The Sepsis Puzzle: Unraveling the Case Mr. H

E. Monroe Carter-Griffin DNP, RN, ACNP-BC
Assistant Professor, Clinical at University of Texas at Arlington
Intensivist Nurse Practitioner for Dallas Pulmonary & Critical Care

Objectives

**This is an interactive case study presentation.**
- Review and define the “old” and “new” sepsis criteria.
- Review the pathophysiology of sepsis.
- Discuss clinical presentation and diagnostics.
- Discuss initial management of sepsis.
- Discuss advanced management of sepsis.
- Identify potential sepsis complications.
- Discuss sepsis measures and reimbursement.

Mr. H

Mr. H is a 63 year old AAM w/PMH DM and HTN who presented to the ER after his wife noted he was “warm with chills” and “acting differently”. The patient reports that his symptoms started about 2-3 days ago and were sudden in onset. Prior to these symptoms he was in his normal state of health and denies any recent changes that could explain why he’s feeling ill.

ROS he denies headache, cough, congestion, SOB, chest pain, abdominal pain, nausea/vomiting, diarrhea/constipation, or difficulty/pain on urination. He does report fever, chills, and decreased appetite.

PMH: DM and HTN

Mr. H


FH: Father – MI, DM; Mother – DM; 2 Brothers – DM

Allergies: NKDA

Medications: PTA: Metformin 500 mg po bid; Norvasc 5 mg po daily

Discussion

As the NP in the ER, you recognize Mr. H is likely having what category of sepsis?
Mr. H

As the NP, what are the initial orders you would place for Mr. H? And why?

Discussion

Mr. H's labs are within normal limits with the exception of:

- WBC 15.1
- PTs 137
- INR 1.5
- K 5.6
- CO2 19
- Gap 21
- Cr 1.47
- Glucose 289
- PCT 2.89
- LA 2.5

Discussion

Sepsis Biomarkers

Lactic Acid
- Inadequate clearance
  - In the setting of sepsis indicates global tissue hypoxia
  - Increased organ dysfunction and mortality
  - Studies have indicated that early resolution of lactate clearance is associated with improvement in organ dysfunction and mortality. Clinicians should aim for such resolution in the first two hours.
  - Trend lactate
  - Procalcitonin
Mr. H

You call report to the AG-ACNP in the ICU and the patient is transferred up.

Now as the AG-ACNP assuming care in the ICU, what is your assessment and plan for this patient based on the HPI, physical examination, and laboratory findings?

Discussion

Mr. H

Throughout the night Mr. H has received multiple IVF boluses for hypotension.

AM labs return and you note:

- WBC 22.4
- Plts 106
- K 5.9
- CO₂ 13
- Cr 2.16
- Glucose 275
- LA 7.1

Mr. H

Shortly after reviewing the labs, you receive a call from the RN stating despite the last fluid bolus Mr. H has remained hypotensive, is “very drowsy”, and his urinary output has dropped to 5 ml/hr x 2 hours.

You immediately go to assess Mr. H.

Mr. H is lethargic on exam and responsive only to tactile stimulation.

Vitals Signs: Temp 100.3 HR 121 BP 73/41 RR 34 Sats 93% on 4L NC

Mr. H

What is most concerning about Mr. H’s recent labs?
What is most concerning about his current clinical presentation?

Based on Mr. H’s current clinical picture, what is the next course of action you would take?

Discussion
Mr. H

Mr. H is started on Levophed 0.1 mcg/kg/min with improvement in his BP.

What are the parameters you will set for Levophed titration?

ABG: 7.18 / 26.0 / 89.0 / 12

Mr. H has a severe ___________ ___________. As the AG-ACNP, what is your next course of action based on the ABG results?

Hemodynamic Support

Resuscitation
- Volume, volume, volume
  - Administer 30 ml/kg crystalloid for hypotension or lactate >4 mmol/L
  - Trend lactate level
  - If hypotension does not resolve despite adequate volume resuscitation then start vasoressors.
  - Arterial line placement
  - Lactated as first choice
  - Second choice: Vasopressin as adjunct therapy (VASST) or Epinephrine

Inotropes
- Dobutamine
  - Administered as added to vasopressor in presence of cardiac dysfunction (i.e. elevated filling pressures or low cardiac output), ongoing hypoperfusion despite adequate intravascular volume resuscitation
  - Norepinephrine is not needed when Dobutamine was used to achieve supranormal levels.

