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An RN Sepsis Training Program That Supports Registered Nurses in the Emergency Room Setting

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This is to certify that the doctoral study by

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has been found to be complete and satisfactory in all respects,
and that any and all revisions required by
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Abstract

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Daphne Davis-Patrick

MSN, Kaplan University, 2012

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Project Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Nursing Practice

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Abstract

Sepsis is a severe blood stream infection that claim the lives of almost 220,000 Americans annually. Delayed patient treatment results in multi-organ failure, morbidity, mortality, and increased hospital length of stay. Timely sepsis management enables hospitals to have decreased expenses, increased patient survival, and judicious interventions. The problem addressed in this project was the lack of sepsis- training for registered nurses (RNs) working in the emergency department (ED) of a 628-bed hospital in the southeastern United States. Under the direction of the director of the ED, 269 patient charts were reviewed during 2014 to February 2015 for data related to a sepsis diagnosis. Data showed that 19.4% (n = 103) of patients diagnosed with sepsis had the sepsis order set implemented by the ED nurse. The purpose of this project was to create an educational sepsis-training program for ED nurses. The program included a 2-hour educational module on signs and symptoms of sepsis, including guidelines from the Surviving Sepsis Campaign and the Emergency Nurses' Association. Stetler's Model of Research Utilization and Benner's Novice to Expert conceptual frameworks supported the project. The director of professional practice provided formative feedback on module content and the program evaluation tool. Director feedback indicated that content was beneficial in educating ED nurses on the signs and symptoms of early sepsis recognition. The ED director has now mandated that all ED nurses take the training module and posttest. The project has the potential to improve early sepsis recognition by ED staff and to improve patient outcomes, thus promoting positive social change for patients, families, and nurses.

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Dedication

This project is dedicated to the registered nurses who work in the emergency department(ED) and whose dedication to providing front line care to the patients makes a big difference in patient's lives. Their willingness to provide health care in a chaotic setting despite being short staff and the different obstacles reflects the pledge to improve health care to a vulnerable ED patient population.

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Thank you to my friends, previous manager, current director and colleagues who encouraged me throughout the journey and understood when I placed my social life in slow motion mode. Special thank you to our three children, Jewel (and son in Law-Joel), Jahdiel, Josiah and my three babies Jude, Jolie and Joelle for understanding why I had to study and work on numerous papers, practicum and projects for the last three years. Thank you to my mother Marlene for her strength, prayers and inspiration throughout my life. Special thank you to Alicia for believing in me and motivating me along this wild expedition.

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Section 1: Overview of the Evidence-Based Project

Introduction

Sepsis is a severe bloodstream illness that can rapidly turn life-threatening (Hall, Williams, DeFrances, & Golonsinskiy, 2011). Signs of sepsis includes temperature > 38.3° Celsius or < 36° Celsius, pulse rate > 90 beats per minute and respiration > 20 breaths per minute (Society of Critical Care Medicine, 2015). Per the Centers for Disease Control and Prevention (CDC) (2016) the outcome of untreated sepsis can be multi-organ failure and even death. In the year 2000, approximately 621,000 people were admitted to the U. S. hospitals with a diagnosis of sepsis; by 2008, the number increased to almost 1,141,000 people (Center for Disease Control and Prevention, 2016).

There is a strong relationship between sepsis, health insurance and the emergency department. The United States of America (U.S.A) spent almost $14.6 billion in the year 2008 on inpatient sepsis treatment (Hall, Williams, DeFrances & Golonosinkiy, 2011). Approximately, 29 million Americans are uninsured (CDC, 2016). Additionally, 45% of the populace has a chronic health condition (Nash, Reifsnyder, Fabius, & Pracillo, 2011). These people can delay in getting to the hospital for treatment because of the financial constraints. People who are uninsured tends to delay in seeking health care treatment and experience more health-related complications including sepsis and death (Institute of Medicine, 2009).

This quality improvement project was conducted at a regional health care system with three facilities. Each year there are about 122,000 (main campus) ER visits and 27,000 admissions. Unlike the long-term care facility, two of the facilities are acute care and both have an ER. The study was carried out in the ED of the main campus where I was an employee.

The Joint Commission Center for Transforming Healthcare (2014) reported that the average mortality rate for sepsis is 25-30%. The Surviving Sepsis Campaign (SSC) is a collaboration between the Society of Intensive Care Medicine and the European Society of Intensive Care Medicine to provide guidelines to successfully manage the problem of sepsis and ultimately decrease sepsis mortality (Society of Intensive Care Medicine, 2015). The SSC bundle is designed to guide sepsis management starting in the ED and continuing in the intensive care unit. The bundle is crucial elements, that when implemented as a set of orders have a greater effect than if individual orders were initiated. This include blood collection for lactic acid and blood cultures, broad-spectrum antibiotics and 30ml/kg crystalloid administered for hypotension or lactic acid greater than 4mmol/L antibiotics within three hours of time of presentation. However, EDs across the country are struggling with using all components of the SSC bundle in a timely manner (Cronshaw, Daniels, Bleetman, Joynes, & Sheils, 2011)

The ED Nurse

According to the Joint Commission Center for Transforming Healthcare (2014) approximately 220, 000 Americans die of sepsis annually. Therefore, a concerted effort is needed to train nurses and thus reduce the effects of sepsis.

At the practicum hospital, a new RN employee is given a general hospital orientation for 3 days, a skills validation checklist, and a self-study handbook, which includes a variety of information including job description, nurse's roles and responsibility, documentation guidelines and scope of practice. The RN is assigned a preceptor from the first day on the job to the end of orientation. The ED's new RN employee orientation consists of nine 12-hour shifts. However, there is no sepsis training or a formal sepsis educational class for the ED nurses at the hospital.

