Diagnosis and Management of SHOCK

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Disclosures

I have no conflicts of interest to disclose.
i am grateful
Quick Poll

In my practice setting, I take care of:

A. Both outpatients and inpatients
B. Inpatients on acute care & step-down
C. Inpatients in B AND patients in the ICU
D. Patients in a post-acute care facility
E. All of the above!
All That is Hypotensive is Not Sepsis...and
All That is Hypotensive Does not Need Fluids
But Sepsis Is Having a Big Year!
Roadmap for the Hour

Objective:
- 2019 Updates in Dx of Sepsis
- Sepsis Mimics
- 2019 Updates in Management of Sepsis
- Non-Septic Shock Management Pearls
- Post-Sepsis Care
Roadmap for the Hour

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Diagnosis and Management of Shock
At least 1.7 million adults in the U.S. develop sepsis each year, and nearly 270,000 die as a result.

Get ahead of sepsis
Know the risks. Spot the signs. Act fast.
Sep is Sepsis Awareness Month

When it comes to sepsis, remember: IT’S ABOUT TIME™. Watch for:

- **TEMPERATURE** that’s abnormal
- Signs of an **INFECTION**
- **MENTAL DECLINE**
- Feeling **EXTREMELY ILL**

As many as 80% of sepsis deaths could be prevented with rapid diagnosis and treatment.

Take the time now to learn more at sepsis.org.
Can We Really Prevent Mortality?

1, Definitely Preventable
2, Moderately Likely to Be Preventable
3, Possibly Preventable Under Optimal Care
4, Unlikely to Be Preventable Despite Suboptimal Care
5, Moderately Unlikely to Be Preventable
6, Definitely Not Preventable

Total Sepsis-Associated Deaths, %
These Patients Come In SICK Already...

- Other
- Stroke
- Chronic Renal Disease
- Chronic Liver Disease
- Unknown
- Chronic Pulmonary Disease
- Dementia
- Hematologic Cancer
- Chronic Heart Disease
- Solid Cancer

Rhee et al. JAMA Network Open 2019
The Trouble with SIRS Criteria
Updates on SEPSIS-3, SOFA, & qSOFA

New! But Improved?
Quick Poll

At my institution, we document using:

A. SIRS, Sepsis, Severe Sepsis, Septic Shock
B. Infected, Sepsis, Septic Shock
C. SIRS and SOFA/qSOFA
D. Only SOFA/qSOFA
SOFA Score $\geq 2$ Reflects Mortality Risk of 10%

Singer et al. JAMA 2016
Blood Pressure (<100 mmHg syst)
Altered Mental Status
achyphnhea (RR > 22/min)
Real-World Data: Only 1/6 qSOFA + Had Sepsis

- 85 hospitals, > 1 mill pts
- PPV for Sepsis only 17.4%
- Only 1/3 pts qSOFA + has infection
- Only 1/6 pts qSOFA + has sepsis
Medicare and Critical Care Societies are still not using the Sepsis-3 Definitions, and newer data are casting their clinical validity into doubt.
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All That is Hypotensive is Not Sepsis...and

what are other words for mimicker?

mimic, imitator, impersonator, simulator, copyist, echo, panto, pantomime, mimick, mimer
Quick Poll

In the medical context, I prefer:

A. Team “Mimic”
B. Team “Mimicker”
C. Use both interchangeably
D. Never use these weird words
DDx: Dr. Jen Babik’s Head-to-Toe Approach

CNS
- Nosocomial meningitis (post-NSG)

HEENT
- Nosocomial Sinusitis
- Hospital-acquired URI

Pulmonary
- Hospital-acquired PNA
- Empyema
- ARDS

Cardiac
- Endocarditis
- Pericarditis

GI/GU
- C. Difficile
- CA-UTI
- Abdominal abscess
- Peritonitis
- Acalculous cholecystitis
- Pancreatitis

MSK
- Osteomyelitis
- Septic arthritis
- Gout

Skin
- Cellulitis at line sites
- Infected decub ulcer
- Surgical site infection

Bloodstream
- CRBSI
- Candidemia

Other non-infectious etiologies
- Drug Fever
- Central fever
- DVT/PE
- Malignancy
- Rheumatologic
- Post-op fever
- Transfusion reaction
- Transplant rejection
- Adrenal insufficiency
### Mimics/Mimickers of Septic Shock

<table>
<thead>
<tr>
<th>More Common:</th>
<th>More Rare:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypovolemic</td>
<td>Anaphylactic Shock</td>
</tr>
<tr>
<td>Hemorrhagic</td>
<td>Adrenal Crisis</td>
</tr>
<tr>
<td>Pulmonary Embolism</td>
<td>Myxedema Coma</td>
</tr>
<tr>
<td>Cardiogenic</td>
<td>HLH</td>
</tr>
<tr>
<td>Obstructive/Tamponade</td>
<td>Toxidromes</td>
</tr>
</tbody>
</table>
Take Home Point

Think head-to-toe for sepsis mimics. A careful history, physical exam, and tools like POCUS and labs are key.
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The Sepsis 6

- Oxygen
- Blood test
- Antibiotics
- Fluids
- Escalate
- Inotropes
Quick Take: Antibiotics BEFORE Blood Cx!

