: New surviving sepsis guidelines from 2017 DO NOT recommend routine “double coverage” of pseudomonas with levaquin (in addition to zosyn/vanc or cefepime/vanc) in those patients with HCAP.

-Urine

-Ceftriaxone 1 gram IV- ok to give in patients with PCN allergy

PEARL: Depending on local sensitivities, Zosyn frequently has lower effectiveness (80%) against urinary E. Coli versus ceftriaxone (98%). So “Zosyn and call it a day” may not work for urinary issues. If urine is a likely source but not yet confirmed, can give cefepime/vanc pending UA results.

PEARL: Check for previous urine cultures for the patient to check the patient’s previous antibiotic sensitivities and let that guide your antibiotic choice

-Central Nervous System- Meningitis

- Ceftriaxone 2 grams IV

-Vancomycin 15-20 mg/kg, max 2 grams

-Acyclovir 10 mg/kg if suspecting HSV meningitis- history of HSV infection, young patient with a new psychotic break

-Abdomen- Cholecystitis, appendicitis, ascending cholangitis, complicated diverticulitis, intra-abdominal abscess

-Zosyn good for chole/appendicitis

-Ciprofloxacin (Cipro) 400mg and Flagyl (metronidazole) 500 mg IV usually used for diverticulitis and other bowel issues or in cases of PCN allergy

-Skin- abscesses, cellulitis causing sepsis

-Zosyn/Vanc- especially Vanc if suspecting MRSA (frequently hospitalized, dialysis, chemo patients or history of multiple abscesses in the past)

Vasopressors in Sepsis

-Generally best to start after sufficient fluid loading

-Start them if MAP <65 after fluid loading.

-Good evidence to say you can start pressors peripherally while waiting to complete central access

-Use a good peripheral- 18 gauge in AC or forearm ok- 24 gauge in the hand is not ok

-Make sure to check IV sites at least once an hour for extravasation and stop the infusion if its detected

First line pressor- dopamine is no longer recommended

Levophed (norepinephrine- commonly “norepi)

-Alpha and beta agonism

-2 mcg/min, maximum of 20-30 mcg/min

-Some will go as high as 1 mcg/kg/min (70 mcg/min)

-Generally point of diminishing returns above 20-30 mcg/min

Second line Pressors

Vasopressin- especially if patient remains tachy on norepi

-0.03 units per minute

Epinephrine- especially if the patient has a normal heart rate on norepi

-1 – 10 mcg/min

Re-evaluate

-After fluids, abx, and pressors on board re-evaluate the patient

-Re-check exam- worth of breathing? Signs of fluid overload, perfusion status better or worse? Mental Status?

-Re-check lactate- is the lactate down by at least 10% in the first hour

-More fluids or pressors to help improve metabolic status?

-Work of breathing- can be up to 30% of patient’s metabolic load in sepsis

-Should you consider intubating semi-electively?

-If you do, low dose sedatives, high dose paralytics

Good ongoing critical care (big and small stuff!)

-Head of bed to 30 degrees- improves ventilation, prevents vent associated PNA

-Tidal volume 6-8 ml/kg of IDEAL body weight on vented patients

-Use a tape measurer to measure sternum to fingertips, multiply by gives you wingspan which is very close to patient’s height- needed to calculate IDEAL body weight

-Place arterial line (especially if on pressors)

-Avoid high FiO2 settings (hyperoxia)- wean down FiO2 on vent to keep sats above 92%

Good ongoing critical care (continued)

- Use ARDSnet protocols in patients at risk for ARDS
- Surgical control of any sepsis sources like abscesses
 - Surgical or IR consult as needed

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