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Intensive Care Unit Nurse Education to Reduce Sepsis Mortality Rates

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Walden University
2018

Abstract

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MSN, Walden University, 2013

BSN, Walden University, 2013

Project Submitted in Partial Fulfillment

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Doctor of Nursing Practice

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Abstract

Sepsis causes major health care problems in the United States, resulting in long hospitalizations, complications, and even patient death. Lack of nursing knowledge regarding sepsis signs and symptoms is a significant problem at a hospital in the northeast. Local hospital data showed a high patient mortality rate for patients diagnosed with sepsis. The purpose of this project was to develop an educational module on sepsis for intensive care nurses. The educational module was developed using current sepsis evidence-based guidelines. The practice-focused question for the project asked whether an educational module on sepsis would increase the intensive care nurse's knowledge on sepsis recognition and treatment guidelines. The adult learning theory was used as a conceptual model to guide project development. After development, the educational module was evaluated by a panel of 8 experts, including a nurse educator, infection control nurse, a charge nurse, a staff nurse, and an infectious disease physician. Program content evaluations included a 10-question pretest/posttest questionnaire completed by each panel member. Program content was modified based on pretest/posttest results. Results of the panel evaluation indicated agreement that the sepsis module content would benefit nurses on sepsis recognition and management for patients. Improving nursing knowledge on sepsis can provide a positive social change to improve patient outcomes, including mortality rates and complications from sepsis.

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Section 1: Nature of the Project

Introduction

Sepsis is the 10th leading cause of death in the United States, with approximately 750,000 new cases diagnosed per year (Turi & Von, 2013). Sepsis causes major health care problems in the United States, resulting in long hospitalizations, complications, and even patient death. It is important for nurses to recognize the early signs and symptoms of sepsis. Khan and Divatia (2010) stated that rapid diagnosis and effective management of sepsis signs and symptoms are critical for successful patient treatment. Nurses are expected by healthcare organizations to recognize the early symptoms of sepsis and initiate appropriate therapeutic interventions when caring for patients (Dellinger & Moreno, 2013). Guidelines for Management of Sepsis and Septic Shock are used by health care providers to guide the treatment of sepsis and septic shock and to prevent this serious medical emergency. The guidelines emphasize early sepsis recognition and resuscitation and treatment when the condition is recognized. Hospitals are encouraged to implement the guidelines and educate hospital staff in their use (Turi & Von Ah, 2013). According to Turi and Von (2013) some hospitals have difficulty implementing sepsis protocols due to lack of compliance with the guidelines. The noncompliance may have many causes such as lack of education and knowledge of guidelines (Turi and Von, 2013). Therefore, there is a need to educate nurses working in an acute care setting where patients may be at risk for sepsis and septic shock. Because patients can deteriorate rapidly when sepsis occurs, it is critical to identify sepsis early. Lack of nursing knowledge regarding sepsis signs and symptoms is a significant problem that can be

addressed by health care team education. Section 1 of this study includes the problem

statement, purpose statement, nature of the doctoral project, significance, and a summary.

Problem Statement

The problem identified for this doctor of nursing practice (DNP) project was that

the local hospital data showed a high patient mortality rate in the intensive care unit

(ICU) due to sepsis. The inpatient severe sepsis mortality rate in the hospital was

approximately 30%, whereas national ratings ranged from 20% to 50% (Leonard, 2016).

The mortality rate from sepsis in this hospital in the northeast required serious attention,

because nearly 28% of patients who developed the bacterial blood infection died from it

in 2014 (Leonard, 2016). Although deaths from sepsis decreased in the 3 years before this

project, the problem continues in recognizing sepsis signs and symptoms, because nurses

do not have comprehensive knowledge about early management and resuscitation of

patients with sepsis or septic shock (Yousefi, Nahidian, & Sabouhi, 2012).

To address the need for nurse education on sepsis recognition and treatment, I

developed an education module for the ICU nurses. The education program was based on

evidence-based practice sepsis guidelines and provided for nurses at the practice site. The

education module allowed nurses to apply their knowledge in decision making and

clinical judgments in recognition and treatment of sepsis. Furthermore, these nurses had

an opportunity to reflect on their mistakes because the education module highlighted the

challenges faced by nurses in dealing with signs and symptoms of sepsis; furthermore,

the education model provided information about early management and resuscitation of

patients with sepsis or septic shock (Miller et al., 2013).

This education module covered sepsis pathophysiology, sepsis bundles for ICU nurses, and the 2016 sepsis guidelines. Daniels (2011) stated that when identification and treatment of sepsis is delayed, then more in-depth education about sepsis is required due to the higher rates of mortality and morbidity. To reduce mortality and gain better outcomes, it is important for ICU nurse to have proficient knowledge regarding the Surviving Sepsis Campaign guidelines. An International Committee of Healthcare practitioners and facilities launched the Surviving Sepsis Campaign Guidelines (2008) in 2012 and updated the guidelines in 2014 and 2016.

Purpose Statement

The purpose of this DNP project was to determine whether an education module on sepsis signs and symptoms increased the ICU nurses' knowledge of sepsis recognition and the use of evidence-based practice. Generally in hospitals, the sepsis guidelines are not followed by the nurses and nurses may not be aware of all the implications of the guidelines. This project will help to fill this gap in practice. The 2016 Surviving Sepsis Campaign guidelines were emphasized in the nursing education module with information on using the sepsis bundle provided to the nurses. The current evidence-based practice guidelines were applied to the diagnosis and treatment of patients with sepsis in the hospital ICU setting. Nurses can be instrumental in saving the life of an individual at risk from sepsis. ICU nurses need to have the knowledge and skills to identify patients with sepsis and to implement appropriate treatment. The sepsis education module focused on providing ICU nurses with knowledge of sepsis signs and symptoms recognition and the evidence-based practice guidelines. The practice-focused question for this project was:

Will participating in an educational module on sepsis increase the ICU nurse's knowledge of sepsis?

Nature of the Doctoral Project

This project was an educational intervention developed to improve nurses' awareness of the Evidence-Based Practice Guideline for sepsis diagnosis and treatment. I used a pre-post evaluation design to determine the change in the nurse's knowledge of the key educational concepts presented in the education program. The design allowed me to evaluate the effectiveness of the education program. Through this project, I intended to bring to a change the nurses' knowledge of sepsis.

Significance of the Project

Approximately 750,000 patients per year are diagnosed with sepsis in the United States (Wang, Devereaux, Yealy, Safford, & Howard, 2010). There are approximately 200,000 US sepsis deaths annually, underscoring the magnitude and importance of this process (Wang et al., 2010). Nurses play a vital role in recognition of early signs and symptoms of sepsis in patients. Nurses provide ongoing patient monitoring in the ICU and often note subtle patient changes which may indicate early signs of sepsis. Therefore, they need to know about the clinical signs and laboratory values that specify sepsis in a patient (Cooper, 2009). Recognizing early signs and symptoms of sepsis early may affect the care of the patient with sepsis (Dellinger et al., 2013). Currently, many hospitals screen patients for sepsis through an automatic computer prompt twice a day. Nurses are required to use screening tools to assess current signs, risk factors, and patient conditions of sepsis. Sepsis detection can improve using screening tools (Cooper, 2009). An overall

understanding of sepsis pathophysiological is important to recognize the variations in the patient's condition and symptoms of sepsis. The purpose of this DNP project was to introduce an education module on the Surviving Sepsis Campaign guidelines. The sepsis education was offered only to nurses who work in ICU. The ICU has five beds. The hospital management hopes that present treatment guidelines will be helpful in improving the ICU nurses' performance in recognizing sepsis.

Evidence-Based Significance

Patient health outcomes will be improved by teaching the ICU nurses to evaluate early sign and symptoms of sepsis. For nursing education, a staff development framework was used. ICU nurses at the hospital were provided a campaign of sepsis education. The ICU nurses have the opportunity to develop and refine their skills and abilities for diagnosing sepsis through the participation in the sepsis education module. The sepsis education for ICU nurses taught them how to use 3-hour and 6-hour bundles of sepsis. According to the Dellinger and Wand (2013), "The Surviving Sepsis Campaign Guidelines are the essence of the sepsis improvement efforts. Using bundles shortens the difficult processes of the care of patients with severe sepsis" (p. 18). Furthermore, Van der Poll and Angus in 2013 stated that "it is recommended to implement program, intervention, and education in a systemic approach to ensure that healthcare clinicians can offer high-quality care practices" (p. 10). The nurses were taught through the use of PowerPoint presentations. The education module was offered during day, evening, and night shifts for all nurses to have access to the training. This project and education wereimportant for every ICU nurse to gain knowledge about the early signs and

symptoms of sepsis in patients that have to be identified and treated on time (Yealy et al. 2014).

