

## Sepsis: implication for nursing

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### ABSTRACT

Sepsis is a serious health problem that is off worldwide interest; it is associated with a high mortality rate despite continuing improvements in infection management and the awareness of population is still poor despite its importance. Direct interventions to achieve the goal of clinician, like reduction of mortality, pass through the resuscitation and antibiotics but their effectiveness depends on the early recognition of symptoms and therefore the septic state. The nursing role is crucial both for the early recognition of the disease state, as well as to treat the patient with professionalism and promptness and to provide appropriate assistance to the kind of complexity that creates this pathological state: to achieve these aims, recommendations and bundles were developed to guide clinical nurses in septic patients' care.

### Introduction

Sepsis is a serious health problem that is off worldwide interest; it is associated with a high mortality rate despite continuing improvements in infection management<sup>1,2</sup> and the awareness of population is still poor despite its importance.<sup>3</sup>

Rate of worldwide incidence is varied, but is estimated to occur in about 300 cases/100,000 people every year and the rate of mortality is comparable to the rate of mortality recorded in 1960 for myocardial infarction. The Agency for Healthcare Research and Quality considers sepsis the most expensive condition treated in US hospitals, in fact this condition costed in 2011 more than 20 billion dollars and about 2.5 billion pounds in the UK.<sup>3,4</sup>

Nurses approach septic patients every day and in all

areas, from community to hospital for acute patients.<sup>5</sup>

Direct interventions to achieve the goal of clinician, like reduction of mortality, pass through the resuscitation and antibiotics but their effectiveness depends on the early recognition of symptoms and therefore the septic state; for this reason the nursing role is crucial both for the early recognition of the disease state, as well as to treat the patient with professionalism and promptness<sup>6</sup> and to provide appropriate assistance to the kind of complexity that creates this pathological state.

### Definition of sepsis

The term *sepsis* was widely used in nursing practice in the past but this word has been misused because of unclear understanding of the meaning, so in 2012 it was defined by the Surviving Sepsis Campaign as: *the presence (probable or documented) of infection together with systemic manifestations of infection.*<sup>7</sup>

The body's response to sepsis is complex: by stimulating the immune system, white blood cells and responses of endothelial cells release cytokines and mediators in turn are activated. These in turn activate a series of physiological changes that include vasodilatation, increased capillary permeability, thrombophilia and decreased fibrinolytic processes. Although the immune response is a protective effect for the organism, the great production of cytokines and mediators damages the endothelial cells, capillary permeability changes and occurs an important vasodilatation with consequent hypotension (severe sepsis).

All these immune responses that occur during the septic state, can lead to multiple organ failure.<sup>1,5</sup> This can be considered a continuum that can evolve from one infection status to multi-organ failure that could lead to death.<sup>8</sup>

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Sepsis is a serious medical condition that can develop in neonatal, pediatric and adult patients.

It can be caused by an infection that may occur in any part of the body and this infection may be caused by different microorganisms, which in 90% of cases are bacteria, but can also be caused by fungal infections or viruses.<sup>5,9-11</sup>

Bacteria associated with sepsis shock may be Gram-negative type [*Escherichia coli*, *Klebsiella* spp., *Enterobacter* spp., *Pseudomonas aeruginosa*, *Serratia*, *Proteus*, *Bacteroides fragilis* (anaerobe)] and Gram-positive type (*Staphylococcus aureus*, *Pneumococcus*, *Alpha-* and *beta-hemolytic streptococci*).<sup>12</sup>

The origin of sepsis is varied, it was found that sepsis of respiratory origin is the most common in the industrialized world<sup>4,5,13-15</sup> with an incidence rate ranging between 35% and 50%, followed by infections of urinary tract, intra-abdominal, catheter-related blood stream infection, device-related, central nervous system and others (e.g., cellulitis, intra-articular).<sup>4</sup>

### Nursing management of septic patient

It is very difficult to identify, especially at early stage, sepsis because of the variability of the symptoms; for example, in 60% of patients with sepsis, the pathological state could present without fever, or in older people, a fall could hide a latent sepsis.<sup>4</sup>

