

SEPSIS: MEDICAL MANAGEMENT OF THE CRITICALLY ILL PATIENT

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Educational Objectives

1. Define sepsis
2. Explain the diagnosis of sepsis
3. Highlight key management principles in a guideline-based approach



1. SEPSIS: DISTINGUISHING OLD & CURRENT DEFINITIONS



Old Definitions

Infection

SIRS

Sepsis

Severe Sepsis

Systemic Inflammatory Response Syndrome

Systemic response to a variety of processes characterized by:

- $T \geq 38^{\circ}\text{C}$ or $\leq 36^{\circ}\text{C}$
- $\text{HR} \geq 90$ bpm
- $\text{RR} \geq 20/\text{min}$
- $\text{WBC} \leq 4,000$ or $\geq 12,000$ or $>10\%$ bands

Suspected or confirmed infection with evidence of **systemic inflammation**

Sepsis with ≥ 1 sign of organ failure:

- Cardiovascular (hypotension requiring vasopressors)
- Renal
- Respiratory
- Hepatic
- Hematologic
- CNS

SEPTIC SHOCK



Current Definitions

SEPSIS

A life-threatening organ dysfunction due to a dysregulated host response to infection.



SEPTIC SHOCK

A subset of sepsis in which underlying circulatory and cellular/metabolic abnormalities are profound enough to substantially increase mortality risk.



2. DIAGNOSING SEPSIS



Clinical Presentation of Sepsis & Septic Shock

If a patient **with an infection** presents with:

- increased respiratory rate
- altered level of consciousness
- **and** mild hypotension

It may indicate:

- A warning sign that the patient may deteriorate and even progress to life-threatening **septic shock**, without aggressive resuscitation



Current Identification Criteria for Sepsis

An acute change in the total *Sequential Organ Failure Assessment (SOFA)* score ≥ 2 points *consequent* to the infection.

- Baseline SOFA score can be **assumed to be zero** in patients **without** preexisting organ dysfunction.
- A SOFA score ≥ 2 is associated with a mortality risk of approximately 10% in the general hospital population with suspected infection.

Patients with suspected infection at high risk of deteriorating can be promptly identified at the bedside with **qSOFA (quick SOFA)**:

1. Glasgow Coma Scale (GCS) < 15
2. Respiratory Rate ≥ 22
3. Systolic BP < 100



Current Identification Criteria for Septic Shock

Persistent hypotension requiring vasopressors to maintain:

- Mean Arterial Pressure \geq 65, **and**
- Lactate $>$ 2mmol/L (18mg/dL)

***despite** adequate volume resuscitation.

If these criteria are present, hospital mortality is in excess of **40%**.



3. MANAGING SEPSIS: KEY PRINCIPLES



The Surviving Sepsis Guidelines

Managing Sepsis requires attention to both:

Sepsis-induced tissue hypoperfusion

Resuscitation & Hemodynamic Support

- Restore hemodynamic stability and tissue perfusion
- Institute appropriate physiologic support to prevent further tissue injury

Infection

- Antimicrobial Therapy,
- Diagnosis &
- Source control



Surviving Sepsis: Action within the first 3, and 4, hours of presentation

HOUR 1 BUNDLE: Completed **within 3 hrs** of presentation

1. Measure **lactate level**
2. Obtain blood cultures **prior** to administration of antibiotics
3. Administer ***broad spectrum antibiotics***
4. Administer ***30 ml/kg crystalloid*** for ***hypotension*** or ***lactate ≥ 4 mmol/L***
5. Apply ***vasopressors*** (for hypotension that ***does not*** respond to initial fluid resuscitation) to ***maintain MAP ≥ 65 mmHg***

To completed **within 4 hrs** of presentation

6. In the event of ***persistent hypotension*** after initial fluid administration (MAP < 65 mmHg) or if initial lactate was ≥ 2 mmol/L, ***re-assess volume status*** and ***tissue perfusion***
7. Re-measure lactate ***if*** initial lactate elevated



Fluid Therapy: Which Fluid?

Crystalloids



0.9% sodium chloride



Use with caution



Lactated Ringer's Solution



Colloids



6% HES 130/0.4



NO HES



Albumin



selected patients?



Surviving Sepsis Campaign Guidelines on Fluid Therapy

Crystalloids are recommended as the fluid of choice for initial resuscitation *and* subsequent intravascular volume replacements in patients with sepsis and septic shock.

Note: The use of **hydroxyethyl starches (HES)** for intravascular volume replacement in patients with *sepsis or septic shock* **is not recommended.**



When can you use albumin?