Nursing experience and clinical skills are valuable assets in the delivery of quality patient care (McHugh & Lake, 2010). The ED nurses in the practicum site have diverse educational and work experience background. Years of experience in the department ranged from less than a year to more than 10 years and changes in existing practice can possibly be met with resistance.

Additionally, nurse driven protocols can allow the triage nurse to input orders as part of the SSC. The registered nurse (RN) in the ED must be able to work amid chaos and calamity because multiple patients are brought in by ambulances at the same times and patients walk into the ED via the front entrance. The ED staff must be prepared to work as a team to deliver timely and appropriate treatment using best practices (Woods & Magyary, 2010). Stress and short staffing can affect a nurse's ability to provide care for patients in the ED.

Problem Statement

According to the Society of Critical Care Medicine (2015) the SSC developed international guidelines for managing severe sepsis and septic shock in 2012. The problem addressed in this project was the lack of an appropriate training program to help nurses applies the SSC principles in the ED.

The practicum hospital in North Georgia has a mortality rate of 24.77 for sepsis and mortality rate of 30.74% within 30 days The ED director and other top administrators investigated the reason for the percentage and discovered that the previous sepsis protocol had never been implemented by the nurses or physicians. In 2013 the ED management team sanctioned the use of the SSC**.** A computerized sepsis order set was developed by the informatics department and the ED nurses were told to implement the order set if the patient had the

hallmark signs and symptoms of sepsis. After introducing the SSC to the staff in the ED, it was discovered that the nurses and doctors were not consistently using the principles of the SSC. A retrospective chart audit, February–August, 2014, revealed that while 103 patients had a diagnosis of sepsis, only 20 sepsis order sets were used to initiate tests and medication for these patients.

A PICO statement offers guidance for choosing the best practice for achieving a successful outcome (Stillwell, Fineout-Overholt, Melnyk, & Williamson, 2010). In this study, a PICO statement was used to (a) help gather evidence and assess the patient population (P); (b) label the intervention, a training program (I) identify the comparison, the lack of a training class (C); and predict the outcome (O) (Zaccagnini & White, 2011).

Purpose Statement

The purpose of this project was to develop an evidence-based practice (EBP), that is, a quality educational program that supported ED nurses. The program was organized for the RNs in the ED to prepare them to recognize and treat sepsis using best practices. The use of philosophy, knowledge development and the implementation of EBP is expected to result in effective patient care.

Goals and Objectives

This quality improvement project was based on developing an educational training program for ED nurses. The program was expected to improve compliance with the SSC in the ED. Previously, the staff had been taught informally about SSC; there was no accountability if measures were not followed. There existed a gap between the needs of the patient with sepsis and the ED nurses training to care for the septic patients The DNP nurse should use nursing

philosophies, theoretical frameworks, and integration of best practice principles in clinical research to teach the nurses and accelerate the comprehension from clinical problem to change in clinical practice.

I developed a structured program for initial training, refresher courses, computer-based learning and continued support for ED nurses. The RN Sepsis Specialty Training Program was designed to create a structured curriculum with precise learning objectives. Use of the program is expected to:

- Promote the use of evidence-based nursing practice in the early identification and treatment of septic patients.
- Improve outcomes for patients, health care providers, and health care organizations (Groves, Burns, & Gray, 2013).
- Improve patient outcomes, including shorter recovery time and early and timely intervention (Society of Critical Care Medicine, 2015); decreased patient mortality rate (Madsen, Simmons, Choo, Portelli, McGregor, & Napoli, 2014).
- Improve outcomes for providers including timely intervention and treatment, 100% compliance with SSC. One outcome goal is that the nurses would be equipped and empowered to develop and incorporate the principles of SSC (Society of Critical Care Medicine, 2015). Global outcomes include nurse's satisfaction that they are well trained to care for septic patients. If nurses feel that they can care for the patient effectively, the result will be will be positive short-term and long-term outcomes for patients and the facility.

- Improve outcomes for the organization include improved patient survival and decreased sepsis mortality ratings. When EBPs are used in health care facilities there is increased staff collaboration, job fulfillment and job retention (Saba & McCormick, 2011).
- Improve early recognition and prompt medical intervention for septic patient (Society of Critical Care Medicine, 2015).

The project established some objectives for the educational program :1: Develop educational plan using the SSC, Stetler model and Novice to Expert conceptual framework. 2: Design a curriculum using educational modalities to meet the need of adult learners, this includes power point presentation, videos, writing activities and case studies. 3: Implement the project and 4: Evaluation of the project. Objectives for the patients are decreased length of stay, deduction in sepsis related mortality and fewer sepsis complications.

Another objective is that the nurse can immediately recognize sepsis in the ED and apply all aspects of the SSC within the required 3–6 hours (Society of Critical Care Medicine, 2015). Team effort is necessary to transform best practices to solve the clinical problem (Woods & Magyary, 2010). The hospital benefit from the positive patient outcome; including decreased length of patient stay and a reduction in the sepsis mortality rate (Society of Critical Care Medicine, *2015:* Madsen et al., 2014). Such positive outcomes can be displayed on a hospital dashboard, intranet, and on the hospital's web page.

Conceptual Framework

Program theory models and framework provides guidance to the entire proposal. The Stetler Model of Research Utilization is a comprehensive framework that can augment the use of

EBP in organizations such as health care institutions (Grove, Burns, & Gray, 2013). This model was useful in the treatment of sepsis because it guides in the management and application for both staff and patients. Additionally, it was used to develop the sepsis educational program. The phases are research, justification, proportional evaluation, conclusion making, transformation and application, and appraisal (Stetler, 2001).

