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Hi everyone, my name is Megan Doble, and I'm an acute care nurse practitioner, and work in an ICU and also do freelance clinical editing for Lippincott NursingCenter. I also teach healthcare policy and advanced pathophysiology to Masters' level nursing students.

In this podcast, I am going to review the basics of sepsis and discuss the latest recommendations on managing patients with sepsis at the bedside.

A key message about sepsis is that it is and should be treated as a life-threatening medical emergency. Mortality associated with sepsis is higher than that of acute MI, trauma, or stroke; worldwide, deaths occur between 1 in 3 to 1 in 6 of those affected by sepsis or septic shock. Early recognition and early intervention, specifically within the first hours after the development of sepsis are the foundation of sepsis management and bedside nurses are in an ideal position to improve sepsis care and outcomes for patients diagnosed with sepsis and septic shock.

Nurses are with patients 24 hours a day and are best able to detect an acute change in clinical status. The Surviving Sepsis Campaign, which for those of that haven't heard of it, is a joint initiative between the SSCM and European Society of Intensive care Medicine with a goal of reducing morbidity and mortality related to sepsis. This organization promotes nursing involvement in detecting sepsis and suggests nurses screen "every patient, every shift, every day," for clinical changes associated with sepsis. Identifying minute clinical changes in a patient with an infection such as a decrease in blood pressure, a fever, increased heart rate, increased respiratory rate, or a change in mental status is a critical element in early detection of sepsis and promotes prompts recognition and treatment, which is the foundation for surviving sepsis.

Now to move on to more details about sepsis, I am going to start by reviewing current definitions of sepsis, then I'll discuss the basics of sepsis pathophysiology, and finally, we will review current patient care recommendations.

So what exactly is sepsis? Over the years, as sepsis has become better understood, definitions have evolved to reflect the latest knowledge. The most recent sepsis guidelines were released in 2021 however, with this release, the current definition has not changed. This most recent definition was released in 2016; this is term the Sepsis-3 consensus definition; and defines sepsis as "life-threatening organ dysfunction due to a dysregulated host response to infection." and septic shock as "a subset of sepsis in which profound circulatory, cellular, and metabolic abnormalities substantially increase mortality." Clinically, patients with septic shock are those who require vasopressors to target a mean arterial pressure of 65 mm Hg or higher in the absence of hypovolemia.

The major change in these definitions as compared to the 2001 definitions was the elimination of the term severe sepsis and the elimination of the term SIRS (or systemic inflammatory response syndrome). Several concepts led to the simplification of the definitions. The task force felt the older definitions which included SIRS, sepsis, severe sepsis and septic shock, lead to a misleading impression that sepsis followed a continuum which is not the case;

SIRS is not a precursor to sepsis. The SIRS criteria, HR > 90, temp > 100.4 or less than 96.8, WBC > 12,000, RR > 20, are not specific to sepsis, these criteria can be present in many clinical conditions including underlying lung disease or cardiac disease; furthermore, the abundance of terms was felt to be confusing and redundant in that the term severe sepsis incorporates criteria for sepsis and septic shock. You may still hear some of these terms in practice, but they are no longer relevant based on the most updated literature and experts on sepsis.

So now, we have a definition of sepsis, but what does “life-threatening organ dysfunction due to a dysregulated host response to infection” mean?

For the purposes of this talk, I will provide an oversimplification, but hopefully, it will impart the necessary framework to understand sepsis.

We know that any time the body is exposed to a pathogen (bacteria, viruses, fungus, or parasites), the innate immune system responds with the goal of controlling the infectious invasion and repairing injured tissue by means of rapid recruitment of immune cells to the site that has been compromise. In general, this reaction is localized. The immune response is accomplished partially through the activation of phagocytic cells (dendrites, macrophages, monocytes, neutrophils), leukocytes, and chemical mediators (complement factors, kinins, clotting factors, cytokines and chemokines); these chemical mediators can be pro-inflammatory or anti-inflammatory with the latter responsible for keeping inflammation in check and preventing a diffuse/systemic reaction.

A normal response to an activated immune response can include, localized inflammation/swelling, pain, malaise; physiologically you may see increased heart rate, increased respiratory rate, and fever. This is not sepsis, but rather a normal response to infection.

Dysregulation of this finely tuned system with the presence of infection is the etiologic mechanism of sepsis. In this setting, there is excess release (or over-manufacturing) of both pro and anti-inflammatory cytokines however the impact is primarily a result of unregulated production of proinflammatory mediators. In this environment, immune complexes including cytokines leave the local site of infection and spread systemically exaggerating a patient’s response to infection.

