Preventing Sepsis Mortality

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Abstract

This research paper explores recent evidence based research on preventing sepsis mortality in inpatient units. Sepsis mortality is an increasing problem in the state of Kentucky and demands immediate intervention. At Baptist Health Paducah, 44 deaths were related to sepsis in a 5-month period. Most deaths related to sepsis can be prevented. This research looks at how these deaths can be prevented and how nurses must change their practice to avoid further mortality from sepsis. This paper includes a literature review of recent research proving that sepsis mortality can be prevented by focusing on discharge teaching to all patients, implementing "code sepsis" in the facility, looking at trends in vital signs over time and strict compliance with sepsis protocols.

Preventing Sepsis Mortality

According to the Center for Disease Control (2014), more than one million people are diagnosed with sepsis every year, and 28-50% of those cases result in death. In Kentucky, 16.1% of deaths are related to sepsis. That's 6% higher than the national average of 10.7% (CDC, 2014). Evidence based research shows that early detection and aggressive treatment of sepsis result in more optimistic outcomes. In a recent sepsis meeting at Baptist Health Paducah (BHP), it was identified that 44 people had died from sepsis at this facility in the last year. Factors that can reduce sepsis mortality include compliance with strict protocols, early detection and aggressive treatment of sepsis, looking at trends in vital signs, and educating patients before they are discharged about preventing sepsis to prevent hospital readmissions.

Sepsis is defined by the CDC as, "a complication caused by the body's overwhelming and life-threatening response to an infection, which can lead to tissue damage, organ failure, and death" (2016). Anyone can acquire sepsis from any infection in any part of the body. Sepsis is most commonly caused by "infections of the lungs, urinary tract, skin, and gut" (CDC, 2016). Since inpatient units typically see patients with these infections, sepsis is prevalent and the prevention of and early treatment of sepsis must be a priority to all staff members.

Process Description

Currently at BHP, there is a sepsis protocol in place on all units. The sepsis checklist includes specific identifiers that place someone in a category of sepsis. These identifiers are: suspected infection source; SIRS (temp >100.9 or <96.8, HR >90, RR>20, WBH>12,000 or <4000); and organ dysfunction (SBP<90, MAP<65, Acute respiratory failure, Creatinine >2.0, Bilirubin>2.0, platelets <100,000, INR >1.5 or ptt>60 seconds, or lactate >2.0). If the patient

falls into any of these categories, the nurse begins the sepsis protocol at "time zero." Time zero begins when the patient meets the criteria. Within 60 minutes of time zero the initial lactate level should be drawn. If the lactate is greater than 2 at this time, the lactate should be repeated within 4 hours, blood cultures should be drawn, and a broad spectrum antibiotic should be initiated (Baptist, 2017). A copy of this protocol can be located in the Appendix A.

When a nurse at this facility suspects sepsis, he/she is to contact the physician and ask for sepsis labs to be drawn (lactate, blood cultures) and for an antibiotic to be ordered which must begin within 60 minutes from time zero. The nurses at BHP have expressed barriers to this process. The most common complaint among nurses is that the physician doesn't order the lactic acid lab in time or doesn't believe that the patient may be septic, which prolongs the process.

The nurses at this facility also feel as though they cannot get the sepsis protocol initiated and/or completed in a timely manner due to many reasons. The main reason for failure to initiate the sepsis protocol is that the physician doesn't order the labs, but they also run into issues in prioritizing care and feeling as though they need to take care of a patient that is more sick right now than the patient who may have sepsis.

Theoretical Framework

Ida Jean Orlando's nursing theory explains the role of the nurse and the importance of meeting the patient's immediate need for help. To be successful at meeting the patient's immediate need for help, the nurse must first assess the patient. Ida Jean Orlando (1990) describes the three elements of the nursing process as, "the behavior of the patient, the reaction of the nurse, and the nursing actions which are designed for the patient's benefit" (p 36). When a patient has sepsis the nurse must treat each patient on an individual basis and assess them thoroughly. Orlando emphasizes the importance of the nurse physically assessing the patient and

using his/her best clinical judgment to treat the patient. Furthermore, Orlando emphasizes that the nurse must continually reevaluate the patient's status to decide if the nursing intervention was successful or if the patient requires further treatment. This is crucial in treating the patient with sepsis. The nurse must continue to assess the patient for improvement or deteriorating status and communicate that with the physician promptly.