Significance for Social Change in Practice

The project has the potential for social change, because educating the nurses will improve their recognition of sepsis signs and symptoms that will result in improving the care of the patients. Education will result in improvement in nursing assessments and interventions, which will improve safety and quality in health care and lower mortality rates (Billings & Halstead, 2012). For the hospital setting, the project is of importance because, previously, there have been no such project to provide education on sepsis and most of the nurses therefore are not aware of the 2016 sepsis guidelines. The nurses usually have problems in identifying signs and symptoms of sepsis and in providing the correct treatment to the sepsis patients. The aim of the DNP project was to improve the nurses' knowledge in recognizing signs and symptoms of sepsis. Teaching and training is based on the health care system's goal of improved patient safety and quality of care (National Institute of General Medical Sciences, 2016). The American Association of College of Nursing (2010) stated that providing annual education on sepsis can help nurses to become aware of sepsis signs and symptoms to improve patient care. It is also expected to improve the confidence level of nurses to follow the "Surviving Sepsis Guidelines."

Summary

In Section 1, I covered the practice problem and the approach that I used to address the problem. Nurses should recognize early signs of sepsis and identify the

alterations in health that suggests patient deterioration before it becomes irreversible. Early treatment and identification that follows the well-known "Surviving Sepsis Campaign Guidelines" procedure have "shown to improve survival rates" (Vazant & Schmelzer, 2011, p. 47). Today, more people have impaired immune systems, have resistance to antibiotic therapy, and are living longer. Such elements present an increasing threat for sepsis (Vazand & Schmelzer, 2011). Other factors that increase the threat are surgery, pneumonia, and invasive tubes and lines, which increase the patient's risk of sepsis. Although these risks have increased, nurses may not have adequate knowledge to recognize them. Therefore, education will be offered to guide and help the nurses in understanding the pathophysiology and signs and symptoms of sepsis and current sepsis guidelines to prevent patient deterioration.

Section 2: Background and Context

Introduction

The aim of this project was to educate ICU nurses on the recognition of the signs and symptoms of sepsis. I included the Surviving Sepsis Campaign guidelines in the nursing education module. Nurses were provided education as a guideline to recognize and understand the signs and symptoms of sepsis. As mentioned by Kleinpell and Schorr (2014), the Surviving Sepsis Campaign Guidelines involves fluid administration and antibiotic. Early intervention leads to improved sepsis outcome (Miller et al., 2013). The rate of sepsis is high with rising morbidity and mortality, mainly when treatment is postponed. Initial recognition is required for improving overall patient outcomes. ICU nurses were provided education on sepsis. The adult learning theory supported the project design. In Section 2, I cover the concepts, models, and theories that I used to guide the project; relevance to nursing practice; local background and context; the role of the DNP student; and a summary of the section.

Conceptual Models, Theoretical Frameworks

The purpose of this project was to promote education for the early detection of sepsis with the help of social learning and adult learning theory. Practice, theory, and research are related to one another to support and validate the nursing interferences (MacRedmond & Dodek, 2010). The adult learning theory is helpful for educating ICU nurses related to sepsis because the study is based on adult learners. The more familiar educators are with adult learning theories, the more effective their practice can be. The nurses will be encouraged to explore the practical information about sepsis. The

encouragement of the nurses will drive them to use new guidelines in clinical practice for identifying sepsis and providing effective care to patients (Kissoon, 2014).

Nurses have a critical role to provide effective care to the patients. According to Wang and Dellinger (2013) working in a health care system with patients who have complicated conditions can be a challenging task for the nurses. Nurses need to learn, but, at times they face barriers that prevent them from understanding the existing guidelines. Nurses face obstacles in obtaining education because of their continuous night shifts hours, overtime work, and personal stressors. Larson and Milana (2006) identified three main barriers to learning and adult participation: situation, institutional, and dispositional. Situational barriers include the barriers that arise from one environment or situation at a given time. Institutional barriers include those procedures and practices that discourage or exclude adults from taking part in organized learning activities, and dispositional barriers are related to self-perception and attitudes about oneself as a learner. The barriers that nurses face come under institutional barriers as the practices in the hospital do not provide them with an opportunity to participate in learning activities. Thus, helping nurses to overcome these barriers is important to promote the education of early detection of sepsis for ICU hospital nurses (Kliger & Hoffman, 2015).

Definitions of Terms

I used the following terms in this project:

Sepsis bundles: "The resuscitation bundle is a combination of evidence-based objectives that must be completed within 6 h for patients presenting with severe sepsis, septic shock, and lactate >4 mmol/L (36 mg/dL)" (Khan & Divatia, 2010, p. 1).

Sepsis: "The presence (probable or documented) of infection together with Systemic manifestations of infection" (Dellinger et al., 2013, p. 168).

Septic shock: "Sepsis-induced hypotension that persists despite adequate fluid resuscitation" (Miller, 2014, p. 26).

Severe sepsis: "Sepsis plus sepsis-induced organ dysfunction or tissue hypoperfusion" (Miller, 2014, p. 24).

Relevance to Nursing Practice

Education on the new guidelines is needed ensure that the evidence that has been shown to improve outcomes is implemented in the practice setting. The project provided education to the nurses regarding the sepsis guidelines from 2016 that would improve the way they handle sepsis patients. The education module was based on PowerPoint presentations that are easy to understand and can be conveniently accessed. Those nurses who lack education on dealing with sepsis patients and providing treatment to those who are suffering could benefit from the project. Educating the nurses on the 2016 sepsis guidelines will improve the nursing practice, resulting in effective care of the sepsis patients.

Local Background and Context

The mortality rate for sepsis has increased at a greater pace because of the lack of evidence-based guidelines for the nurses (Daniels, 2011). The hospital setting where the issue of sepsis is observed is located in the northeast and the major problem is that nurses do not have sufficient information about sepsis (K. Jerry, personal communication, December 2016). The issue results in failure of early management and resuscitation of

patients with sepsis or septic shock. There is lack of nursing education regarding sepsis, and no particularly defined and disciplined standards to screen and treat sepsis exist (K. Jerry, personal communication, December 2016). These findings indicate that most nurses are unfamiliar with treatment procedures for sepsis; therefore, educating the nurses about sepsis is necessary to improve patient care.

Several procedures are recommended for treatment of patients with sepsis. Nursing care in patients with sepsis includes a series of activities, such as monitoring of vital signs, changes in cardiovascular and hemodynamic parameters, the state of ventilation and oxygenation, the parameters of coagulation, metabolic indices, and mental status (Delaney & Fitzpatrick, 2015). The nurse should apply the appropriate support treatment for each of the affected organs (artificial ventilation respiration, hemofiltration, etc.), permanently monitoring the patient's response to treatments. Nurses working in open heart cardiac care units, along with long-term facilities, need to have guidance and knowledge about caring for patients with severe sepsis (Kliger & Hoffman, 2015). The role of the ICU nurse is to be able to recognize patient initial sepsis signs and to prevent severe infection. Nurses should be educated regarding the deviations involved in a patient's situation and how to improve sepsis care. Thus, there is a need for an educational intervention program that can work to improve nursing knowledge and practice.

The procedures have been written for providing the sepsis treatment (Clemmer, 2013). The Surviving Sepsis Campaign Guidelines for Management of Severe Sepsis and Septic Shock were restructured in the year 2016. These procedures have been settled

through various professionals throughout the world. However, considering the chief

issues in health care, the septic shock rates and sepsis remain unsatisfactorily higher with

the number of incidence rising (Mellhammar, et al., 2016). Thus, one method for

improving the rate of mortality is associated with sepsis to begin the suitable therapy

rapidly.