This cascade is driven by circulating pro-inflammatory mediators and can lead to diffuse vasodilatory effects which can cause systemic hypotension, increased capillary/vascular permeability, hemoconcentration, macromolecular extravasation, Capillary leakage leads to release of histamine and prostaglandin which can cause protein-rich edema and swelling. This cascade also leads to dysregulation of the clotting system and cause immunosuppression. In whole the outcome of this dysregulation leads to tissue ischemia, microvascular damage, and ultimately end organ damage.

So that gives you some background on the pathophysiology of sepsis. It is also imperative to understand that sepsis cannot occur if there is not an underlying infection however, we do not always know what type of infection precipitated the septic reaction and why certain people develop sepsis or septic shock and others will not. Bacterial infections are the most likely to cause sepsis. Those patients at highest risk are the very young, older adults, and those with an impaired or weakened immune system. Although some types of infections are associated with a higher risk of developing sepsis, two people may have the exact same pathogen and only one of them develops sepsis. There is thought to be an underlying genetic predisposition, that makes some people making them more likely to develop sepsis.

So next we will move on to patient care. The treatment of sepsis focuses on infection control, hemodynamic support and prevention of end organ damage. And what we mean by prevention of end organ damage is, you know, managing hypertension, managing hypoperfusion.

So if somebody's blood pressure is low, we are not going to be able to support their other organs. So we want to keep that MAP above 65, either through fluid or vasopressors, and that's going to help prevent worsening renal failure. It's going to improve perfusion to the brain, perfusion to the organs, and we'll get into that in more detail.

But when you hear end organ damage, those are the systems you're supporting, your vital organs to prevent further damage. Understanding the recommendations at times can be confusing. There's constant change in response to discovery of new knowledge and ongoing research. So as a nurse, it's important to know what's out there. And also if you're somebody that works with septic patients, often just understanding or keeping abreast of current literature, current research.

The two main components you should be aware of when looking for guidance on sepsis, both of which are published by the Surviving Sepsis Campaign, are their evidence-based consensus guidelines on the management of sepsis and septic shock. The most recent version of these, released in 2021. And then there are also patient care bundles, and these are constantly being updated.

It started with a six hour and three hour bundle. The most recent were released in 2018, and the most recent one is called the hour one bundle. So first, we will talk about these care bundles. So the hour one bundle was first introduced in 2018 and it combined elements of the older bundles with an emphasis on sooner care.

These are currently the accepted bundle for patient care in the hospital setting in the United States. So the first… there's five of them.

1. The first is measure lactate and remeasure at the initial lactate is elevated at greater than 2 mmol/L;
2. Obtain blood cultures prior to administering antibiotics.
3. Administer broad spectrum antibiotics.
4. Administer fluid resuscitation at a rate of 30 miles per kilogram for hypertension or in patients with a lactate greater than 4 mmol/L on initial lactate.
5. And lastly, it's the addition of vasopressors if hypotension during or after fluid resuscitation persist with a goal MAP of greater than or equal to 65 mm Hg.

So these are five elements. You know, as a bedside nurse, you may not be directly ordering these. However, it's very important with respect to morbidity, mortality that you're aware of them and ensure that these measures are taking place with patients with suspected or true sepsis or septic shock. I will mention that when the one hour bundle was initially released, there was some pushback from the clinical community.

There was concern that it would promote harm when not combined with sound clinical judgment. There was concern that a push to implement these interventions within an hour could lead to rushed medical decisions. Overuse of antibiotics or overaggressive fluid resuscitation without taking into consideration other underlying diseases that could be exacerbated by excess volume. So that's primarily for patients with heart failure that can't tolerate fluid.

Others argue that the measures and recommendations were not supported by quality evidence. The Society of Critical Care Medicine and the American College of Emergency Physicians initially recommended that hospitals not implement the one hour bundle. However, this was eventually overturned and the hour one bundle is currently being used with the caveat that individual clinical judgment is imperative and the foundation of management of sepsis.

The hour one bundle following some of the controversies…there were four elements that were added. And if you look at the Surviving Sepsis Campaign online, you'll see this as a kind of an infographic below the hour one bundle. But it's number one is act quickly upon sepsis and septic shock recognition, minimize time to treatment. Two… sepsis and septic shock are medical emergencies. The third is monitor closely for a response to intervention. And number four is communicate sepsis status and handoffs between nurses. And then there's an Asterix. That's all elements of the hour one bundle may or may not be completed within the first hour after sepsis recommendation. So that's put in there to express that. It's not a rush to get them done.

