Introduction – Sepsis

Sepsis is life-threatening organ dysfunction caused by a dysregulated host response to infection
Septic Shock: Subset of sepsis with circulatory and cellular/metabolic dysfunction associated with higher risk of mortality

Before, SIRS+Infection = SEPSIS

SIRS: Temp >38.3, or <36, HR >90, RR>20, WBC >12, or <4, new altered mental status

But now…

The total SOFA score of two or more points from the baseline score to represent organ dysfunction -> SEPSIS
Quick SOFA criteria (qSOFA) • Respiratory rate ≥22/min • Altered mentation • Systolic blood pressure ≤100 mm Hg

Classifications

SIRS
SEPSIS
SEVERE SEPSIS
SEPTIC SHOCK-profound circulatory, cellular, metabolic abnormalities. Pressors required for MAP ≥65 and serum lactate >2 despite adequate fluid resuscitation
MULTIPLE ORGAN DYSFUNCTION SYNDROME

CASE I

ID: Patient is an 80 yo F, generally healthy presented to the ED today for 1 day history of abdominal pain, nausea/vomiting.
Severe mid-epigastric pain radiating to the back with emesis after meal yesterday, NBNB. +Chills, otherwise negative ROS.

What is your top 3 differential diagnoses?

- Pacreatitis
- Cholycystitis
- Gastric ulcers

Vital signs
Temp: 36.5C
RR: 20s
HR: 100s-110s
BPs: 90s-120s/70s
MAPs: 70s-80s

What labs/imaging, you would hope the ED had gotten already? ☺

Lab results
CBC: WBC 10.1, neut#8.0
Chem10: K+3.2, CBGs 220s, otherwise unremarkable. BUN 13, and Cr 0.8
LFT: normal except mild elevated AST 93
Lipase: 25,464

Ultrasound:
Echogenic pancreatic parenchyma can be seen with pancreatitis
Common bile duct is dilated to 9 mm
Although the gallbladder wall is thickened, no other ultrasound evidence of acute cholecystitis is found. No convincing cholelithiasis.

So what's next?
FM consulted for admission for pancreatitis
Pt was given 1L bolus, and started MIVF 200cc/hr

Admission around 1230AM

Patient still tachycardic in the 110s, in pain, BPs a bit soft, MAP 70s
Given another bolus

Team was called to the patient's room at around 1:45 AM, patient's blood pressure at that time was 68/51 with MAP of 57, HR 115, RR 32-35. Patient still endorsed mid-epigastric pain that was not relieved by pain medications.

What is your next step?

- Another 1L bolus was ordered (4L now)
- Repeat CBC/diff, lactate, CMP, blood cultures x2. Started pt on empiric antibiotic coverage (Vanc/Zosyn)

Re-evaluate at this point…

MICU consulted

GI was consulted and performed an EUS with findings of peripancreatic fluid and pericholecystic fluid raising concern for acute cholecystitis. Cholecystoduodenostomy via lumen opposing metal stent, AXIOS, for transmural drainage of the gallbladder

WBC: 3.6

PT/INR: 21.9/1.87

Chem10:

- K+ 4.7, 5.2, 6.9
- BUN: 35-40
- Cr: 2.58-3.43
- Calcium: 5.6
- Phos: 11.4

pH: 7.2

UA: negative LCE/Nitrites. Large protein

Blood cultures: positive for E.coli x2

CASE 2
ID: Patient is a 63 yo male with PMH MSSA bacteremia, CAD s/p CABG, ischemic cardiomyopathy with LVEF of 25% s/p ICD placement, recurrent ventricular tachycardia, paroxysmal afib on anticoagulation, ESRD s/p kidney transplant failure now on hemodialysis via tunneled dialysis catheter, makes minimal urine, T2DM, chronic bilateral foot ulcers, recent cdiff infection recently discharged from the hospital who presents with two days of generally feeling unwell and weak. He had two falls at home but did not hit his head. Denies fevers, chills, cough, chest pain, abdominal pain, n/v.
Vitals:
Temp: 101 F
BP: 95/68 (MAP 77)
HR 90-100
RR 18
SPO2 low 80s with 3 L O2 requirement
Does he meet SIRS criteria?
-YES
Temperature >38C (100.4), HR >90

Does he meet SEPSIS criteria?
-Yes- multiple infection sources

What are potential sources of infection?
-UTI, TDC catheter infection, ICD infection, endocarditis, bilateral foot ulcers
What do you want to order?
-Chest Xray
-CBC, lactate, Chem7
-Urine Cx
-Blood Cx x2
-VBG
-TEE/TTE
-Imaging of foot for osteo
INITIAL RESULTS
-CXR- unremarkable
-CBC WBC 7.8, HGB 6.5
-Chem: BUN 58, Creat 7.98
-Lactate 4.5
-pH 7.28
What next?
-given 2L fluid, Bp with MAPs 60-70
-started on broad ABX (vanc + cefepime)
-remove possible infection sources- TDC catheter
Floor or ICU?
-Meets criteria for SEPTIC SHOCK- severe sepsis + organ dysfunction—

-MAP <65, recent lactate >4
-Contact ICU→ ICU requiring pressors briefly

- SUMMARY

Treatment for + Sepsis screen
-Assess for septic shock (MAP <65, lactate >4)
or hypotension despite adequate IVF
-Initiate ICU contact and plan
-Give 2L NS bolus if hypotension or lab sings of organ dysfunction
-START OR BROADEN ABX COVERAGE in <1 HR and get NEW blood cultures first if possible
-STAT lactate + labs for signs of organ dysfunction
-Physical exam, diagnostic tests for potential source
-Frequent reassessment

PEARL: each hour delay of antimicrobial tx is associated with increased in-hospital mortality in pts with sepsis and septic shock
What happened next: ADDITIONAL RESULTS:
-Urine Cx : unable to obtain, hx of 2 urine cx + for MSSA within 2 months
-Blood Cx: + MSSA
-TDC catheter culture: + MSSA
-TTE: LVEF 16.7%, no reports of vegetation
-TEE: small vegetation seen on mitral valve

PEARL:
MSSA seen in URINE unlikely due to ascending UTI but from systemic infection

Immediate evaluation and management of sepsis and septic shock:
**ABCS! Immediately secure airway if indicated, correct hypoxemia, and establish venous access ASAP for fluids and antibiotics
**Stabilize respiration→supplemental O2 should be supplied to ALL pts with sepsis and oxygenation monitored with continuous pulse ox. Intubate, mechanical ventilation if required to support increased work of breathing that typically accompanies sepsis or for airway protection associated with encephalopathy and depressed levels of consciousness
***Start IV FLUIDS AND ABX ASAP!

Prognostic factors:

Host-related —

1. *Immunosuppressant*: Anomalies in the host's inflammatory response may indicate increased susceptibility to severe disease and mortality, such as failure to develop a fever, leukopenia, thrombocytopenia, hyperchloremia, a patient's

comorbidities, age, hyperglycemia, hypocoagulability, and failure of procalcitonin to fall have all been associated with poor outcomes.

Type of infection — Sepsis due to nosocomial pathogens has a higher mortality than sepsis due to community-acquired pathogens

Antimicrobial therapy — Studies have shown that the early administration of appropriate antibiotic therapy will decrease mortality rate.

Restoration of perfusion — Failure to aggressively try to restore perfusion early may also be associated with mortality