Such therapy can only start with on-time evaluation if the nurse recognizes the

major symptoms of sepsis. Khan and Divatia (2010) mentioned that the instant execution

of antibiotics and fluid resuscitation within the starting hours of when a patient develops

sepsis may influence the outcomes. Thus, the project on early detection of sepsis will be

directed by the Surviving Sepsis Campaign Guidelines that will help in educating nurses

on the pathophysiology that is associated with the symptoms of early sepsis to evaluate

early recognition of symptoms of sepsis. The Surviving Sepsis Campaign education

involves the use of fluid resuscitation and antibiotics from the sepsis bundles, along with

the vasopressors that are helpful in improving blood pressure (Billings & Halstead,

2012).

Nurses must manage sepsis patients with care and provide effective treatment to

ensure that they are able to recover. Dellinger et al. (2013) have stated that sepsis

management needs early goal-directed therapy for raising the rates of survival. The sepsis

bundle cannot be started unless the sepsis is identified early. If sepsis is not identified

early, infection overcomes the body and may cause even death. Getting an on-time

diagnosis or early sepsis diagnosis is an essential step for decreasing the mortality rate

(Vazant & Schmelzer, 2011). My study is based on recognition of early symptoms and

laboratory values, which helps in detecting early symptoms of sepsis by improving ICU nurses' knowledge about sepsis.

The Surviving Sepsis Campaign emphasis on early detection with respect to 1-, 3-, and 6-hour bundles involves measures that help in completing and improving the outcomes. Khan and Divatia (2010) conducted a reflective case-control study to determine the clinical outcome for the patient associated with the time within the emergency room from diagnosis to the beginning of first arterial antibiotic treatment. Khan and Divatia found that the time during detection of sepsis to the circulation of antibiotics is considered as the golden hour. Improved patient outcomes depend on early detection and quick treatment within an hour of recognizing symptoms of sepsis.

Surviving Sepsis Campaign Guidelines (2014) provided evidence-based suggestions that are directly associated with the bundles. The 3- and 6-hour bundles involve context, implementation, imitation, and grading of evidence (Kenny, 2017). Kleinpell and Schorr (2014) noted that when surviving sepsis campaign bundle is implemented on a group, it affects the individual elements itself (Nguyen, Schiavoni, Scott, & Tanios, 2012). Sepsis is associated with increased patient mortality and requires early intervention to potentially improve patient outcomes. Therefore, it is important for nurses to be educated on implementing the surviving sepsis campaign bundles to recognize and treat patients with early signs of sepsis.

In the new guidelines, *sepsis* is defined as a life-threatening dysfunction of organ caused from dysregulated response towards infection (Kenny, 2007). Once nurse has recognized septic shock and sepsis, broad parenteral antibiotics with adequate control are

recommended (Kenny, 2007). The authors of the 2016 sepsis guidelines have distinguished between septic shock and sepsis in consideration of empiric therapy. For those who have septic shock (especially the ones with predicted mortality rate more than 25%), the recommendation is to use double coverage—that is, two antibiotics of different functional classes for targeting pathogen. In contrast, for those who have sepsis or predicted mortality below 15%, the recommendation is to use single, which is applicable in on-going sepsis therapy with bacteremia, but without shock (Kenny, 2007). The guidelines are, however, clear that in case multidrug resistance exists; even the patients who have less predicted mortality should be given combination therapy and infectious disease consultation. In addition, procalcitonin-based algorithms are encouraged by the guidelines for assisting with antimicrobial de-escalation, which usually requires trending procalcitonin values so its level on presentation is prudent for obtaining (Kenny, 2017).

The Sepsis Guidelines (2016) normalize lactate in the patients having elevated lactate levels as marker of tissue-hypo perfusion. The authors of the guidelines clearly declared that serum lactate is not a direct measure of tissue perfusion. Corticosteroids being used in septic shock and sepsis have remained an issue with various pieces of evidence refuting or supporting their usage in different patient populations under equally diverse protocols of dosing and therapy durations. The Sepsis Guidelines suggested 200 mg of hyrdrocortisone to be administered daily in patients who septic shock refractory to vasoactive infusions and fluids. Moreover, the guidelines also give recommendations for number of sepsis-management-related concerns including, nutrition, sedation, blood

glucose control, analgesia, blood products, mechanical ventilation, immunoglobulins, and much more (Kenny, 2017).

Angus and Poll (2013) recommended that the programs for infection control need to be executed, although the programs are helpful in completing and sustaining variations in practice. Health-care-acquired infections, in addition to the problem of rising hospital costs, the length of stay, and disability, challenge health care systems in preventing infections. These factors also cause difficulty in detecting infections and in beginning the process of treatment as early as possible.

Role of the DNP student

My role was to develop the project that allowed educating the nurses properly according to the Sepsis Guidelines 2016. It was also my responsibility to evaluate the effectiveness of the project through pre-post evaluation tests from the nurses by asking questions about whether project was helpful in improving their knowledge on sepsis.

Summary

In Section 2, I covered a general overview of the project with a description of the problem from a local and national view, the learning theory that I used to guide the study, the general approach, the role of the DNP student, and a summary of the section.

Section 3: Collection and Analysis of Evidence

Introduction

The purpose of this project was to educate ICU nurses to recognize early signs and symptoms of sepsis. The 2016 Surviving Sepsis Campaign guidelines guided the education module. The existing evidence, literature review, and webinars guided the development of the education materials. The purpose of this project was to educate ICU nurses on the recognition of the signs and symptoms of sepsis.

Practice-Focused Question

The practice focused question for this project was: Will the ICU nurses' knowledge of sepsis increase after participating in an educational module on sepsis? Sources of evidence for the project included multiple library databases including MEDLINE, CINAHL, ProQuest, PubMed, Science Direct, Education Research Complete (ERIC), and SAGE Premier. The key search terms that I used in reviewing the literature were *sepsis, septic protocol, sepsis educational program, Surviving Sepsis Guidelines, adult learning theory,* and *infection control*. The phrases for the search were *sepsis in older patient*, *sepsis education module*, *dealing with sepsis*, *nurses problems with sepsis*, and *long-term care of sepsis*. The literature studies were limited to full-text articles, clinical trials, English-language publications, and core clinical journals published in the last 10 years.

Evidence Generated for the Doctoral Project

To determine the evidence presented in the project, the educational module was evaluated by a panel of content experts (Appendix F). The content experts were

responsible for determining the quality of the eudcational module, and any changes that were recommended by the experts in the educational module were made to make it suitable for the ICU nurses.

Analysis and Synthesis

Descriptive statistics with graphical representations were used for data analysis and program evaluation. A comparison between pretest and posttest results was made and a summative program evaluation was presented.

Project Evaluation Plan

Pre-post tests and a summative evaluation were used to evaluate the project and to obtain the content experts review of the program. The content experts included a nurse educator, infection control nurse, a charge nurse, a staff nurse and an infectious disease physician. The team of content experts determined whether the project was suitable for the needs of the nurses and whether the hospital could adopt this module for the education of the ICU nurses.

Summary

The program was developed by education and debriefing. The program focused on education for early intervention of sepsis including the Surviving Sepsis Campaign guidelines. Content experts helped in accessing the project. Eventually, the results of the project will become part of the annual hospital report.

Section 4: Findings and Recommendations

Introduction

Sepsis is a major cause of mortality and morbidity and the most common cause of septic shock around the world. The advancements in medical technology have not been effective to control mortality from sepsis, and mortality remains as high as 15% in patients with sepsis and in 40% to 50 % of patients with septic shock along with multiorgan dysfunction syndrome (Nasir et al., 2015). The problem that I identified for the project was that the mortality rate for sepsis is on the rise and is one of the major reasons for this increase is lack of nurses' knowledge regarding evidence-based guidelines for care of patients with sepsis. In a hospital setting in the northeast an issue of sepsis mortality was observed and nurses did not have sufficient information to care for patients with sepsis and septic shock. The hospital data showed that the mortality rate from sepsis required serious attention, because 28% of the patients who developed the bacterial blood infection died from sepsis in the year 2014 (Leonard, 2014). The gap identified in practice was that although research is being conducted to care for patients with sepsis, lack of nurses' knowledge about early management and resuscitation of patients with sepsis and septic shock is a significantissue in health care. It is important that the issue be addressed as a top priority.

The purpose of the doctoral project was, therefore, to educate intensive care nurses at a hospital in the northeast to recognize signs and symptoms of sepsis and provide adequate treatment to the sepsis patients. The education regarding sepsis, its signs and symptoms, and management was provided through an extensive educational

module delivered in a PowerPoint presentation. The practice-focused question for the project was: Will the ICU nurses' knowledge of sepsis increase after participating in an educational module on sepsis?