But these are measures that should take place. And so the last element that I'll discuss in this podcast are the most recent clinical care recommendations from that were released in 2021. So the key measures that they highlighted were focused on antibiotics and IV fluids. However, there were 93 recommendation statements. So we will just cover a few that I feel are most imperative to your work as bedside nurses.

The first component is with respect to antibiotics. So the recommendation is if shock is present, broad spectrum antibiotic should be administered immediately and ideally within an hour if sepsis is definite, probable or suspected. However, if shock is absent, a broad spectrum, antibiotics should be administered immediately. If it's definite or probable sepsis, if there's suspicion of alternate etiologies, there should be a rapid assessment, including history and clinical examination for infectious and noninfectious causes of acute illness.

You know, we're looking for other causes for sepsis after this rapid assessment. If there's no alternative explanation, then antibiotics should be administered within 3 hours. If you're truly concerned for acute infection and sepsis with respect to initial fluid resuscitation, the new guidelines say that for patients with sepsis induced hypo perfusion or septic shock, you should administer 30 mL/kilogram of a balanced crystalloid within the first 3 hours of resuscitation.

So when they say balance crystalloids, in general, the ones that we most commonly use are normal sterile saline or lactate ringer's. A balanced crystalloid is Lactated Ringer's or plasmalyte. And the concern there is the high sodium and chloride content of normal saline. So the new guidelines from 2021 endorse Lactated Ringer's, which is more commonly available. Plasmalyte is available in some facilities, and that's also considered balanced.

Another new recommendation is that we use restrictive instead of liberal use of I.V. fluids in those with signs of hypoperfusion and volume depletion. After our initial resuscitation. And what this means is that instead of just continuing to get fluid that we reassess, look for signs of, you know, fluid causing harm rather than more good and really in the earlier introduction of vasopressors.

With respect to vasopressors, the recommendation is norepinephrine as a first line vasoactive agent. And that's not new. That has been the recommendation throughout the first two sets of guidelines. However, a newer recommendation is that you may administer norepinephrine peripherally to restore them rather than delaying initiation until the central line is secured.

Another new recommendation is with respect to oxygen. The recommendation is for sepsis induced hypoxic respiratory failure, that high flow nasal cannula be used over other noninvasive ventilation strategies such as CPAP or BiPAP.

They added a new recommendation against IV vitamin C, and this is not something that's in typical practice. But I believe over the past couple of years there is more research investigating it and they felt strongly that it should not be used.

Another change is there's a recommendation against use of the Qsofa or the quick sequential sepsis related organ failure assessment as a single screening tool for sepsis. So what this recommendation involves, you know, there's many screening tools for sepsis. We have the Qsofa, there's the SIRS criteria, there's the NEWS, which is national early warning result, or the MEWS, which is the modified early warning result.

So that what this recommendation did was take the emphasis off of the Qsofa and really encourage clinical judgment and use of discrete clinical factors. So, you know, as a bedside nurse, you're still going to be looking at heart rate, fever, high respiratory rate, white count, you know, the components of all of these, but not as a yes or no checkmark or to determine if a patient has sepsis.

So, again, a lot of times this just goes back to clinical judgment, which is what you're doing as nurses at the bedside all the time. But it's just not packaged into one screening tool. And I think that was kind of the overall goal of taking recommending against this one agent over others for sepsis screening. So given all of this information, the bedside nurses most important role is truly recognition of clinical changes associated with the deterioration in clinical status.

So using your clinical judgment, knowing what the management strategies are and ensuring that your patients have access to and have orders for these effective management strategies that have been shown to decrease morbidity and mortality related to sepsis and septic shock. Really, the take home message is again, recognize that sepsis is a medical emergency. Early recognition and treatment can prevent death. Continue to gain expertise in sepsis, clinical recommendations and bundles so that you're confident in advocating for your patient and when you present these small clinical changes that are the precursors to sepsis and that you have the data and evidence support in your concern. So I truly

appreciate you listening. For more information on sepsis, be sure to check out our sepsis pocket guides, guideline summaries, journal articles, and blogs on NursingCenter. Thank you for listening today and I hope you were able to gain some new information on sepsis.

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