Benner's framework, Novice to Expert, can be beneficial in the process of transforming nurses' knowledge about sepsis (Alligood & Tomey, 2010). The five components of the framework view the RN as a novice, advance beginner, competent, proficient and experience. The nurses would be able to provide quality care of patients with complex medical problems (including sepsis), provide effectual collaboration skills and be dedicated to professional development (McEwin & Wills, 2011).

The integration of the Stetler Model of Research Utilization and the Novice to Expert framework was relevant in the development of the sepsis educational program. The Novice to Expert framework identifies characteristics that make the nurses teachable; the Stetler model supports EBP in patient care and nurse's education and was a strong foundation for the program. The application of the two frameworks offered a rich theoretical underpinning to sustain the sepsis training program for nurses in the ED. A more comprehensive explanation of each theory is described in Section 2.

Significance to Practice

The nurses are at the patient's bedside continuously and can detect subtle deviations in conditions including signs of sepsis. Health care is a national priority and health care professionals are called upon to focus on the patient, use teamwork, and continuously improve

care (Kelly, 2011). According to the CDC (2016) in 2008 approximately, 1,141,000 people were diagnosed with sepsis. The SSC provides evidence-based guidelines to care for the patient with a diagnosis of sepsis, severe sepsis or septic shock (The Society of Critical Care Medicine, 2015). The hospitalization rate of those with septicemia or sepsis more than doubled between 2000 and 2008, from 11.6 to 24.0 per 10,000 populations (Hall, Williams, DeFrances, & Golonsinskiy, 2011). Implementation of this quality improvement project is expected to facilitate shorter stays and fewer complications. Successful patient outcomes and the use of EBPs pave the way for policy development (White & Dudley-Brown, 2012).

Implications for Social Change in Practice

The implications for positive social change include the possible influence of the quality improvement project in enhancing the ED nurse's knowledge, changes in workflow and in facilitating the resourceful use of the SSC principles. The effective practice and continued adoption of the SSC can improve the quality of patient care, endorse patient safety, decrease sepsis healthcare expenses, and result in enhanced patient outcomes.

Educating the ED nurses about sepsis has implications for social change. The ED nurse assess the vital signs, physical condition of the patient, initiate interventions and coordinate patient care. The ED RN will benefit from sepsis education. Topics included in the program includes, diagnostic tests, medications, three and six hour interventions and impact of sepsis. The RNs delivery of care can positively impact patient outcome. The training is expected to improve assessment skills. The RNs can become proactive in sepsis treatment when they can identify vague changes in patient's conditions.

Patients will benefit from the nurse's education. There will be early sepsis identification and initiation of blood sample collection, administration of intravenous fluids and antibiotics. Timely interventions provide early diagnosis, reduced ICU admissions, decreased length of stays, reduce ED and ICU stays, and more patients with improved outcomes (Society of Critical Care Medicine, 2015). The patients with sepsis are at increased risk for sepsis related morbidity (CDC, 2016). This can include organ failure such as kidney failure and consequently there will be the need for hemodialysis. When the nurses are educated about the subtle signs of sepsis, they can identify changes in lab values and alert the physician. Then there will be interventions and consultation of other medical specialists. Thus, resulting in early treatment to prevent further morbidities.

The hospital benefits from the nurse's sepsis education. Early treatment of sepsis reduces inpatient stay and reduces 28-day mortality rates of patients with sepsis or septic shock (Madsen et al., 2014). The patient's response to the health care provided by the hospital is crucial to the analysis of quality health care. CDC (2016) publishes sepsis report, therefore the public can view the reports to see which cities has the highest sepsis scores and chose to go to a different hospital for their health care need. Sepsis places a financial burden on the hospital as these patients require lengthier treatment thus increasing health care related cost (CDC, 2016). Patients with a diagnosis of sepsis has a 75% longer average length of stay than those without sepsis (Hall, Williams, DeFrances, & Golonsinskiy, 2011). The Center for Medicare and Medicaid Services (2015) are not providing reimbursement for specific hospital acquired infections including catheter associated urinary tract infection and vascular site infections. Therefore, education will

provide the nurses with resources to identify and treat sepsis in a timely manner. This can result in the hospital saving money.

ED interdisciplinary team members will benefit from nurse's education. Sepsis education is not only envisioned for the nurses, other members of the health care team can benefit from education including the patient care technician, phlebotomist and the pharmacist.

Definitions of Terms

The following definitions were used to guide this project.

Bundle: Selected essentials of sepsis care implemented as a group (Surviving Sepsis, 2013).

Early goal- directed therapy: early resuscitation to maintain physiologic balance

Surviving Sepsis, 2013).

Sepsis - is a systemic inflammatory response syndrome and the body's complicated response to infection (Mallick, Upadhyay, Jagia, Pamkar & Prasad, 2011**)**.

Septic shock- sepsis that causes tissue hypoperfusion or organ failure (Surviving Sepsis, 2013).

Assumptions and Limitation

Assumptions

The ED RNs provide honest answers on the demographic data collection sheet, sepsis questionnaire and the evaluation would be honest. Honest answers would guide the researcher in understanding the ED nurses' role, work flow and developing future classes.

Limitations

- The study was planned in a single setting. The other ED can be included in the study.
- The study would be diverse in regards to gender, because most of the ED RNs are females. Measures to address this limitation was not addressed.

- The project was not completed because RN short staff in the department. The researcher developed a computer based learning module for the ED RNs.