The literature from multiple sources including CINAHL, MEDLINE, ProQuest, Science Direct, PubMed, SAGE Premier, and Education Research Complete (ERIC) was reviewed for the development of educational module. A literature review matrix can be found in Appendix A and the educational module can be found in Appendix F. The focus of the education module was on the 2016 sepsis guidelines (Sepsis Surviving Campaign, 2016) and nurses were provided information on the 2016 Surviving Sepsis Campaign guidelines and the sepsis bundle. The project focused on developing an educational module for educating ICU nurses about sepsis and its signs and symptoms. The expert panel members were presented the educational modules and improvements were made by incorporating suggestions from expert panel members.

Findings and Implications

A PowerPoint presentation was used for presentation of educational module to the expert panel members. Members of expert panel include notable heath care professionals associated with care of patients with sepsis. The expert panel included eight members and their names and responses were kept confidential for the purpose of this study. Members included the senior vice president of medical affairs, an outcomes data analyst, a research nurse, a clinical nurse educator, a clinical coordinator for the ICU/CCU, the director of infection control, an ICU staff nurse, and the president of quality outcomes. The panel of experts evaluated the content and appropriateness of the educational module and provide

suggestions through a summative assessment survey. To assess the expert's knowledge of sepsis, a pretest and posttest evaluation questionnaire was designed. The expert panel consisted of eight members, who completed the summative survey and provided additional feedback on the education module. The consent form was emailed to the panel members for taking part in the project and providing their feedback through summative program evaluation. They were also required to fill in the pretest and posttest evaluation. The summative program evaluation can be found in Appendix B. The pretest and posttest questionnaire can be found in Appendices C and D, respectively. The consent form can be found in Appendix E.

All responses were anonymous and returned through an e-mail account. The findings of the pretest and posttest are presented in the following sections:

Table 1

Q1 Pretest Answers

Question 1		Answers	
Don't know	True		False
0	$N = 8$		$N = 0$
	$N\ (100\%)$		
Question 1	100% (% answering correctly)		

Table 2

Q1 Posttest Answers

Question 1		Answers	
Don't know	True		False
0	$N = 8$		$N = 0$
	N (100%)		
Question 1	100% (% answering correctly)		

The first question was: Active participation of nurses in the medical care team's discussion about sepsis is essential. In response to this question, all of the expert panel responded "true" in both the pretest and posttest questionnaires. These responses indicated the importance of nurses' participation in medical care team while discussing about sepsis and its signs and symptoms.

Table 3

Q2 Pretest Answers

Question 2		Answers	
Don't know	True		False
0	$N = 8$		$N = 0$
	N (100%)		
Question 2	100% (% answering correctly)		

Table 4

Q2 Post-test Answers

Question 2	Answers	
Don't know	True	False
0	$N = 8$	$N = 0$
	N (100%)	
Question 2	100 % (% answering correctly)	

The second question was: "=Nurses should be continually updated on annual basis with lectures/workshops/conferences/seminars about sepsis. In response to this question, all the expert panel members responded "true" in both the pretest and posttest questionnaires. These responses indicated the need of updating nurses' knowledge about sepsis through lectures, workshops, seminars, and conferences.

Table 5

Q3 Pre-test Answers

Question 3	Answers	
Don't know	True	False
0	$N = 8$	$N = 0$
	N (100%)	
Question 3	100% (% answering correctly)	

Table 6

Q3 Post-test Answers

Question 3	Answers	
Don't know	True	False
0	$N = 8$	$N = 0$
	N (100%)	
Question 3	100% (% answering correctly)	

The third question was: The application of new data regarding the prevention and treatment of sepsis is used in your daily practice. In response to this question, all the expert panel members responded "true" and their responses indicated that they incorporate new data about sepsis prevention and treatment in their daily practice.

Table 7

Q4 Pre-test Answers

Question 4	Answers	
Don't know	True	False
0	$N = 6$	$N = 2$
	N (75%)	N (25 %)
Question 4	75% (% answering correctly)	

Table 8

Q4 Post-test Answers

Question 4	Answers	
Don't know	True	False
0	$N = 6$	$N = 2$
	N (75%)	N (25 %)
Question 4	75% (% answering correctly)	

The fourth question was: White cell count > 12,000/mm3 is in the definition of systematic inflammatory response. The correct answer to this question was "true" as white cell count > 12,000 cells/mm3 is in the definition of systemic inflammatory response syndrome (Huang et al., 2017). The majority of expert panel members answered the question correctly in both the pretest and posttest questionnaires, whereas 25 % were not aware of this information. The results indicated that in the educational module developed, there is a need to emphasize more on white cell count and its relationship with inflammatory response syndrome and sepsis to aware nurses about this essential information.

Table 9

Q5 Pre-test Answers

Question 5	Answers	
Don't know	True	False
0	$N = 8$	$N = 0$
	N (100%)	
Question 5	100% (% answering correctly)	

Table 10

Q5 Post-test Answers

Question 5	Answers	
Don't know	True	False
0	$N = 7$	$N = 1$
	N (87.5%)	N (12.5 %)
Question 5	87.5% (% answering correctly)	

The fifth question was: Patients with septic shock have hypotension despite intravascular volume restoration with fluids. The correct answer to this question was "true" and all the expert panel members answered the question correctly on the pretest, whereas one member answered incorrectly in the posttest. This indicated that the majority

of experts were able to answer this question in both the pretest and posttest. It is unclear
why the expert missed the question in the post test and may indicate that the wording of
the question was confusing or the content may need to be clarified.

Table 11

Q6 Pre-test Answers

Question 6	Answers	
Don't know	True	False
0	$N = 8$	$N = 0$
	N (100%)	
Question 6	100% (% answering correctly)	

Table 12

Q6 Post-test Answers

Question 6	Answers	
Don't know	True	False
0	$N = 8$	$N = 0$
	N (100%)	
Question 6	100% (% answering correctly)	

The sixth question was: When I notice that the patient meets the sepsis criteria, I should inform other nurses directly and precisely. In response to this question, all of the expert panel members answered "true" in both the pretest and posttest questionnaires. Results indicated the need to focus on what ICU nurses need to do when they assess the patient as meeting the sepsis criteria.

Table 13

Q7 Pre-test Answers

Question 7	Answers	
Don't know	True	False
1	$N = 5$	$N = 2$
	N (62.5%)	N (25 %)
Question 7	62.5% (% answering correctly)	

Table 14

Q7 Post-test Answers

Question 7	Answers	
Don't know	True	False
0	$N = 7$	$N = 1$
	N (87.5%)	N (25 %)
Question 7	87.5% (% answering correctly)	

The seventh question was "the fall in mean arterial pressure <70mmHg is a sign of a patient in sepsis". The correct answer to this question was "true" and five out of eight expert panel members answered the question correctly in pre-test while seven out of eight answered correctly in post-test. Results indicated an improvement in the percent of experts answering question seven correctly after the education module. The education module may benefit from added content related to question seven.

Table 15

Q8 Pre-test Answers

Question 8	Answers	
Don't know	True	False
0	$N = 8$	$N = 0$
	N (100%)	
Question 8	100% (% answering correctly)	

Table 16

Q8 Post-test Answers

Question 8	Answers	
Don't know	True	False
0	$N = 8$	$N = 0$

	N (100%)	

Question 8	100% (% answering correctly)	

The eighth question was "Vomiting, diarrhea, gastroparesis or ileus may be early signs of organ dysfunction (correct answer: true)". The correct answer to this question was true and it was answered correctly by all expert panel members in both pre-test and post-test evaluation.

Table 17

Q9 Pre-test Answers

Question 9	Answers	
Don't know	True	False
0	*N* = 8	*N* = 0
	N (100%)	
Question 9	100% (% answering correctly)	

Table 18

Q9 Post-test Answers

Question 9	Answers	
Don't know	True	False
0	*N* = 8	*N* = 0

	N (100%)
Question 9	100% (% answering correctly)

The ninth question was "I consider that my patient has septic syndrome when the level of consciousness alters (correct answer: true)". The correct answer to this question was true and all the expert panel members answered the question correctly in both pre-test and post-test evaluation.

