Recommendations for sepsis management in resource-limited settings

Essay

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Moataz Mohamed Hussien

To

My Mother who always support me, *My dear* and *lovely Sister* and *My father* whom I wished to be among us may peace rest upon his soul

To

My love

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List of Abbreviations

ACCP	**:**	The American College of Chest Physicians
bpm	**:**	Beat per minute
CARS	**:**	counter inflammatory response syndrome
CRP	**:**	c-reactive protein
FiO2	**:**	Fraction of inspired oxygen
IL	**:**	Interleukin
LOE	**:**	Level of evidence
LPS	**:**	Lipopolysaccharide binding protein
MIF	**:**	Macrophage inhibitory factor
PAF	**:**	Platelet activating factor
SCCM	**:**	The Society of Critical Care Medicine
SIRS	**:**	Systemic inflammatory response syndrome
SNP	**:**	single nucleotide polymorphism
TH	**:**	T- helper
TNF	**:**	Tissue necrosis factor

Level of evidence (LOE)

level of evidence (A)	Research evidence supported by at least 2 level I investigations (large, randomized trials with confident results)
level of evidence (B)	Evidence supported by one level I investigation
level of evidence (C)	Evidence supported by level II investigations only (small, randomized trials with uncertain results)
level of evidence (D)	Evidence supported by at least one level III investigation (nonrandomized study)
level of evidence (E)	Evidence supported by level IV (nonrandomized, historical controls, and expert opinion) or level V evidence (case series, uncontrolled studies, and expert opinion).

(Intensive Care Med, 2012)

Introduction

Infection and sepsis are among the leading causes of death world wide. The annual burden of sepsis in high income countries is rising with mortality of 40 %. Despite these figures from industrialized countries, the largest part of the global sepsis burden occurs in middle- & low-income countries, 90% of the world wide deaths from pneumonia, meningitis or other infections occur in less developed countries ***(Adhikary et al., 2010).***

Around 70 % of global deaths in neonats & infants are attributable to sepsis, with the majority of cases occurring in Asia & Sub- Saharan Africa. A high incidence of bacterial, parasitic, & HIV infection combined with low hygienic standards & and vaccination rates, widespread malnutrition & lack of resources, explain the death proportionally high morbidity & mortality from sepsis in these countries ***(Black et al., 2010).***

In 2004 & 2008, the surviving sepsis campaign released guidelines for severe sepsis & septic shock management. Implementation of these guidelines together with timely administration of essential therapies (e.g. fluid resuscitation, antibiotics, & source control measures) improved management & outcome. Similar initiatives have

been undertaken in children resulting in comparable improvements in outcome. Despite their benefits, the surviving sepsis campaign and American college of critical care medicine pediatric guidelines can not be implemented in most middle- or low- income countries due to lacking resources. This leaves those clinicians caring for the majority of sepsis patients worldwide without standardized and adoptable guidance for sepsis care ***(Brierley et al., 2009).***

These recommendations are specifically based on resources affordable & commonly available in middle & low income countries and systematically weigh the available scientific evidence for its applicability in resource limited settings. They are not meant to replace the surviving sepsis campaign or American college of critical care medicine pediatric guidelines, but can be considered if the later are impossible to implement due to resource constrains ***(Dellinger et al., 2008).***

Aim of the work

This work aims to understand meaning of sepsis its risk, different predisposing factors and causes understanding how to react with it, its types and early management.

Providing clinicians practicing in resource-limited settings with a framework to improve the diagnosis and treatment of pediatric and adult patients with sepsis.

Definition of Sepsis

The term sepsis is derived from the Greek word sepsis, which means 'to make putrid'. Early descriptions of disease mediated by "small invisible creatures" were made in the second century B.C., and the concepts of contagion and isolation of diseased individuals followed. Despite attempts for prevention pan-epidemic infections have caused the deaths of millions of persons throughout history. The first documented observations of living bacteria were made by van Leeuwenhoek in 1674 and classification of bacterial morphology in the early nineteenth century. However, the relationship between infectious disease, its etiology, and its pathogenesis remained elusive ***(Fraust et al., 1995).***

In 1992, the American College of Chest Physicians (ACCP) and the Society of Critical Care Medicine (SCCM) introduced definitions for systemic inflammatory response syndrome (SIRS), sepsis, severe sepsis, septic shock, and multiple organ dysfunction syndromes. **Table (1)** ***(Burdette, 2010).***

Bacteremia is defined as the presence of viable bacteria within the liquid component of blood. Bacteremia may be primary (without an identifiable focus of infection) or, more often, secondary (with an intravascular or extravascular focus of infection). While sepsis is commonly associated with bacterial infection, bacteremia is not a necessary ingredient in the activation of the inflammatory response that results in severe sepsis. In fact, septic shock is associated with culture-positive bacteremia in only 30-50% of cases ***(Filbin, 2010).***

Systemic inflammatory response syndrome (SIRS): The systemic inflammatory response to a wide variety of severe clinical insults manifests by 2 or more of the following conditions:

- Temperature greater than 38°C or less than 36°C.
- Heart rate greater than 90 beats per minute (bpm).
- Respiratory rate greater than 20 breaths per minute or PaCO2 less than 32 mm Hg.
- White blood cell count greater than 12,000/µL, less Than 4000/µL, or 10% immature (band) forms ***(Dellinger et al., 2010).***

Sepsis: This is a systemic inflammatory response to a documented infection. The manifestations of sepsis are the same as those previously defined for SIRS. The clinical features include 2 or more of the following conditions as a result of a documented infection:

- Rectal temperature greater than 38°C or less than 36°C.
- Tachycardia (>90 bpm).
- Tachypnea (>20 breaths per min).

With sepsis, at least 1 of the following manifestations of inadequate organ function/perfusion also must be included:

- Alteration in mental state.
- Hypoxemia (PaO_2 <72 mm Hg at FiO_2 [fraction of inspired oxygen] 0.21; overt pulmonary disease not the direct cause of hypoxemia).
- Elevated plasma lactate level (more than 4 mmol/L).
- Oliguria (urine output <30 mL or 0.5 mL/kg for at least 1 h).

Severe sepsis: This is sepsis and SIRS associated with organ dysfunction, hypoperfusion, or hypotension. Hypoperfusion and perfusion abnormalities may include, but are not limited to, lactic acidosis, oliguria, or an acute alteration in mental status ***(Dellinger et al., 2010).***