Summary

This section provides a general idea of the problem of sepsis management in the ED of the hospital. Early signs of sepsis can be missed by the RN. The development of a quality enhancement project such as the RN Sepsis Training Program can sustain the nurses working in the ED. This platform was based on research and grounded in theory using conceptual frameworks. Instrumental application allows for translation of the evidence to change the preexisting practice of management of the patient with sepsis (Grove, Burns & Gray, 2013). The authors go on to say that development of guidelines or policies can transform knowledge into action. Additionally, nursing theories guide nursing research and professional performance (Alligood & Tomey, 2010). The authors argued that the interrelationship between theory, knowledge, research and evidence-based practice is important when addressing a clinical problem. Section 2 covers the following topics review of scholarly evidence, the city's population, the nurse's role and quality health care. The Stetler model and Benner's novice to expert theory were investigated as tools to help understand the data.

Section 2: Review of Scholarly Evidence

Introduction

In the absence of a formal sepsis training classes for ED nurses at the organization, this project sought to develop an educational program to support the ED nurses in the care of patients with sepsis or septic shock. Section 2 presents an evaluation of the literature and theoretical framework that support the use of the nurses training program.

The purpose of this quality enhancement project was to develop a sepsis educational program that support the ED RNs This section examines the scholarly literature on the following topics: population, sepsis, the nurse's role in sepsis identification and nurse's education, health information technology, and theoretical models that can lead to program expansion.

Literature Research Strategy

The literature search used the following databases: CINAHL Plus with Full Text, OVID, Cochrane Library, and Medline. The following terms were used: *sepsis, emergency room, surviving sepsis,* and *EBP*. The Boolean expression, OR, was used to broaden the scope of articles; the expression, AND, was used to narrow the scope of articles. The literature review included professional and medical peer reviewed journals, nursing textbooks and clinical resources. The following websites also proved useful for the review: Emergency Nurses Association and the American Nursing Association. The purpose of the literature review was to provide scholarly support for early sepsis identification and ED nurse education.

Literature Review

Sepsis is problem and claims the lives of thousands of people annually (Society of Critical Care Medicine 2015; CDC, 2016). The SSC provides guideline to manage the care of patients with sepsis and septic shock (Society of Critical Care Medicine, 2015). Early treatment of sepsis reduces hospitalization and sepsis related mortality rates (Madsen et al., 2014). The Society of Critical Care Medicine and the European Society of Intensive Care Medicine has provided the SSC to guide health care providers on the management of sepsis (The Society of Critical Care Medicine, 2015). However, sepsis management is a problem in EDs throughout the world (Ferrer, et al., 2008): Society of Critical Care Medicine,2015 & Yousefi, Nahidian, & Sabouhi, 2012). Education of nurses is an important aspect of clinical practice problems including management of sepsis (Groves, Burns & Grey, 2013). There is continued need for research on the problem of managing sepsis in the ED.

The City

The City's Population

The suburban city is located minutes away from downtown. Data collection can focus on the community profile, social assessment, health status and risk for future sepsis (Hodges & Videto, 2011). The city's health is influenced by the demographics of the population and a person's economic status can predict what medical treatment that they may seek. 15.3 % of the nation's population under the age of 65 years does not have health insurance; on the other hand, 22.3% of the city's population under the age of 65 years does not have health insurance (United States Census Bureau,2015).

During the years 2009- 2013, the median household income of the United States was $53,046, when compared with the city's median income of $30,619 (United States Census Bureau, 2015). People in the communities are faced with many barriers to accessing appropriate health care including poverty, cultural practices and beliefs, availability of resources, and health insurance (CDC, 2016). Approximately, 10.1% of people under age 65 years had a disability during the years 2009- 2013, as compared to 8.4% of the nation's population (United States Census Bureau, 2015).

Access to Care

Approximately, 29 million Americans do not have health insurance Almost, 29 million Americans are uninsured (CDC, 2016). The lack of health insurance can cause the patient to delay seeking medical treatment and they can be very sick by the time treatment is sought in the ED. Uninsured person are at higher risk for health problems than those with health insurance (Institute of Medicine, 2009). The poverty rate in United States of America is 14.5%, whilst the city had a rate of 33.1% (United States Census Bureau, 2015).

Per Healthy People 2020 (2014) obstacles to accessing good health care includes: not having health insurance, high price tag on health care and the availability of health care. During 2008, Americans ages 18 years and older made more than 98 million (78%) ED visits for acute and chronic health related problems. Healthy People 2020 (2014) have a major goal to improve the nation's ability to obtain complete superior health care access. Another deterrent to health care access is the availability of adequate staff to meet the need of the patients. Some of the members of the ED's interdisciplinary team consist of the: doctors, nurses, pharmacist, social worker, case managers, lab personnel, manager, educator, director, secretary and patient care

technician. A fully functioning staff can provide adequate care to the patients beginning from the time they enter the ED with diverse health care needs including natural disasters and disease manifestation (McHugh, 2010).

ED Staff, Recruitment, and Retention

ED nurses are needed to triage patients, administer medication and other emergency treatment (McHugh, 2010). ED nurse recruitment and retention are important aspects of the department because patients enter the doors 24 hours of the day and nurses are needed to provide immediate care to the patients (Jackson, 2006). Due to the health care restructuring in 1990s, there has been a decrease in the number of registered nurses who work in the hospitals (McHugh, 2010). The author goes on to say that nurses leave because of discontentment with the job and retirement. According to the American Nursing Association (2015), education, training and skills development improves nurse retention and job satisfaction.

A descriptive, non-experimental study design was conducted with 101 EDs; these departments were level 111 trauma centers ED throughout the United States (McHugh, 2010). The study was intended to look at some successful strategies that are been used to improve retention and recruitment of ED nurses. Some tactics includes: increase in educational loan exoneration, grants for training, clinical educational instructions, and tax-based inducements. Additionally, the article highlighted the need for federally subsidization programs to invest in and support nursing schools and faculty.