Corticosteroids
- Refractory shock: hypotension despite adequate volume resuscitation and vasoressors
  - Hydrocortisone should be administered in low dose (not to exceed 100 mg/day)
  - Studies indicate significant difference in mortality but did not indicate improvement in shock reversal

Respiratory Support

O2 therapy/Nebs
- Indications for mechanical ventilation:
  - Increased or decreased respiratory rate with impending respiratory compromise
  - Shock associated with respiratory compromise
  - Significant metabolic or respiratory acidosis
  - Significant or refractory hypoxemia

When patients have stabilized and shock has resolved then weaning trials should be initiated.

Glycemic Control

Protocol approach for blood glucose levels >180 mg/dL on two consecutive readings:
- Tight glucose control is no longer recommended.
  - Hyperglycemia demonstrated to increase in mortality with tight glucose control
  - Initiate insulin drip
  - Glucose levels should be checked every 2-4 hr until stable and then every 2 hr
  - Statement by several organizations indicate blood glucose level targeting 160-180 mg/dL is sufficient
  - Avoid hyperglycemia, hypoglycemia, and large swings in glucose levels
  - Doses recommendations and protocols vary among institutions and studies

Bicarbonate Administration

- Guidelines recommend AGAINST bicarbonate use for purpose of improving hemodynamics or reducing vasopressor requirement in patients with lactic acidosis and pH > 7.15
- No study has evaluated the effects of bicarbonate administration on patient outcome
- Administration of bicarbonate has been associated with sodium/hydru overload, increase in lactate and PCO2, and decrease in ionized calcium
Mr. H

Night 2
You are receiving report from your collaborating physician regarding Mr. H. He informs you that his urine and blood cultures were both positive for gram negative bacilli.
While awaiting the final culture results, what antibiotic(s) would cover for gram negative bacilli in the blood and urine?

Antimicrobial Therapy

Choice of antimicrobial depends on HPI, allergies, recent antibiotic therapy (within last 3 months), co-morbidities, recent hospitalizations and susceptible community/hospital pathogens.
Initial antimicrobial choice should be broad enough to cover all likely pathogens.
Once causative pathogen identified then de-escalation of antibiotics should be done.
Typical duration of antimicrobial therapy is 7-10 days.
- Longer courses may be appropriate depending on infection and clinical response.

Mr. H

Mr. H has kept you very busy throughout the course of the night.
You’re following up on AM labs and note:
- WBC: 20.1
- Hgb: 9.1
- Plts: 62
- K: 5.7
- CO2: 16
- Gap: 20
- BUN: 65
- CO2: 3.12
- LA: 4.5
- ABG: 7.20/35/180/15.1 on AC 16/55/50/5
- CXR: developing central vascular congestion

Mr. H

Based on Mr. H’s recent labs and imaging, what complications has he developed as a result of his sepsis?

Discussion

Additional Sepsis Considerations
Nutrition

Administer oral or enteral feedings as tolerated within the first 48 hours after diagnosis.
- No consistency on mortality was observed in studies.
- Secondary outcome: reduced incidence of infectious complications, reduced length of mechanical ventilation, and reduced ICU/hospital length of stay.
Start with low dose feedings and advance as tolerated.

Enteral vs. Parenteral Nutrition
- No studies suggest that TPN is superior over enteral nutrition.
- Some studies suggest TPN may cause more infectious complications, possibly longer ICU/hospital stay, and longer duration of organ support.

DVT Prophylaxis

Daily pharmacoprophylaxis against VTE.
- Has been shown in multiple trials to reduce DVT and/or PE.
- UFH vs. LMWH.
  - Dependent on renal function.
  - Use in the absence of contraindications.

Use of pharmacologic therapy + intermittent compression devices.
Intermittent compression devices only when contraindications to heparin use.
- When risk increases, start pharmacoprophylaxis.

Stress Ulcer Prophylaxis

Patients that have bleeding risk factors should be started on GI prophylaxis.
- H2 blocker or PPI.
- Trials have confirmed that prophylaxis reduces UGIB in general ICU populations with sepsis.

Sepsis Core Measures

CMS Measure
What are the new measures that have been tied to reimbursement?

Questions???