Table 19

Q10 Pre-test Answers

Question 10	Answers	
Don't know	True	False
0	$N = 6$	$N = 2$
	N (75%)	N (25 %)
Question 10		

Table 20

Q10 Post-test Answers

Question 10	Answers	
Don't know	True	False
0	$N = 6$	$N = 2$
	N (75%)	N (25 %)
Question 10		

The tenth question was "The scoring assessing system for sepsis is used in daily practice in my work setting". For this question six out of eight expert panel members answered 'true' and this indicates use of scoring assessing system in their practice for sepsis. Two expert panel members answered 'false' in both pre and post-test. The

majority of respondents supported the use of the scoring assessing system and this indicate the ICU nurses should be taught about the use of scoring assessing system for sepsis patients in daily practice.

Analysis and Synthesis of Findings

The pre-test and post-test questionnaire from expert panel revealed the positive and negative aspects of education module developed for education of ICU nurses regarding sepsis. Questions four and seven, were answered incorrectly by one or two expert panel members. The incorrect answers by panel experts on these two questions can indicate a need to focus more on the content of these questions in the educational module. The content of question 4 focused on White cell count > 12,000/mm3 and definition of inflammatory response. The content of question 7 focused on fall in mean arterial pressure as a sign of sepsis. The educational will be modified to cover these aspects of sepsis in more detail prior to staff implementation.

Unanticipated Outcomes or Limitations

There were no unanticipated limitations or outcomes of the project. It was expected that the educational module would be evaluated by expert panel members and they would provide their opinion about the module. Expert panel members evaluated the sepsis educational module were through a summative evaluation that included seven close ended questions and one open ended question.

Implications resulting from findings

Apart from the pre-test and post-test questionnaire, a summative program evaluation was also conducted at the end of the project from the expert panel members.

The purpose of this evaluation was to obtain feedback from expert panel members

regarding their opinion of recognizing the signs and symptoms for patients with sepsis

after participating in the educational module. The results of the summative program

evaluation are presented below:

Table 21

Question 1 Results

Question 1	Frequency	Percent
Answer	$N=8$	
Strongly Agree	7	87.5
Agree	1	12.5
Total	8	100.0

In response to the question "I feel confident in dealing with patients with Sepsis"

100 percent of the respondents strongly agree or agree to the statement indicating they

feel confident in dealing with patients with sepsis after receiving the education module.

Table 22

Question 2 Results

Question 2		Frequency	Percent
Answer			
Valid	Strongly Agree	7	87.5
	Agree	1	12.5
	Total	8	100.0

The second question was "I am confident in recognizing signs and symptoms of sepsis". In response to this question 7 out of 8 respondents 'strongly agreed' while one out of eight agreed to the statement.

Table 23

Question 3 Results

Answer		Frequency	Percent
Valid	Strongly Agree	7	87.5
	Agree	1	12.5
	Total	8	100.0

The third question was "I am confident in recognizing early laboratory diagnostics tests for sepsis". In response to this question, majority of respondents 'strongly agreed' to recognizing early laboratory diagnostics tests for sepsis.

Table 24

Question 4 Results

Answer		Frequency	Percent
Valid	Strongly Agree	3	37.5
	Agree	5	62.5
	Total	8	100.0

The fourth question was "The education program on sepsis has improved knowledge about sepsis". In response to this question three out of eight respondents strongly agreed that education program was helpful in improving knowledge about sepsis and five out of eight agreed to the statement. None of the respondents indicated that educational module was not helpful and this indicates the efficacy of educational module.

Table 25

Question 5 Results

Answer		Frequency	Percent
Valid	Strongly Agree	3	37.5
	Agree	4	50.0

	Frequency	Percent
Neither	1	12.5
Total	8	100.0

The fifth question was "I learned new things in the program and it was beneficial". In response to this question three out of eight respondents strongly agreed and four out of eight agreed to the statement that educational module was helpful in providing new knowledge and it was beneficial. This response indicates the educational module for sepsis would be beneficial for ICU nurses in increasing their knowledge about sepsis.

Table 26

Question 6 Results

Answer		Frequency	Percent
Valid	Strongly Agree	5	62.5
	Agree	3	37.5
	Total	8	100.0

The sixth question was "An educational module should be implemented in other hospitals". In response to this question majority of respondents, i.e. five out of eight strongly agree to the statement and three out of eight agreed to the statement. This indicates the need for implementing educational module about sepsis in different hospital settings.

Table 27

Question 7 Results

Answer		Frequency	Percent
Valid	Strongly Agree	5	62.5
	Agree	3	37.5
	Total	8	100.0

The seventh question was "The information provided in the education module would be helpful for clinical practice". In response to this question, majority of respondents, (five out of eight) strongly agreed to the statement and three out of eight agreed to the statement. The response to this question indicates the effectiveness of current educational module and that it can be implemented in hospital settings.

Potential Implications to Positive Social Change

The therapeutic interventions for sepsis patients are greatly affected by the critical role played by intensive care nurses in the early detection and prevention of sepsis (Yousefi et al., 2012). The purpose of this DNP project was to determine if an educational module would be a beneficial learning tool for ICU nurses to increase their knowledge of sepsis. The educational module was evaluated by an expert panel to determine if it would be helpful in increasing ICU nurses' knowledge of the signs and symptoms of sepsis and the necessary treatment.

Positive social change can occur through improved ICU nurses' knowledge of sepsis and the potential for improved patient outcomes. Increased nursing knowledge has the potential to improve patient mortality rates in the hospital setting.

Recommendations

The gap-in-practice identified in the project was that the ICU nurses lacked knowledge of sepsis guidelines and did not apply the sepsis guidelines in the treatment of patients with sepsis and septic shock. The findings of the project indicate that the educational module about sepsis would be beneficial for ICU nurses in increasing their knowledge about sepsis. The results of this DNP project supported the recommendation that ICU nurses should regularly participate in an education module on sepsis signs and symptoms and current guidelines for patient management. The educational module used in the current DNP project can be found in Appendix F.

Contribution of the Doctoral Project Team

The project was conducted by the doctoral student and was fully supported by the local hospital management team. Members of the expert panel who reviewed the educational module also provided their suggestions for improving the educational module. A total of eight experts were invited to participate in the project, and were required to evaluate the educational module and take part in pre and post tests and summative evaluations. The suggestions, views and recommendations provided by expert panel members included the following comments:

"*Very educational and very thoughtful*"

"The first 12 slides are very heavy on pathophysiology. While this is good information to have, nurses likely won't absorb it through a slide presentation, and they wouldn't benefit. Second half was well-done"

"Education on sepsis is provided during nursing orientation-bodge buddies are provided and cms bundle compliance is stressed. Although more education is always desired – it is not accurate to state that sepsis education is inadequate"

"Including an interactive participation within the program would be beneficial in accounting for the many differences in which people learn and stimulate better learning"

Also *"Providing direct clinical examples and how nurses would deal with such situations would help in providing real world challenges and offer new ways of better problem solving techniques"*

"The information provided within the program is clear and concise. It allows nurses to be able to make more informed decisions and allow them more depth to their critical thinking."

Three panel members did not provide additional feedback. The experts provided feedback that indicated the education module on sepsis was beneficial for ICU staff nurses and has the potential to increase nursing knowledge on sepsis. Results of the pre and post tests and the summative evaluation will help to modify the program before implementing for the ICU nursing staff

Strength and Limitations of the Project

Strengths

The project included development of an educational module on sepsis for ICU nursing staff, with content verification by a panel of eight experts. Results indicated that the educational module would benefit different hospital settings with the purpose to increase awareness among nurses about sepsis. The project also was designed to use a pre-test to evaluate the ICU nurse's baseline knowledge about sepsis and care of patients with sepsis. Experts found the pre-test helpful in identification of the nurse's knowledge gap on sepsis. Another strength of project was that expert panel members thoroughly reviewed the content. The education module can now be implemented in the hospital setting and pre and post-test can be used to determine if nurses' knowledge on sepsis will be increased through the participation in the educational module.

Limitations

One limitation of the project was that the results of the project cannot be generalized to all ICU nurses due to the small sample size.