Use of **albumin** is suggested *in addition* to crystalloids **when patients require substantial amounts of crystalloids.**

You can use albumin:

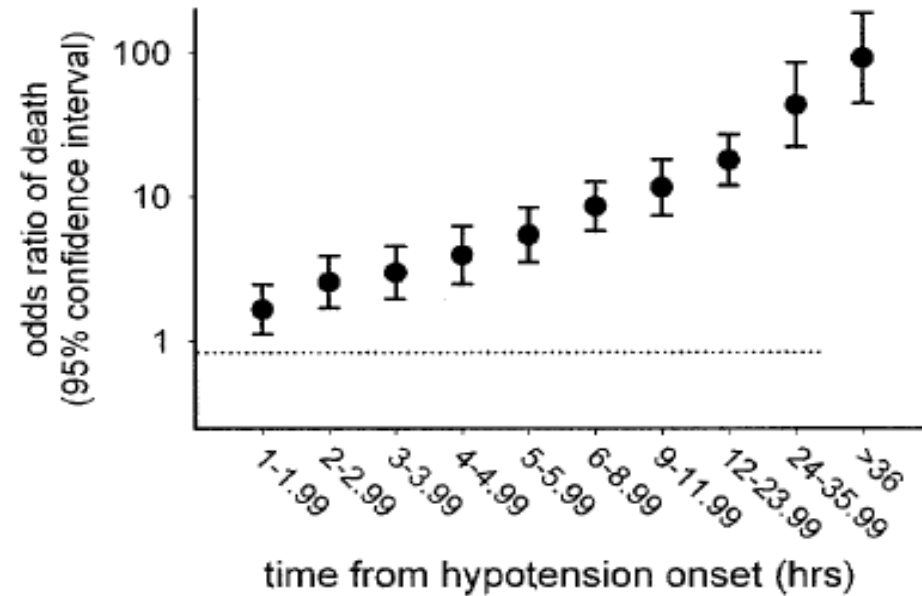
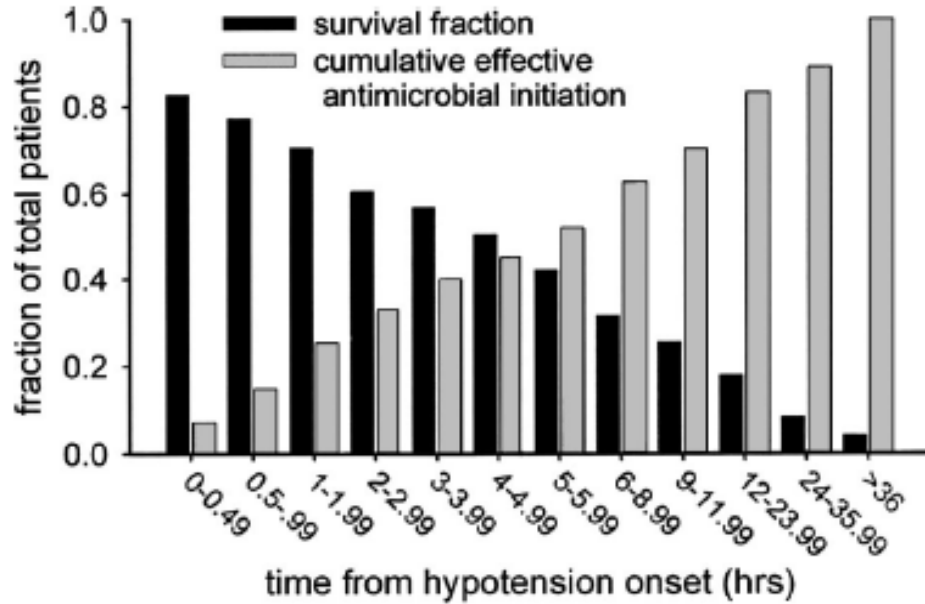
- in cirrhotic patients
- in patients with hepatorenal syndrome
- as an alternative after a few liters of crystalloid

DO NOT GIVE to patients with Traumatic Brain Injury.

It is associated with worsening outcomes.



The Surviving Sepsis Campaign Guidelines for Antibiotics



Every hour in delay of administration of appropriate antibiotics **lowers** survival by approximately 7.6%.



The Surviving Sepsis Campaign Guidelines for Vasopressors

Norepinephrine should be used as the **first-line** vasopressor

- **Vasopressin** or **epinephrine** can be added to meet MAP targets
- **Vasopressin** can be added **to decrease** norepinephrine usage

Dopamine should only be used in **select patients** with:

- Low risk of tachyarrhythmias
- Bradycardia

Dobutamine should be used in patients **with** ongoing hypoperfusion **despite** fluid resuscitation and vasopressors



The Surviving Sepsis Campaign Guidelines for Steroids

IF adequate fluid resuscitation and vasopressor therapy are able to **restore hemodynamic stability**, the guidelines **suggest against** using IV hydrocortisone to treat septic shock patients

- **IF** this is **not** achievable, the guidelines suggest the use of IV hydrocortisone at a dose of 200 mg per day (noting that it is a weak recommendation, based on low quality of evidence).



Critical Goals for Managing Sepsis

IMMEDIATE

1. Identify source
2. Initiate early broad spectrum antibiotics
3. Ensure IV access (2 preferably)
Fluid Resuscitation
4. Conduct Baseline Lab work including Lactate and ABG
5. Foley catheter to monitor Urine Output

FIRST 6 HOURS

1. Serial lactate
2. Central venous gas
3. Ongoing Fluid or vasopressors to maintain MAP >65
4. Plan for source control

FIRST 24 HOURS

1. Source control identified and dealt with
2. Stress ulcer prophylaxis
3. Low tidal volume ventilation
4. DVT prophylaxis



Summary



- **High mortality** from sepsis (**30-50%**)
- **Early clinical** recognition is **key**
- **Source control/Empiric Antibiotics**
- **Early fluids and antibiotics** saves lives
- **Prolonged septic shock** (unrecoverable organ failure) is a **terminal illness**, thus **discuss goals of care *early*** in the course of management