The ED Nurse

Early goal-directed therapy for sepsis saves patients' lives; however, early implementation remains a problem in the ED of hospitals across the nation (Burney et al., 2012).

The ED nurse is an essential part of the health care team who assist in health care recovery (McHugh, 2010). The RN's source of knowledge initially came from what was learned in nursing school, best practice research evidence data, clinical reasoning and expertise. Additionally, experience, research, teaching and traditions allow the nurse to be proficient in patient care (Grove, Burns & Gray, 2013). The nurses in the ED work in different sections including triage, urgent care, trauma room, and the treatment room. The triage nurse is the first medical personnel that the patient encounters when they enter the hospital via the ED. Per the position statement by the Emergency Nurses Association (2011) the ED RN ought to conduct a succinct evaluation and make an accurate decision about the next phase of treatment. The ED nurse has a very important role in recognizing sepsis and initiating treatment because failure to pay critical attention to slight changes in vital signs can result in death. The ED nurse must use critical judgment and timely intervention to save lives of the patients who present with sepsis.

The ED nurse should identify hall mark signs of sepsis such as temperature > 101 F (38.3 C) or < 96.8 F (36 C), pulse > 90 beats a minute, and respiration rate > 20 breaths per minutes (Society of Critical Care Medicine, 2015). It is very important to recognize sepsis and commence lab draws for lactic acid and blood culture. Additionally, initiation of IV fluid and antibiotics is crucial within the first three hours (Society of Critical Care Medicine, 2015). The nurse is called to protect, assist with alleviation of suffering, health promotion, prevent illness, treatment of human, coordinates and provide patient care (Grove, Burns & Gray, 2013). The scope of practice can change in different health care environments, and can be guided by facility policy and procedures and state board of nursing requirements. Nurses become burnt out due to different factors including inadequate staffing, high patient to nurse ratio, and high patient acuity

(American Nursing Association, 2015). Despite these challenges, many nurses find emergency nursing rewarding and fulfilling and they are excellent candidates as sepsis champions (Grant, Colello, Riehle, & Dende, 2010).

Background of the ED Nurse Role

The American Nurses Association (2015) describes nursing scopes and standards of practice by asking specific questions about the nursing practice including, why the practice is done, where it is done and how it is done. Different health care specialties have specific scopes and standards of practice. The Emergency Nursing Scope and Standard of Practice guides nursing care in the ED and multifaceted care ought to be delivered immediately in a rapid time frame (Emergency Nurses Association, 2011).

ED nurses are expected to have a strong comprehension foundation to provide safe and competent patient care (Evans & Kohl, 2014). They must use critical judgment, skills and evidence based practice in their daily routine (Emergency Nurses Association 2011). More of the nation's citizens are seeking health care need via the ED, therefore it is important for the nurses to know their roles and scope on practice in the department (Evans & Kohl, 2014). The Emergency Nurses Association (2011) recommend that the ED nurses should have specialized professional educational to ensure the delivery of safe emergency room care. The Institute of Medicine (2009) and other health care reformers recognize that the nurses need additional training and education.

HealthCare Reforms Transforms the ED Nurse Role

The Registered Nurse Safe Staffing Act (H.R. 5527/ S .3491) was launched in the House and Senate in June 2011 (American Nurses Association, 2011). Over 20 states have endorsed

safe staffing legislation including: Texas, Oregon, Nevada, Washington and Illinois. The safe staffing mandate allow the ED nurse to practice safely within the scope of her education and training. The results of this act have benefitted the hospital, patients and nurses (American Nursing Association, *n.d*). The IOM (2009) recommends that nurses should receive higher level of education and training through an enhanced education system. This allow the ED RN to improve in the delivery of safe health care to the patients in the ED. Recommendations to improve sepsis management includes education, accountability and prevention of infections (Aitken, et al., 2011).

Nurse Education Training

There is support for nursing education. According to Nash et al., (2011) the IOM, the National League for Nursing, and the state boards of nursing recommend health professional educational reform. The IOM (2009) recommends the development of an educational curriculum for nurses that focus on knowledge and skills development to enable the provision of quality care**.**

Sepsis education can alert the nurses to subtle signs of sepsis. A study was done to evaluate the impact of sepsis educational program on nurses' capability to recognize, intervene and provide adequate nursing care for patients with a sepsis diagnosis. A total of 82 nurses from the ED and intensive care units participated in the yearlong program. After the study, there was no improvement in the self-assessment competence scores; however, the nurses felt more competent in their ability to provide care for the patients with sepsis (Delaney, Friedman, Dolansky, & Fitzpatrick, 2015).

Ferrer et al., (2008) reported on a study done in Spain during the years 2005 to 2006. The chosen sites were 59 intensive care units (ICU) located throughout the country. The researchers construed that inadequate sepsis education affected the care of sepsis management in the country. The objective was to decide if an educational program using principles from the SSC affected provision of care for the septic patients and severe sepsis mortality rate. The nurses and physicians from the ICU, ED and the inpatient departments were educated on sepsis, identification and management of septic shock and severe sepsis. The study concluded that the national education resulted in decreased hospital mortality and increased compliance with the SSC guidelines.

According to the American Association of Colleges of Nursing (2006) the creation of an educational program can be facilitated by the DNP graduate. Nurses are being called upon to fill expanding roles and to master technological tools and information management systems while collaborating with other health professionals**.** Nurses should be encouraged to participate in nursing research and practice what was learned (Williams & Jordan, 2007).