Recommendations for Future Projects

The project focused on development of an educational module for ICU nurses regarding early recognition of signs and symptoms of sepsis. This DNP project has the potential to be used in different hospital settings, including medical, surgical units and the emergency department nursing staff. Recommendations from expert panel members can be used to modify and expand the content of the educational module. The method of education to be used in the future project can be helpful to increase nurses' knowledge

about sepsis, but it is recommended that projects in the future include other methods of education delivery such as seminars, written hand-outs and web- based services. The educational module should also be improved to include the latest sepsis guidelines for patient management. Also, it is recommended that this type of project be conducted on a larger scale in different hospitals using the same educational module and then determine the effectiveness of educational module in improving nurses' knowledge about sepsis and septic shock. This would allow for a larger sample size.

Section 5: Dissemination Plan

Dissemination of the project will first involve the management team and the ICU clinical setting where the issue of sepsis mortality rate was the highest. I will inform the executive management of the clinical setting about the development of educational module, including project results and positive feedback from the expert panel. This will involve presenting the project results to the hospital's executive management team. The next steps after the local hospital implementation will include disseminating the project information to other health care organizations within the larger hospital system. This will involve contacting the executive management of health care organizations to schedule a meeting about the project and potential benefits for nursing staff. The completed project in the form of a scholarly paper will be submitted to ProQuest to be published in the official database. ProQuest is an official database for doctoral and master level thesis and dissertations. A wide range of nursing professionals use the database to extract current information.

Analysis of Self

As a DNP scholar, I started to work on this project in 2016. This project has provided me significant insight into sepsis and septic shock. As a DNP scholar, I am responsible to bring change in the health care system to improve patient safety and provide quality care to patients. I took this responsibility as a challenge and started to evaluate the ICU nurses' practices related to sepsis recognition and treatment. The issue

identified in the local hospital was the lack of nurses' knowledge about how to care for patients with sepsis and septic shock.

As a DNP practitioner, I have the responsibility to promote a favourable learning environment for nurses so they are able to provide quality care to the patient. As a DNP practitioner, I was responsible to educate nurses about the problem of increasing mortality rates from sepsis and how nurses can recognize the signs of sepsis and provide evidence-based care for patients with sepsis or septic shock. Therefore, I decided to develop an educational project on sepsis for nurses in the ICU setting.

As a project manager, I developed the research proposal for my project and an educational module to educate nurses about sepsis management and recognition of its early signs and symptoms. After IRB approval, I implemented the project, presenting the educational module to the expert panel. The implementation results showed that educational module was helpful for ICU nurses in increasing their knowledge of sepsis.

Overall, the project was a great learning experience and I gained insight into the scholarly writing process and developed an understanding of how to conduct a project in a clinical setting. While conducting the project, I was faced with a few challenges. First, I was to observe an issue in health care and then propose a solution for positive change. The literature review on sepsis was extensive, and it took 2 months to complete. During that time, I was developing knowledge on the gap in practice and proposing solutions to hospital management on interventions to improve the practice problem. Presenting the evidence-based solution to the health care organization was also challenging, because hospital executives would need to completely support the project and the resources for

completion. The management of the hospital was supportive and allowed me to implement the project in their setting. Overall, the project was a great learning experience, and I believe that patient outcomes will be improved with added nursing education on sepsis.

During the project, I found myself working in different roles. I worked as practitioner by making an effort to improve quality of health care services. I worked as scholar by researching methods to increase nurses' knowledge about sepsis and developing the content for the educational module and my doctoral project. I worked as project manager while completing the project and presenting the educational module to expert panel members.

Summary and Conclusion

In this doctoral project, I identified an issue in a health care setting and focused on resolving the issue. The issue identified in the project was that local hospital data showed a high patient mortality rate in the ICU due to sepsis. I focused on developing an educational module for ICU nurses to help them recognize early signs and symptoms of sepsis and how to use evidence based practice guidelines to provide care to patients of sepsis and septic shock. For the education of nurses an educational module about sepsis and septic shock was developed. A PowerPoint presentation was used to present the educational module to a total of nine expert panel members, of which eight participated in pretest and posttest evaluations and summative evaluations. The expert panel members extended their full support in reviewing the content of educational module and provided suggestions to further improve the educational module. The results of the project will

become part of annual hospital report and it is expected that nurses' knowledge of sepsis

will help them in providing better care for sepsis patients.

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Appendix A: Literature Review Matrix

Full Reference	Theoretical/ Conceptual Framework	Research Question(s)/ Hypotheses	Research Methodology	Analysis & Results	Conclusions	Grading the Evidence
Kleinpell, R., & Schorr, C. (2014). Targeting sepsis as a performance improvement metric: role of the nurse. AACN advanced critical care, 179-186	The 2012 Surviving Sepsis Campaign guidelines advocated was taken for executing the evidence-based practice care for sepsis	What strategies are used to find early recognition and targeted treatment that improve sepsis care and patient outcomes?	Evidence-based practice care for sepsis	Execution of performance improvement strategies, which is expected at early recognition and targeted treatment that can added to improve sepsis care and patient outcomes.	Process of executing performance improvement initiatives showed a significant contribution of nursing care.	Level C
Yousefi, H., Nahidian, M., &Sabouhi, F. (2012). Reviewing the effects of an educational program about sepsis care on knowledge, attitude, and practice of nurses in intensive care units. Iranian journal of nursing and midwifery research, S91.	N one	How to assess mean scores of knowledge, attitude and practice of ICU nurses related to sepsis?	Quasi-experimental study was taken in the study in which 64 nurses were taken with at least one year of experience in ICU. Random sampling was done and nurses were randomly selected and further divided into test and control groups.	The independent t-test, mean scores of knowledge, attitude, and practice of ICU nurses in the test group were significantly more than the control group instantly and 3 weeks after the intervention	It is concluded that training suggestively enhanced the levels of knowledge, attitude, and practice of ICU nurses within sepsis care.	Level B

Robson, W. P. (2004). From A&E to ICU: how nurses can support the Surviving Sepsis Campaign. Intensive and Critical Care Nursing, 113-115.	The Surviving Sepsis Campaign	What are different therapies and campaigns are used to survive in sepsis?	Care bundle approach was taken in the study.Care bundles are taken as new approach to confirming evidenced based interventions are put into practice	A record of all patients who are with severe sepsis is preserved so that after every three months, the medical notes can be reminded and compliance with the care bundle can be audited.	The Surviving Sepsis Campaign provides nurses a factual prospect to make a change to patient care, and should be comprised by all.	Level C
Cullen, L., & Adams, S. (2010). An evidence-based practice model. Journal of PeriAnesthesia Nursing, 25(5), 307-310. http://dx.doi.org/10.1016/j.jopan.2010.07.004	Lowa Model of evidence based practice and Surgical Care improvement project bundle	When problem-focused trigger in patient care?	Evidence-based practice was done by clinicians tried to do systematic changes.	Traditional practice is intensely rooted in patient care or organization.	Problem-focused trigger specifically when the clinician identified the problem in patient care, which needs attention with surgical site infection, which was higher than desired rate.	Level B
Angus, D. C., Linde-Zwirble, W. T., Lidicker, J., Clermont, G., Carcillo, J., &Pinsky, M. R. (2001). Epidemiology of severe sepsis in the United States: analysis of incidence, outcome, and associated costs of care. Critical Care Medicine-Baltimore-, 29(7), 1303-1310.	None	How to regulate the incidence, cost, and consequence of severe sepsis in the United States	An observational cohort study was conducted in order to review how many patients are facing severe sepsis. The data was collected for all non-federal hospitals (n = 847) in seven U.S. states.	The result showed that all patients (n = 192,980) were meeting the criteria for severe sepsis that was based on the International Classification of Diseases, Ninth Revision, Clinical Modification.	Severe sepsis is costly, frequently deadly and common state involved in various deaths each year especially the ones from acute myocardial infarction. This is mainly common in elder and more likely to rise further within U.S population group.	Level M

Appendix B: Summative Program Evaluation

Q.1 I feel confident in dealing with patients with Sepsis

A) Strongly Agree

B) Agree

C) Neither

D) Disagree

E) Strongly Disagree

Q.2 I am confident in recognizing signs and symptoms of sepsis.

A) Strongly Agree

B) Agree

C) Neither

D) Disagree

E) Strongly Disagree

Q.3 I am confident in recognizing early laboratory diagnostics tests for sepsis

A) Strongly Agree

B) Agree

C) Neither

D) Disagree

E) Strongly Disagree

Q.4 The education program on sepsis has improved knowledge about sepsis

A) Strongly Agree

B) Agree

C) Neither

D) Disagree

E) Strongly Disagree

Q.5 I learned new things in the program and it was beneficial?