Evidence

The nurse must be able to recognize the signs and symptoms of sepsis. According to the sepsis fact sheet found on National Institute of General Medical Sciences, "the common signs and symptoms of sepsis are fever, chills, rapid breathing and heart rate, rash, confusion and disorientation" (NIGMS, 2017). In the critical care units, sepsis is harder to identify due to the patient's already poor condition. The nurses on these units must be highly aware of these sepsis signs, their patient's individual status and initiate the sepsis protocol immediately.

Time is of the essence when treating sepsis. According to Jody Vaughan and Andy Parry in Assessment and management of the septic patient, "for every hour delay in treatment, mortality risk increases by 7.6%" (p 1198). It is vital that the nurses and physicians communicate at the first sign of sepsis and that labs are ordered. Implementing a "code sepsis" could be beneficial in improving communication between staff members and result in a quicker response time by physicians and nurses. In a study looking at ten different sepsis bundles, the group labeled "code SMART" had a higher compliance than the other sepsis bundles. Not only was the compliance higher in the "code SMART group" but the survival rate at discharge was higher than any of the other groups. When a nurse suspected that a patient had sepsis he/she called "code SMART" over the overhead the facility. The team that responded to this code included an

"ICU physician, ICU nurse, respiratory care practitioner and pharmacist" (LaRosa, Ahmad, Feinberg, Shah, DiBrienza, & Studer, 2012, p 2).

Furthermore, the entire staff should be educated on the basic signs and symptoms of sepsis and be prepared to help initiate the sepsis protocol. In a research study by Doerfler, et al. (2015), North Shore-LIJ Health System implemented teaching to not only nurses, but clinical support staff and even clerical staff to help decrease mortality rates from sepsis. For example, when they called a "code sepsis" the clerical worker was responsible for calling the pharmacy and informing them of the possible need of antibiotics as soon as possible. In addition, the nursing assistants were educated on signs and symptoms of sepsis and were aware of vital signs that may need to be reported to the nurse. The results of this study showed that by including all staff members in the sepsis code, mortality from sepsis at North Shore-LIJ decreased by "approximately 50% and increased compliance with sepsis resuscitation bundles" (p 208).

Often when assessing patients for sepsis the provider is looking only at vital signs for that moment or the most recent vital signs that were recorded. For example, if a patient's heart rate is not greater than the protocol of 90 then the system will not flag that this patient is becoming septic and the provider will not initiate the protocol. In a recent study by Quinten, Meurs, Maaten, & Ligtenberg, the authors discovered that in the septic patient the vital signs begin to form a trend before the system may flag this patient as septic. Therefore, if the nurse is not looking at the trend of vital signs over a period of time he/she would not notice the deteriorating trend in vital signs. Specifically, the authors found that the blood pressure of the patients who had sepsis decreased, the heart rate increased, the MAP decreased, and the temperate increased before the patient's vital signs actually fell into the protocol parameters (Trends in vital signs, 2016).

Eighty percent of sepsis cases begin outside of the hospital and this is the highest reason for hospital readmissions (NIGMS, 2017). This hospital currently does not have a requirement for discharge patient teaching on sepsis. By teaching patients about the signs and symptoms of sepsis and explaining that sepsis is a medical emergency, sepsis readmission rates could decrease. According to a recent study that looked at 30-day readmission rates, sepsis was the number one reason for readmission and the costliest. The average cost for a patient readmitted because of sepsis was $10,070 (Mayr, F. B., Talisa, V. B., & Balakumar, V., 2017). When a patient at BHP is readmitted due to a sepsis diagnosis, the hospital must pay for that patient's stay. In an investigation looking into 30 day hospital readmissions and ways to prevent those readmissions, Leppin, Gionfriddo, & Kessler (2014) implemented interventions to prevent readmission such as discharge planning that was individualized to each patient, a telephone follow up, patient-directed patient education, home visits, a patient hotline where patients could access healthcare workers for their questions related to their illness, and other interventions specialized to each patient such as meetings with the caregiver and education for them. Organically the authors found that the readmission rate related to sepsis among investigated facilities was 82%. "Implementing interventions that are complex, involve more individuals in the care delivery, and support patient capacity for self-care are 1.4, 1.3, and 1.3 times more effective than other interventions" (p 1095).

Proposed Procedures

First and foremost, the nurses must become experts at recognizing the early signs and symptoms of sepsis. This can be implemented throughout the hospital through regular education opportunities and simulation labs. New nurses should participate in extra training for sepsis identification and how to proceed with the sepsis protocol.