The IOM (2009) recommended nurse's education and training through an improved education system. An ED in a university hospital in the Netherlands conducted a sepsis training program for nurses and the results indicated that there was earlier recognition of sepsis, improved nurses' compliance with the SSC and overall improved patient outcome (Tromp et al., 2010).

The National League for nursing (2014) support completion of a training program for nurses. Patient needs have become more complicated, and nurses ought to attain requisite competencies to deliver high-quality care. The National Council of State Board of Nursing

(2015) recommends that nursing education should include research, patient values and clinical expertise. These competencies include research and evidence-based practice, as well as competency in specific content areas including identification and treatment of sepsis in the ED.

Affordable Care Act

The Affordable Care Act was approved by Congress and signed by President Obama in 2010. This allows the health care consumer to take charge of their health. Additionally, they can appeal any health care decisions they believe were inappropriate (U.S. Department of Health and Human Service, 2014). Nurses must be educated and empowered to deliver appropriate care to diverse population and with different health conditions including sepsis (White & Dudley-Brown, 2012). The current nursing shortage in the United States began in 1998 (Buerhaus, Staiger, & Auerbach, 2011). Unfortunately, the crisis continues as more nurses become burnt out, achieve higher degrees, and leave the bedside for various reasons. Patient safety is negatively affected by the departure of nurses from the bedside (Mason, Leavitt, & Chafee, 2012).

An assessment of 2,200 nurses was completed and 90% of nurses indicated that the work load has escalated in the last few years and patient's safety is at risk (Dean, 2011). Despite the many challenges facing the nursing professions, health care is a national priority and nurses are mandated to focus on the patient, use collaboration, and constantly improve the care (Kelly, 2011). The nursing profession has over 3 million members and can make a positive contribution to the objectives set forth by the 2010 Affordable Care Act (IOM, 2009). Nurses should achieve higher levels of education and training through an improved education system that promotes

seamless academic progression and practice within their scope of practice laws (Zaccagnini & White, 2011).

Scope of Practice

In 2000, America health system was ranked 37th out of 191 countries by the World Health Organization (2000). Nurses are called upon to practice within their scope of practice to improve the American health system. The National Council of State Board of Nursing (2015) provides standard of care for delivery of safe nursing care across the states. According to the board, each state has rules and regulation concerning scope of practice for the RNs, License Practical Nurse and other license health care professionals. The IOM Future of Nursing Initiative advised that by 2020, health care facilities should have approximately 80% BSN nurses.

The American Association of Colleges of Nursing (AACN), (2006), recommends that the nurses collaborate with other health care team members to provide optimum care to the patients. The National Council of State Board of Nursing (2015) works in partnership with nursing practice societies to provide much needed information to the nursing body. The DNP graduate can assist in the creation of health policies on local and international level to assist the RNS to provide nursing care within their scope of practice (American Association of Colleges of Nursing, 2006). The Nurse Practice Act protects the patient from dangerous nursing practice and supports the RN in building skills, knowledge and autonomy in patient care (National Council of State Board of Nursing, 2015).

ED Nurse Role and Training Program

Sepsis places a financial burden on the nation. The IOM of the National Academies, (2010) reckon that medical errors is to blame for approximately 1 million injuries and can reach

annual death of over 100,000 deaths in the United States. Nurses have a very crucial role in the identification of patients with sepsis, mobilization of the medical team, and executing interventions (Delaney, Friedman, Dolansky, & Fitzpatrick, 2015).

The title of RN is ascribed to an individual, who has passed the NCLEX-RN exam after completing a course of study at a state approved school of nursing (National Council of State Board of Nursing, 2015). The nurse can enter the profession with a diploma in nursing, associate degree or a Bachelor of Science in Nursing. The nursing program spans two to six years and prepares the nurse to practice in diverse health care environment. According to the National Council of State Board of Nursing (2015) ineffectual care places the patient at risk for harm. Many facilities provide a general hospital and unit specific orientation to new RN employees and the RN is assigned a preceptor for a designated time. Therefore, a support program should be established to ensure the RN has a full comprehension of caring for the patients that come through the ED (IOM, 2009). The American Association of Colleges of Nursing (2006), highlighted that nurses should have training using an enhanced education system

The IOM (2009) recommends there should be a focus on nursing education. Health care agencies including the Institute for Healthcare Improvement (2015) are willing to provide educational resources to support nursing education. Health care organizations, the state board of nursing, and the federal government should support educational programs for RNs. The subsequent actions should be taken to execute and support RN training programs in specialty units including the ED:

- Health care organizations, including hospitals can improve their patient's satisfaction scores when the nurses are educated and know the appropriate nursing interventions.

Patient safety is improved when nurses are competent (Fero, Witsberger, Wesmiller, Zullo, & Hoffman, 2009). Additionally, the hospital is significantly affected by the nurse's education and clinical expertise (McHugh & Lake, 2010).

- Additionally, the nurses take an active role in health care when they are well educated (American Nursing Association, 2015).
- State board of nursing: The National Council of State Board of Nursing (2015) should continue to provide educational topics associated with nursing practice and the ED nurses ought to participate in these opportunities.
- Federal government- the Affordable Care Act aims to improve health care and the nursing education must persist even after the RN has passed the NCLEX. Additionally, the IOM and the Robert Wood Johnson Foundation (2015) have collaborated to meet the educational needs of the nursing vocation.

Health care organizations that use nurse training and educational program have seen positive patient outcomes (Palleschi, Sirianni, O'Connor, Dunn, & Haseanu, 2014). Additionally, studies have shown that nurse training program can improve patient safety, (Fero, Witsberger, Wesmiller, Zullo, & Hoffman, 2009; National League for Nursing, 2014; Williams & Jordan, 2007).