A) Strongly Agree

B) Agree

C) Neither

D) Disagree

E) Strongly Disagree

Q.6 An educational module should be implemented in other hospitals

A) Strongly Agree

B) Agree

C) Neither

D) Disagree

E) Strongly Disagree

Q.7 The information provided in the education module would be helpful for clinical

practice

A) Strongly Agree

B) Agree

C) Neither

D) Disagree

E) Strongly Disagree

Q.8 Please list your recommendations for improvements in the program.

_____

_____

_____

_____

_____

_____

_____

_____

Appendix C: Pretest Questionnaire

Please complete the questionnaire on sepsis. Choose one answer

Q.1 The active participation of nurses in the medical care team's discussion about sepsis is essential.

( ) True   ( ) False   ( ) don't know

Q.2 Nurses should be continually updated on annual basis with lectures/workshops/conferences/seminars about sepsis

( ) True   ( ) False   ( ) don't know

Q.3 The application of new data regarding the prevention and treatment of sepsis is used in your daily practice

( ) True   ( ) False   ( ) don't know

Q.4 White cell count > 12,000/mm^3 is in the definition of systematic inflammatory response:

( ) True   ( ) False   ( ) don't know

Q.5 Patients with septic shock have hypotension despite intravascular volume restoration with fluids.

( ) True   ( ) False   ( ) don't know

Q.6 When I notice that the patient meets the sepsis criteria, I should inform other nurses directly and precisely

( ) True   ( ) False   ( ) don't know

Q.7 The fall in mean arterial pressure <70mmHg is a sign of a patient in sepsis

( ) True   ( ) False   ( ) don't know

Q.8 Vomiting, diarrhea, gastroparesis or ileusmay be early signs of organ dysfunction

( ) True   ( ) False   ( ) don't know

Q.9 I consider that my patient has the septic syndrome when the level of consciousness

alters

( ) True   ( ) False   ( ) don't know

Q.10 The scoring assessing system for sepsis is used in daily practice in my work setting

( ) True   ( ) False   ( ) don't know

Appendix D: Posttest Questionnaire

Please complete the questionnaire on sepsis. Choose one answer

Q.1 The active participation of nurses in the medical care team's discussion about sepsis is essential.

( ) True   ( ) False   ( ) don't know

Q.2 Nurses should be continually updated on annual basis with lectures/workshops/conferences/seminars about sepsis

( ) True   ( ) False   ( ) don't know

Q.3 The application of new data regarding the prevention and treatment of sepsis is used in your daily practice

( ) True   ( ) False   ( ) don't know

Q.4 White cell count > 12,000/mm^3 is in the definition of systematic inflammatory response:

( ) True   ( ) False   ( ) don't know

Q.5 Patients with septic shock have hypotension despite intravascular volume restoration with fluids.

( ) True   ( ) False   ( ) don't know

Q.6 When I notice that the patient meets the sepsis criteria, I should inform other nurses directly and precisely

( ) True   ( ) False   ( ) don't know

Q.7 The fall in mean arterial pressure <70mmHg is a sign of a patient in sepsis

( ) True   ( ) False   ( ) don't know

Q.8 Vomiting, diarrhea, gastroparesis or ileusmay be early signs of organ dysfunction

( ) True   ( ) False   ( ) don't know

Q.9 I consider that my patient has the septic syndrome when the level of consciousness

alters

( ) True   ( ) False   ( ) don't know

Q.10 The scoring assessing system for sepsis is used in daily practice in my work setting

( ) True   ( ) False   ( ) don't know

Appendix E: Consent Form for Anonymous Questionnaires

You are invited to take part in an evaluation for the staff education doctoral project that I am conducting.

Questionnaire Procedures:

If you agree to take part, I will be asking you to provide your responses anonymously, to help reduce bias and any sort of pressure to respond a certain way. Staff members' questionnaire responses will be analyzed as part of my doctoral project, along with any archival data, reports, and documents that the organization's leadership deems fit to share.

Voluntary Nature of the Project:

This project is voluntary. If you decide to join the project now, you can still change your mind later.

Risks and Benefits of Being in the Project:

Being in this project would not pose any risks beyond those of typical daily professional activities. This project's aim is to provide data and insights to support the organization's success.

Privacy:

I might know that you completed a questionnaire but I will not know who provided which responses. Any reports, presentations, or publications related to this study will share general patterns from the data, without sharing the identities of individual respondents or partner organization(s). The questionnaire data will be kept for a period of at least 5 years, as required by my university.

Contacts and Questions:

If you want to talk privately about your rights in relation to this project, you can call my university's Advocate via the phone number 612-312-1210. Walden University's ethics approval number for this study is 11-03-17-0395113.

Before you start the questionnaire, please share any questions or concerns you might have.

Appendix F: Educational Module

SEPSIS EDUCATION MODULE

Defining The Septic Picture

▶ **Sepsis:** Life-threatening organ dysfunction caused by deregulated host response to infection

▶ **Septic:** Subset of sepsis with circulatory and cellular/metabolic dysfunction associated with higher risk of mortality

Identifying Acute Organ Dysfunction by Sequential Organ Failure Assessment (SOFA) Score Indices

Lung (ARDS)
$PaO_2/FiO_2 \leq 400$
(bilateral infiltration on CXR)

Cardiovascular
Mean arterial pressure <70 mmHg

Serum creatinine ≥1.2
Urine output <500 ml/day

Serum bilirubin ≥1.2 mg/dl

Blood coagulation (DIC)
Platelets $<150 \times 10^3/\mu l$
(prolonged prothrombin time, increased FDP)

Recognizing Acute Organ Dysfunction: Cardiovascular

Clinical features
• Ventricular dilatation
• reduced ejection fraction
• reduced contractility

• Myocardial depression
• Impaired intracellular calcium homeostasis
• disrupted high energy phosphate production.

SOFA Score Indices
Mean arterial pressure <70 mmHg

Recognizing Acute Organ Dysfunction: Lungs

Clinical Features
- Impaired oxygenation

Pathway
- Vascular hyper-permeability
- Neutrophil accumulation

SOFA Score Indices
PaO2/FIO2 <400 (bilateral infiltration on CXR)

Recognizing Acute Organ Dysfunction: Kidney

Clinical Features
- Reduced GFR
- Reduced urine volume

- Tubular epithelial cell injury
- dysfunction or adaptive response of tubular epithelial cells

SOFA Score Indices
Serum creatinine ≥1.2
Urine output <500 ml/day

Recognizing Acute Organ Dysfunction: Liver

Clinical Features
- Jaundice
- cholestasis

Disturbed intracellular and extracellular bile salt transport

SOFA Score Indices
Serum bilirubin ≥1.2 mg/dl

Identifying Acute Organ Dysfunction as a Marker of Severe Sepsis: Blood Coagulation system (DIC)

Clinical Features
- Bleeding diathesis,
- microthrombi and tissue ischemia

- Intravascular coagulation
- microvascular damage
- systemic thrombin generation
- endothelial injury

SOFA Score Indices
Platelets <150 × 10^3/µl (prolonged prothrombin time, increased FDP)

Maldistribution of blood flow

- Mechanical obstruction
  - Micro-emboli
  - Increased blood viscosity
  - Compression
- Systemic & local mediator & ion influence
  - Constriction vs. dilation
- Loss of regulatory activities/endothelial cell injury
  - Reactive hyperemia
  - Anticoagulation

Oxygen Supply & Demand Dynamics and Compensatory Mechanisms

- Improve pulmonary gas exchange
- Increase oxygen delivery
- Alter the distribution of blood flow
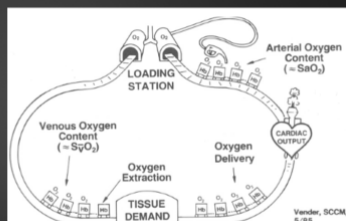
Metabolic Alterations & The Stress Response

Initiation of Stress Response

Sympathetic Nervous System Activation

Hypothalamus Activation

Metabolic Alterations & The Stress Response

SNS Activation
- Gut hypothesis
- ↑ BMR
- Inhibition of insulin secretion
- Inhibition of glucose uptake by the tissues

Hypothalamus Activation
- Adrenal cortex stimulation
- Changes in carbohydrate, protein & fat metabolism resulting in ↑ glucose concentration