For this reason, the Surviving Sepsis Campaign, in 2012 drew up international guidelines for the identification and management of severe sepsis. Generally, main signs of sepsis are:<sup>2,7</sup> i) fever ( $T^{\circ} >38.3^{\circ}$ ); ii) hypothermia ( $T^{\circ} <36^{\circ}$ ); iii) heart rate  $>90/\text{min}$  (considers patient age); iv) tachypnea; v) altered mental status; vi) significant edema or positive fluid balance; vii) hyperglycemia (plasma glucose  $>140 \text{ mg/dL}$ ) in the absence of diabetes mellitus; viii) leukocytosis [white blood cells (WBC) count  $>12,000 \text{ cells/mm}^3$ ]; ix) leukopenia (WBC count  $<4000 \text{ cells/mm}^3$ ); x) low blood pressure (systolic  $<90 \text{ mmHg}$ , diastolic blood pressure  $<70 \text{ mmHg}$ , data must be associated with the patient's age).<sup>7</sup>

The above-mentioned guidelines have been drafted to give indications to the medical management of the patient in septic state but do not treat the importance of the nursing role in achieving a good outcome for the patient. Expert nurses with advanced skills are needed to identify patients with deterioration of clinical status and to ensure appropriate assistance to patients with sepsis.<sup>2</sup>

A study performed in 2011,<sup>2</sup> identified sixty-three recommendations to guide clinical nurses who care for patients with sepsis. The macro subjects are:

- Prevention of infection: the subject is education of staff which happens to be the first step (fundamental) to raise awareness of the problem and implement

strategies for preventing infection, the accountability which results in the promotion of a culture of patient safety, the continuous surveillance of nosocomial infections, washing hands as evidence suggests that a proper hand washing reduces the rate of infections or alternatively the use of hydro-alcoholic gel and the proper use of those devices that can be vehicles of infection (e.g., mechanical ventilation patients, venous catheter-related infections, surgical-site infections and urinary tract infections).

- Management of infections: the topic is concerned with the identification of the source of infection and the early removal of the infected device or what purports to be a critical step and prevention of transmission of infection among patients, particularly for infections of alert microorganism like methicillin-resistant *S. aureus* or as *Clostridium difficile*.
- The first therapeutic approach: the nurse is responsible for the early recognition of septic state of the patient, clinical monitoring, collection of blood samples and not, administration of the antibiotic therapy, infusion therapy; the role of the nurse is fundamental throughout the patient care process in an area of great collaboration with various professional roles.
- Other nursing support: providing nutritional therapy in critically ill patients because malnutrition is associated with increased morbidity and mortality so that the guidelines suggest starting enteral nutrition in the first 24/48 h, the eye care through hydration with ophthalmologic product, especially in patients in intensive care unit with altered levels of consciousness and who cannot hydrate their corneas and to protect them from dehydration, abrasion, perforation and infection, prevention of pressure ulcers through the mobilization and the use of anti-bedsore devices.<sup>1,2</sup>

For management of sepsis in acute moment, the fundamental approach includes early recognition, appropriate, and timely delivery of antibiotics, controlling the source of infection and adequate resuscitation with intravenous fluids and possibly vasoactive drugs.<sup>16</sup>

In 2014, a project named *The Sepsis Six*<sup>17</sup> was successfully launched to improve management of septic patient. The sepsis six is comprised of three diagnostic and monitoring steps and three therapeutic interventions: i) deliver high-flow oxygen; ii) take blood cultures prior to antibiotics but do not delay treatment; iii) administer empirical intravenous antibiotics; iv) measure serum lactate; v) start intravenous fluid resuscitation with crystalloids; vi) commence urine output monitoring *via* either a catheter or chart.