Conceptual Framework

The application of EBP models and nursing theories have a positive influence on clinical practice problems. Evidence base models and frameworks can be incorporated in the educational program to meet the need of the staff and care for the septic patient (White & Dudley-Brown, 2012).

The Stetler Model of Research Utilization

The Stetler Model of Research Utilization is a comprehensive framework that promotes EBP in nursing (Stetler, 2001). It can be used to guide the development of the educational sepsis training program (Grove, Burns & Gray, 2013). The authors go on to say that it has been successfully used in institutional to develop policies, revise protocols and other health care changes. Additionally, it can be used by educators to develop educational programs. This model was useful in the development of the sepsis educational program because it provided guidance in the management, application and education about sepsis. The five sections of the model are; preparation, validation, comparative evaluation and decision making, translation and application, and evaluation. Implementation of the sepsis education program was planned in details and the evaluation was conducted. According to Hodges & Videto (2011) evaluation must be ongoing to determine if there is need to make changes. It also identifies if objectives and goals are being met, examine progress and note vigor and flaws of the program.

The Stetler Model was successfully used in a large urban medical center. It was used in a staff development curriculum to rejuvenate a preceptor program. The application of the model resulted in a decrease in staff turnover and the nurses were more satisfied with their preceptors (Romp & Kiehl, 2009).

Benner's Novice to Expert Model

Instrumental application allows for translation of the evidence to change the preexisting practice of caring for the patient with sepsis (Grove, Burns & Gray, 2013). The authors go on to say that development of guidelines or policies can transform knowledge into action. Studies have shown that students learn best when they are given more opportunity to learn and spend time

learning (Palardy, 1994). The Novice to Expert model was derived from the Drefus Model of Skill Acquisition (Benner, 1984). The model describes the clinical preparedness of the RN as she grows into an expert. The Novice to Expert theory has been effectively used to develop educational and clinical understanding, seminars and orientation programs (Benner, 1984; Alligood & Tomey, 2010). The model can be used in the educational program for the ED to help in the transformation process in caring for the patients with sepsis. This model is useful in identifying the nurses need and categorizing the different stages of their professional growth in the ED.

There are five components of the model.

Novice- is a beginner with very little or no experience (Benner, 1984; Alligood & Tomey, 2011). At times the RN may have prior nursing experience, however when placed in a new environment, or there is change in policy or practice they can become a novice in the environment. The accentuated focus on sepsis management in the ED categorizes the nurses as novice in sepsis management.

Advance beginners- have enough knowledge to recognize and intervene in regular situations (Grove, Burns & Gray, 2013). The ED nurse ought to be able to recognize the hall mark signs of sepsis including elevated pulse rate, temperature and respiration (Society of Critical Care Medicine, 2015).

Competent- two to three years' experience in the same work environment the nurse can demonstrate marginal acceptable performance (Benner, 1984). They have enough experience to grasps concept, have time management and organizational.

Proficient- the nurse can see the whole picture and possibly gain increased confident in their knowledge and abilities (Benner, 1984). The RN is then able to administer antibiotic and intravenous fluid to the septic patient within three hours of arrival to the ED because untreated sepsis can result in patient's demise (CDC, 2016).

Expert – is highly skilled, can predict the unexpected and is quick and reliable (Benner, 1984). The expert nurse can be encouraged to use EBP to provide quality patient care to reduce sepsis in the ED (Grove, Burns & Gray, 2013).

According to the American Nurses Association (2015) and the Emergency Nurses Association (2011), the ED nurse must provide comprehensive care to all the patients. However, with the new emphasis on sepsis identification and timely intervention, the nurse can be faced with the challenge of being a sepsis novice. The educational program was designed using Benner's model to guide the nurse in the transition from a sepsis novice to an expert. The domain that can be valuable to the nursing education progam includes: teaching, diagnostic patient procedures, efficient management of immediate change in patient's condition, administration of therapuetic inteventions, monitoring and maintaing qualtity health or clinical practices and nurse responsibility and competencies (Benner, 1984).

The integration of the two selected conceptual models, the Stetler Model and Novice to Expert model was successfully used to plan the sepsis training program for the ED nurses. The Stetler model was used to appraise, develop, implement, support and evaluate the educational program (Stetler, 2001). Benner's theory provided a strong foundation for support and implementation of skills, clinical knowledge and competence (Benner, 1984). The 21st century

health care professional should be committed to using health information technology, collaborative team work, EBP, and accentuating patient-centered care (Clutter, 2009).

Sepsis treatment usually begins in the ED and then the patient is transferred to an Intensive Care Unit, and at times the six hour interventions are completed in the ICU. Several studies were done in ICUs. An evaluation was done after a one-day sepsis educational program on nurses understanding, attitude, and nursing practice of nurses in an Iranian intensive care unit. The results indicated that there was a major increase in the mean score of comprehension, attitude, and nursing practice in the test group instantaneously and at three weeks later (Yousefi, Nahidian, & Sabouhi, 2012).

The Joint Commission Center for Transforming Healthcare (2014), reports that the cost of sepsis management is approximately 17 billion dollars annually; therefore, the goals are early recognition and prompt medical intervention. Suarez, et al., (2011) highlighted a study to determine the cost of the sepsis bundle after an educational program was implemented when compared to traditional sepsis care. The study was done on 59 medical-surgical intensive care units located throughout Spain. The two-month education program trained nurses and physicians from the ED, surgical and medical departments, and ICU in Spain. The curriculum included early identification and management of severe sepsis utilizing the SSC guidelines. The results of the study indicated that there was enhanced use of the SSC protocol and there was decreased hospital mortality rate. Additionally, there was an increased financial cost with the use of the SSC protocol when compared with the standard care for sepsis management.