Metabolic Alterations & The Stress Response

- **SNS Activation**
  - Gut hypothesis
  - ↑ BMR
  - Inhibition of insulin secretion
  - Inhibition of glucose uptake by the tissues
- **Hypothalamus Activation**
  - Adrenal cortex stimulation
  - Changes in carbohydrate, protein & fat metabolism resulting in ↑ glucose concentration

Your Role as a Nurse

- Prevention of infection
- Early recognition of patients with signs of sepsis
- Early initiation of evidence-based practice therapies appropriate for your area of practice (antibiotics, fluids/blood, and vasopressors)
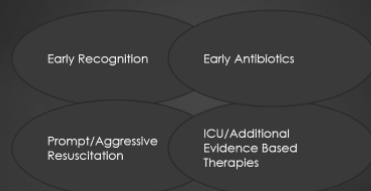
Preventing the Invasion

- Handwashing
- Line care
- Oral care
- HOB

Early Management

- Early Recognition
- Early Antibiotics
- Prompt/Aggressive Resuscitation
- ICU/Additional Evidence Based Therapies

Implementation of Early Screening Tools and Triggers

Screens and triggers
developed to ID Severe
Sepsis patients in the ICU

Early Recognition: A Screening Process

- TIME IS CRITICAL
  - ➢ If you identify patients early then you can intervene and prevent further tissue damage
- To screen effectively, it must be part of the nurses' daily routine
- Must define a process for what to do with the results of the screen
- If you don't screen you will miss patients that could have benefited from the interventions

Triggers for identifying Severe Sepsis

Location/Trigger Type	Standard Procedure	Manual Alert Message	Computerized Alert Message
ICU	• Upon admission	• From concurrent coder or case manager	• Upon pharmacy entry of antibiotic/vasopressors
	• By nurse at shift change	• Nurse MAR review (for antibiotic/ vasopressor)	• In note field on computerized MAR
	• Change in lactate • During RN, MD, RPh rounds	• Change in lab values (lactate)	• In note field of vasopressor computerized label
	• Criteria-Based Early Response	• Place on all ICU charts (daily)	• Upon withdrawal of med from Automated Dispensing Cabinet

Implementation of Evidence-Based Sepsis Bundles

Implementation
of the Sepsis
Bundle with
protocol & order
sets

Screens and triggers
developed to ID Severe
Sepsis patients in the ICU

Surviving Sepsis Guidelines 2016

▶ Sepsis and septic shock are medical emergencies and it is recommended that treatment and resuscitation begin immediately.

▶ The Sepsis Guidelines 2016 recommend that a specific anatomic diagnosis of infection requiring emergent source control be identified or excluded as rapidly as possible in patients with sepsis or septic shock, and that any required source control intervention be implemented as soon as medically and logistically practical after the diagnosis is made.

Antibiotics

▶ It is recommended that administration of IV antimicrobials be initiated as soon as possible after recognition and within 1 h for both sepsis and septic shock.

▶ Empiric broad-spectrum therapy with one or more antimicrobials to cover all likely pathogens.

Initial Resuscitation

▶ The Sepsis Guidelines 2016 recommend that in the resuscitation from sepsis-induced hypoperfusion, at least 30ml/kg of intravenous crystalloid fluid be given within the first 3 hours.

▶ Following initial fluid resuscitation, additional fluids be guided by frequent reassessment of hemodynamic status

Fluid Therapy

▶ The Sepsis Guidelines 2016 recommend crystalloids as the fluid of choice for initial resuscitation and subsequent intravascular volume replacement in patients with sepsis and septic shock

▶ Using albumin is suggested in addition to crystalloids when patients require substantial amounts of crystalloids

High Versus Low Blood-Pressure Target in Patients with Septic Shock

▸ The Sepsis Guidelines 2016 recommend an initial target mean arterial pressure of 65 mmHg in patients with septic shock requiring vasopressors

Vasoactive agents

▸ The Sepsis Guidelines 2016 recommend norepinephrine as the first choice vasopressor

▸ Moreover it is suggested adding either vasopressin (up to 0.03 U/min) or epinephrine to norepinephrine with the intent of raising MAP to target, or adding vasopressin (up to 0.03 U/min) to decrease norepinephrine dosage

What to do when shock is not resolving quickly?

▸ The Sepsis Guidelines 2016 recommends further hemodynamic assessment (such as assessing cardiac function) to determine the type of shock if the clinical examination does not lead to a clear diagnosis.

▸ The suggestion is to use dynamic over static variables to predict fluid responsiveness, where available.

Diagnosis

▸ The Sepsis Guidelines 2016 recommend that appropriate routine microbiologic cultures (including blood) be obtained before starting antimicrobial therapy in patients with suspected sepsis and septic shock if doing so results in no substantial delay in the start of antimicrobials

▸ Appropriate routine microbiologic cultures always include at least two sets of blood cultures (aerobic and anaerobic).

Antimicrobial Therapy
Antibiotic Stewardship

▶ The Sepsis Guidelines 2016 recommend that empiric antimicrobial therapy be narrowed once pathogen identification and sensitivities are established and/or adequate clinical improvement is noted

▶ The Sepsis Guidelines 2016 suggest that an antimicrobial treatment duration of 7-10 days is adequate for most serious infections associated with sepsis and septic shock.

▶ The Sepsis Guidelines 2016 recommend daily assessment for de-escalation of antimicrobial therapy in patients with sepsis and septic shock.

▶ The Sepsis Guidelines 2016 suggest that measurement of procalcitonin levels can be used to support shortening the duration of antimicrobial therapy in sepsis patients

CORTICOSTEROIDS

▶ Sepsis Guidelines 2016 suggest against using intravenous hydrocortisone to treat septic shock patients if adequate fluid resuscitation and vasopressor therapy are able to restore hemodynamic stability. If this is not achievable, we suggest intravenous hydrocortisone at a dose of 200 mg per day.

Mechanical Ventilation

▶ It is recommended to use prone over supine position in adult patients with sepsis-induced ARDS and a PaO2/FIO2 ratio <150

▶ The Sepsis Guidelines 2016 recommend against the use of HFOV in adult patients with sepsis-induced ARDS.

▶ The Sepsis Guidelines 2016 recommend against the use of beta-2 agonists for the treatment of patients with sepsis- induced ARDS without bronchospasm

▶ The Sepsis Guidelines 2016 suggest using lower tidal volumes over higher tidal volumes in adult patients with sepsis-induced respiratory failure without ARDS

Glucose Control

▶ The Sepsis Guidelines 2016 recommend a protocolized approach to blood glucose management in ICU patients with sepsis, commencing insulin dosing when 2 consecutive blood glucose levels are >180 mg/dL. This approach should target an upper blood glucose level ≤180 mg/dL rather than an upper target blood glucose ≤110 mg/dL.

▶ The Sepsis Guidelines 2016 recommend that blood glucose values be monitored every 1 to 2 hrs until glucose values and insulin infusion rates are stable, then every 4 hrs thereafter in patients receiving insulin infusions.

▶ It is also recommended that recommend that glucose levels obtained with point-of-care testing of capillary blood be interpreted with caution, as such measurements may not accurately estimate arterial blood or plasma glucose values

Renal Replacement Therapy

- The Sepsis Guidelines 2016 suggest against the use of renal replacement therapy in patients with sepsis and acute kidney injury for increase in creatinine or oliguria without other definitive indications for dialysis

Nutrition

- The Sepsis Guidelines 2016 recommend against the use of renal replacement therapy in patients with sepsis and acute kidney injury for increase in creatinine or oliguria without other definitive indications for dialysis
- The Sepsis Guidelines 2016 recommend against the administration of parenteral nutrition alone or in combination with enteral feeds (but rather to initiate IV glucose and advance enteral feeds as tolerated) over the first 7 days in critically ill patients with sepsis or septic shock in whom early enteral feeding is not feasible
- The Guidelines suggest the early initiation of enteral feeding rather than a complete fast or only IV glucose in critically ill patients with sepsis or septic shock who can be fed enterally
- The Guidelines suggest the use of prokinetic agents in critically ill patients with sepsis or septic shock and feeding intolerance

Nurse Setting the Goals of Care

- Goals of care and prognosis should be discussed with patients and families
- The Sepsis Guidelines 2016 recommend that the goals of care be incorporated into treatment and end-of-life care planning, utilizing palliative care principles where appropriate.