Generally, sepsis bundles are a great approach to standardize care, and in some cases, to prevent the onset of the sepsis avalanche regretfully, they are no treatment for sepsis.<sup>8</sup>

The bundle implementation should consider: i) performing baseline observation of vital signs: respiration

rate, oxygen saturation (SpO<sub>2</sub>), capillary refill time, heart rate, and blood pressure. Consider the patient's level of consciousness - is he or she alert or drowsy? Level of consciousness is represented by the D - disability of the ABCD approach and refers to disability of the central nervous system;<sup>5</sup> ii) making available the necessary for administered supplemental oxygen therapy *via* a facial mask and necessary for obtaining blood specimens especially blood culture:<sup>5</sup> blood cultures should be taken before antibiotics are given to identify any micro-organisms that may be in the blood. They should be taken from a peripheral vein and from any invasive catheters that the patient may have *in situ*, such as a central venous catheter. Blood cultures, however, are not always positive in patients with severe sepsis;<sup>18</sup> iii) inserting a urinary catheter with an hour urometer that allows the hourly urine volume to be measured - and to obtain a urine specimen;<sup>5</sup> iv) considering pain and discomfort: pain and discomfort are the uppermost stressors for the critically ill, and apparent tissue damage is not a prerequisite for pain. Endotracheal suctioning (if necessary) hurts, prolonged immobilization and routine care are painful, and general intense discomfort of vague origin is common in critical illness;<sup>19,20</sup> pain is one of major issue in sepsis and requires a continuous monitoring;<sup>8</sup> v) observing the patient: to perform half-hourly observations of vital signs and hourly measurement of urinary output;<sup>5,7</sup> vi) considering patient and family comfort/care: to promote patient comfort/pain relief/sedation/turning/skin care; provide patient and family teaching; address needs of families of critically ill patients.<sup>2</sup>

We can also consider these recommendations like the interventions for the main nursing diagnoses identified in patients with sepsis in 2014:<sup>21</sup> the main nursing diagnoses, described according to the NANDA-I taxonomy are: risk for infection, risk for aspiration, risk for impaired skin integrity, impaired skin integrity, impaired spontaneous ventilation, impaired gas exchange.

A fundamental aspect is the condivision of nurses care goal with patients and their family. The literature may want to discuss the prognosis and goals of care such as ask no more than 72 h after admission to intensive care and then by the fact acute. The recommendations emphasize that it is essential to share the clinical situation with the patient and relatives, sharing the therapeutic objectives, flexible hours for the visit of the relatives and the integration of palliative support where necessary. Sometimes, the family of the patient must make a big effort to understand the criticality of the clinical picture and the nurse plays a fundamental role which is recognized by the international literature, to help family members to understand the situation, through continuous reports and talks.<sup>1,22,23</sup>

Generally, for treatment of hospitalized patients with sepsis, it is fundamental:<sup>6</sup> i) to disseminate infor-

mation on the new guidelines to the team members; ii) to include discussion of the guidelines during unit clinical care meetings and clinical rounds; iii) to constitute a multidisciplinary team and outline a timeline for implementing the guidelines; iv) to use the new guidelines as a performance improvement initiative for the Intensive Care Unit as well as noncritical care areas to improve recognition and treatment of patients with sepsis.

Specific areas include: i) aid in the early identification of sepsis including recognizing patients at risk for developing sepsis (patients who are elderly, immunocompromised, patients with surgical/invasive procedures, indwelling catheters, mechanically ventilated patients) and monitoring physical assessment parameters including vital signs and perfusion status (urine output, mental status changes, skin color); ii) to provide comprehensive sepsis treatment (circulatory support with fluids, inotropes, and vasopressors; supportive treatment with oxygenation and ventilation; antibiotic administration; sepsis guideline recommendation measures; monitor and report patient response to treatment); iii) to promote patient and family centered care (patient and family teaching, addressing the needs of families of critically ill patients, setting goals of care, and holding family care conferences to discuss goals of care).

It can be said then that nurses have a very specific and crucial role throughout the diagnostic and therapeutic process of the patient with sepsis. Guidelines and recommendations in the literature can help the nursing staff in developing information and to provide nursing care based on solid evidence to help achieving optimal patient outcomes.

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