In addition to assessing the patient for sepsis signs and symptoms, the nurse should look at the patient's vital signs over time. The nurse can do this simply in EPIC by pulling up the patient's vital signs over the past 24 hours. If the nurse notices a decline, even if it is not within the sepsis protocol, he/she should communicate this concern to the physician and proceed with the sepsis checklist. To ensure that nurses are following this protocol the patient's trend of vital signs over the last 24 hours should be printed and posted in each patient's room so that the nurses can seamlessly handoff the patient at shift change and continue to monitor the trend in vital signs.

The entire staff should be involved in sepsis management; this will address the issue of not having enough time, or the physician not ordering the labs in time. This begins with the nursing assistants/technicians/aids. These clinical support staff members often spend more time at the bedside than nurses and physicians. The support staff should be educated on vital signs that should be reported to the nurse immediately. Once the nurse is notified he/she will call the "code sepsis." Code sepsis will notify the physician of the patient's deteriorating condition, the pharmacy will be notified that the floor will need antibiotics soon, and the facility can proceed with their protocol. Code sepsis will improve compliance with the sepsis protocol as it did in the study by LaRosa et al (2012).

When a patient is discharged from the hospital because of any infection, they will receive teaching about the signs and symptoms of sepsis and how to proceed with medical help. The nurse should spend time educating the patient, not only giving them a printout to take home, but spending extra time explaining what sepsis is and why it is an issue. An example of the issues that the nurse should go over with the patient are included in the Appendix B.

Implementation into Practice

Currently at this facility there is a sepsis team that meets monthly and works diligently to prevent sepsis. To implement the new protocols, the sepsis team would first be informed of the change. These team members include the directors of every floor at the facility, infection control, quality control, research, and a physician. The directors will then hold a meeting with their charge nurses and educate them about the new policy. The charge nurses will educate staff nurses on when to call a code sepsis and how to respond. The physician will educate the hospitalist team and other physicians that work at the facility about the change and how they will respond when a "code sepsis" is called. Once every member of the healthcare team has been educated on code sepsis the code can be implemented.

Since this is a multitude of changes and new procedures it will take time to implement throughout the entire hospital. The implementation will start in the critical care units. The nursing assistants will be trained on what vital signs to report to the registered nurse. The nurses will be trained on early recognition of sepsis including looking at the trends in vital signs. The printout of vital signs will begin to be posted in each patient's room immediately since this is an easy implementation. The nurses will be educated on what to include on discharge to every patient that is being discharged, a handout can be found in appendix B. Each patient should receive this handout and it should be explained to them at discharge. The patient should understand that sepsis is a medical emergency. The patient should also receive a number that the unit can be reached if they have questions.

Conclusion

Sepsis is a concern not only at the hospital in this study but across all hospitals in Kentucky. The sepsis rate is higher in Kentucky than the national average and the mortality rate from sepsis has increased 31% since 1999 (CDC, 2014). There is evidence based research that proves nurses have a role in improving the outcomes of sepsis by implementing interventions related to early recognition and treatment of sepsis. The barriers to completing the sepsis protocol must be addressed and compliance rates must improve. It is essential that the nurse is diligent in assessing each patient for sepsis and continuing the assessment throughout care. The nurse must also be willing to spend time with each patient at discharge to prevent readmission due to sepsis. Along with the nurse's important role in preventing mortality from sepsis, the healthcare team can work together to improve sepsis recognition and outcomes.