Blood cultures’ yield decreased from 51% in septic patients before antibiotics to 28% in patients already on antibiotics.

Scheer et al. CMI 2019
Quick Poll

For resuscitation in septic shock, I use:

A. pRBCs
B. 0.9% Normal Saline
C. IV Albumin
D. Plasmalyte
E. Lactated Ringer’s
F. D5-½ NS
G. Just lower the MAP goal
Patients received ≥500mL isotonic crystalloids in ED and subsequently hospitalized outside an ICU

Balanced crystalloids (Lactated Ringer’s/Plasma-Lyte) N=6,708
Isotonic crystalloids (0.9% normal saline) N=6,639

25 Hospital-free days (OR 0.98; 95% CI, 0.92 to 1.04; P=0.41)

4.7% Major kidney adverse events (OR 0.82; 95% CI 0.70-0.95; P=0.01)
Quick Poll

When someone is hypotensive, I:

A. Start vasopressors right away
B. Fluid resuscitate 2-3 L & then press
C. Fluid resuscitate, transfuse, & then press
D. Transfuse right away
E. POCUS, POCUS, more POCUS
CENSER TRIAL
Early Use of Norepinephrine in Septic Shock Resuscitation

Phase II, randomized, double-blind, placebo-controlled

To assess if early low-dose norepinephrine in adults with sepsis with hypotension increases shock control by 6 hours compared with standard care.

310 Adults (18 years or older) who presented at the ED with hypotension determined by MAP lower than 65 mmHg and infection as the suspected cause

early norepinephrine (n = 155) VS standard treatment (n = 155)
Conclusion: Early norepinephrine was significantly associated with increased shock control by 6 hours. Further studies are needed before this approach is introduced in clinical resuscitation practice.
Quick Poll

At my institution, we are urged to abide by a:

A. 3-hour sepsis bundle
B. 1-hour sepsis bundle
C. We don’t use a sepsis bundle
D. What is a sepsis bundle?
The (Dreaded) (Great) (Impossible) 1-Hour SSC 2018 Bundle

1. Measure lactate level. Remeasure lactate if initial lactate elevated (> 2 mmol/L).
2. Obtain blood cultures before administering antibiotics.
3. Administer broad-spectrum antibiotics.
4. Begin rapid administration of 30 mL/kg crystalloid for hypotension or lactate ≥ 4 mmol/L.
5. Apply vasopressors if hypotensive during or after fluid resuscitation to maintain a mean arterial pressure ≥ 65 mm Hg.

Initiate bundle upon recognition of sepsis/septic shock. May not complete all bundle elements within one hour of recognition.
Slew of Articles Saying: Nope.

“Compliance with the 2018 Surviving Sepsis Campaign would require a wholesale alteration in the management of ED patients with either vague symptoms or absence of triage hypotension.”

Filbin et al. Annals of EM 2019
A Spoonful of Citrus?

- Cocktail of thiamine, steroids, Vit C
  - C 1500q6 + Hydrocort 50q6 + B1 200q12

- 47 pts, 47 (retrospective) controls - 40% vs. 8.5% hospital mortality

Marik et al. CHEST 2017
Effect of Vitamin C Infusion on Organ Failure and Biomarkers of Inflammation and Vascular Injury in Patients With Sepsis and Severe Acute Respiratory Failure

The CITRIS-ALI Randomized Clinical Trial

- Multicenter, double-blind, placebo-controlled RCT of IV Vitamin C in Sepsis-Induced ARDS

Fowler et al. JAMA 2019
A Negative Trial? A Positive Trial?

Gehan-Breslow-Wilcoxon test, $P = .01$
HR, 0.55 (95% CI, 0.33-0.90)

Fowler et al. JAMA 2019
The Controversy Continues

- Mortality was secondary endpt, **NEGATIVE** study for primary endpts
  - Change in SOFA score
  - Biomarkers (CRP, thrombomodulin)

- Late initiation of Vitamin C (up to 48 hrs post-ARDS)
  - **Natural history**?
  - **Survivorship bias**?

Fowler et al. JAMA 2019
Take Home Point

In sepsis, draw blood cx before Abx. Resuscitate with a balanced crystalloid solution (LR or Plyte). Avoid excessive fluidizing before moving to pressors. Bundles & checklists help. Vitamin C at least isn’t harmful.
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The Complexity of Cardiogenic Shock

\[ V = IR \]

\[ MAP = CO \times SVR \]

1st Line Vasopressor: Norepi
The Complexity of Cardiogenic Shock

“The treatment of cardiogenic shock must be a compromise between the best tissue perfusion possible & the lowest myocardial energy cost.”

Squara et al. CHEST 2019
Take Home Point

Match vasopressors to your physiology. Even though norepi is first-line vasopressor for both cardiogenic & septic shock, mixed shock patients need layers of optimization.
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Pathophysiology of Sepsis Mortality

Venet et al. Nature Reviews Nephrology 2018
What about ACTUALLY “Surviving Sepsis?”

1 yr post-D/C, 15% of sepsis survivors died & 6-8% die/year over the next 5 yrs.

Shankar-Hari et al. JAMA Network Open 2019
The Most Practice-Changing Read on Shock

Awdish. In Shock. 2017
Take Home Point

[Video]
Thank You!
Questions?

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