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Appendix A

Baptist Health Paducah Severe Sepsis Checklist

BAPTIST HEALTH PADUCAH

Severe Sepsis Checklist

PLACE PATIENT STICKE
HERE

For Patients 18 Years and Older NOT part of permanent record KEEP CHECKLIST in chartlet	Initial Correct Box			
Indicator	**Yes**	**No**	**N/A**	**Comments**
Identify Severe Sepsis = 1. Infection source (suspected or Clinical) 2. SIRS (Temp >100.9 or <96.8, HR>90, RR>20, WBH>12,000 or <4000 or Bands >10%) 3. Organ Dysfunction – any one (SBP<90, MAP<65, Acute Resp Failure, Creat>2.0,Bili>2.0, Plat<100,000,INR>1.5 or Ptt>60sec, Lactate>2.0)				
Time Zero Date: _____Time: _____ *The clock starts as soon as the patient meets these criteria – it does **NOT** wait for the next sepsis screen documentation*				
Physician notified for STAT orders: Lactate, Bld cultures, antibiotic, fluid bolus				
Within 60 minutes of Time Zero:				
Initial Lactate level drawn LA: _____				
***If greater than 2, be sure repeat Lactate drawn within 4 hours: LA: _____				
Blood Cultures obtained (prior to antibiotic)				
Broad Spectrum antibiotic initiated *Refer to list of accepted antibiotics on page 2 *Notify Pharmacy for STAT delivery of antibiotics *If multiple antibiotics orders, administer shortest infusion time first				
At any point when SBP < 90, MAP < 65 or Lactate >/= 4:				
Fluid bolus administered *30 ml/kg (Wt in kg ____ x 30 = _____ ml) NS or LR				
Chart both start and end times of bolus Start time: _____ End time: _____				
Monitor BP and lung sounds frequently during fluid bolus				
Document at least 2 consecutive B/Ps within the hour after end time of fluid bolus Time _____ B/P _____ Time _____ B/P _____				
If SBP remains < 90, MAP < 65 or Lactate >/= 4 after bolus **Patient is in SEPTIC SHOCK*				
Physician notified for STAT orders: Vasopressor				
Vasopressor initiated				
Provider reminded to complete Focus Exam *or* Tissue Perfusion Assessment *refer to required elements on page 2				

Severe Sepsis Checklist

Components of Focus Exam : (**all** components must be documented by physician, PA, APRN)	Components of Tissue Perfusion Assessment (must document **2** of the following)
-VS (T/P/R/BP) -Cardiopulmonary Exam -Capillary Refill -Peripheral Pulse Evaluation -Skin color exam	-CVP -ScVO2 -Bedside Cardiovascular Ultrasound -Passive Leg Raise -Fluid Challenge

Broad Spectrum Antibiotics: (includes trade & generic name)

Antibiotic Monotherapy

Ampicillin/sulbactam	Ceftolozane/tazobactam	Invanz (Ertapenem)	Primaxin (Imipenem/Cilastatin)
Avelox (Moxifloxacin)	Ceftriaxone	Levaquin (Levofloxacin)	Rocephin (Ceftriaxone)
Avycaz (Ceftazidime/avibactam)	Claforan (Cefotaxime)	Levofloxacin	Teflaro (Ceftaroline fosamil)
Cefepime	Doribax (Doripenem)	Maxipime (Cefepime)	Ticarcillin/clavulanate
Cefotaxime	Doripenem	Meropenem	Timentin (Ticarcillin/clavulanate)
Ceftaroline fosamil	Ertapenem	Merrem (Meropenem)	Unasyn (Ampicillin/sulbactam)
Ceftazidime/avibactam	Fortaz (Ceftazidime)	Moxifloxacin	Zerbaxa (Ceftolozane/tazobactam)
Ceftazidime	Imipenem/Cilastatin	Piperacillin/tazobactam	Zosyn (Piperacillin/ tazobactam)

Antibiotic Combination Therapy

Column A	**Plus**	**Column B**
Aminoglycosides OR Aztreonam OR Ciprofloxacin		Cephalosporins (1st and 2nd Generation) OR Clindamycin IV OR Daptomycin OR Glycopeptides OR Linezolid OR Macrolides OR Penicillins

Column A	**Column B**		
Aminoglycosides	**Cephalosporins**	**Daptomycin**	**Macrolides**
Amikacin	**(1st and 2nd Generation)**	Cubicin (daptomycin)	Azithromycin
Garamycin (gentamicin)	Ancef (cefazolin)	Daptomycin	Erythocin (erythromycin)
Gentamicin	Cefazolin		Erythromycin
Kanamycin	Cefotan (cefotetan)	**Glycopeptides**	Erythroped (erythromycin)
Kantrex (kanamycin)	Cefotetan	Targocid (teicoplanin)	Ketek (telithromycin)
Nebcin (tobramycin)	Cefoxitin	Teicoplanin	Sumamed (azithromycin)
Tobramycin	Ceftin (cefuroxime)	Telavancin	Telithromycin
Aztreonam	Cefuroxime	Vancocin (vancomycin)	Xithrone (azithromycin)
Azactam (aztreonam)	Mefoxin (cefoxitin)	Vancomycin	Zithromax (azithromycin)
Aztreonam		Vibativ (telavancin)	
Ciprofloxacin	**Clindamycin IV**		**Penicillins**
Cipro (ciprofloxacin)	Cleocin (clindamycin)	**Linezolid**	Ampicillin
Ciprobay (ciprofloxacin)	Clindamycin	Linezolid	Nafcillin
Ciprofloxacin		Zyvox (linezolid)	Oxacillin
Ciproxin (ciprofloxacin)			Penicillin G

Appendix B

Patient handout at discharge