Education and clinical practice changes can result in improvement in sepsis management. Palleschi, Sirianni, O'Connor, Dunn, and Haseanu (2014) outlined the result of the effect of

inter-professional sepsis education. The goal was to improve early identification and treatment of sepsis. Nurses, physicians, rapid response team and midlevel providers from four hospitals were provided education on sepsis related topics including: pathophysiology, sepsis awareness, surviving sepsis guidelines, blood cultures, antibiotics and judicious treatment and interventions. After education, there was an improvement in blood culture being drawn prior to antibiotic administration, improved lactate levels drawn and an improved time to antibiotic administration. In another study, comprehensive sepsis education was done for the nurses and doctors in an ED and ICU. After six months, the results indicated decreased mortality rate from 51.4% to 27.0% and 37 patients were diagnosed with sepsis in the ED and treatment was commenced immediately instead of being started in the ICU. Additionally, there was shorter antibiotic start time and earlier goal directed treatment start time (MacRedmond, Hollohan, Stenstrom, Nebre, Jaswal, & Dodek, 2010).

The sepsis education project at the ED of the practicum hospital was planned to be done initially, annually and included in all new RN employees' orientation schedule. Shiramizo, Marra, Durão, Paes, Edmond and Santos (2011) highlighted a sepsis educational program in an ICU that was conducted initially and reinforced annually. Prior to the education program, the six-hour compliance rate was six% and the mortality rate was 54%. At the end of the study in three years later, the six-hour compliance rate was 13.7%, and hospital mortality rate was 16.2%.

This project was designed for the ED nurses. Delaney, Friedman, Dolansky, and Fitzpatrick (2015) highlighted the effect of sepsis education on nurse's competence. 82 ED and critical care nurses participated in a one-year critical care training program. The results showed no improvement scores in self-assessment, however; the nurses felt more competent to provide

care for the septic patients. The post assessment knowledge grades improved significantly. Burney, Underwood, McEvoy, Nelson, Dzierba, Kauari & Chong (2012) conducted a study to determine sepsis barriers on specific barriers at the ED of a major urban academic medical center. The result of the survey indicated that knowledge deficit and procedural difficulties hindered sepsis identification and management.

Summary

The literature reviews examined evidence- based literatures about the problem of sepsis and ED RNs education to gain a better perceptive about implementation of applicable intervention strategies. Research strategies provided an avenue to delve into various library databases and books and use key search words to obtain sepsis material. The literature search focused on the city, the ED nurse, nursing education and health care reform. Two theoretical frameworks, The Stetler model and Benner's Novice to Expert model, were discussed to provide theoretical understanding of the patient population, the clinical problem, and the educational development of the ED nurses. Literature research has shown barriers to nurses providing quality health care and highlighted some solution to nursing education and quality health care. Yet, there is a significant gap in the literature to support sepsis education for the ED RN.

A wide array of recommendations has been made by the retrospective research appraisal. Training programs, models and frameworks, exploratory studies, and the use of technology has proven to be useful. Additionally, national and statewide health care improvement programs focus on innovative ways to promote the translation of knowledge. Educational training programs are supported by the IOM and literature research. The facilitator of this project has worked at the hospital for the last 10 years and have seen procedures and policies changed

thorough the years and the RN's attempt to provide quality care despite lack of structured education, high staff turnover and staffing challenges. The hospital leaders and unit management team ought to provide a supportive environment and encourage the education process.

I prepared for the sepsis program by conducting extensive research; gathering retrospective and real time sepsis data from the ED's electronic medical record to validate that there was a problem with sepsis management. Extensive literature review identified the impact of sepsis on patient's lives, practical application of EBP and the clinical practice problem affecting the ED's throughout the nation. I appraised the literature, developed the curriculum and used a collaborative team approach to support the education program. I, who worked on the project does not have an ED background; my 21 years of experience spans diverse specialties including ICU, medical surgical nursing, oncology and stroke. The initial preceptor, who was the director of the emergency nursing service, reported that sepsis management is a problem in the department. I compiled a retrospective sepsis audit for more than one year. It revealed an inconsistent application of the sepsis order set for patients who presented with the signs and symptoms of sepsis. I had no bias or personal gain from this sepsis educational project. Section 3 describes the approach to the quality improvement initiative to develop a RN sepsis training program to support the nurses in the ED.

Section 3: Approach

Introduction

The purpose of this quality improvement project was to create and maintain a RN sepsis training program to support nurses in the ED. The project included an execution and an evaluation plan. A pilot study was planned prior to the proposed implementation. A pilot study is done with a smaller population prior to the start of a larger study. This is valuable to the researcher because it provides preliminary data that can influence the larger study. The pilot provides meaningful data including required finances, time frame and methods of execution (Kannan & Gowri, 2015).

The American Nurses Association (2011) states that nursing care depends on many factors, including skill level and the education qualification of the nursing staff.

This section outlines the steps of the curriculum development process for the RN sepsis training program (see Figure 1).

1. Organize a project team with institutional stake holders (ED director, manager**,** educator and ED RN).
2. Guide the project team in reviewing appropriate data and literature.
3. Obtain internal review board approval.
4. Develop the RN training curriculum.
5. Select nursing theory to base the program.
6. Write and review program mission statement
7. Review other EBP programs.
8. Establish time table.

9. Choose strategy and activities for program.
10. Develop an evaluation plan.
11. Write learning objectives.
12. Pilot the program with a selected group

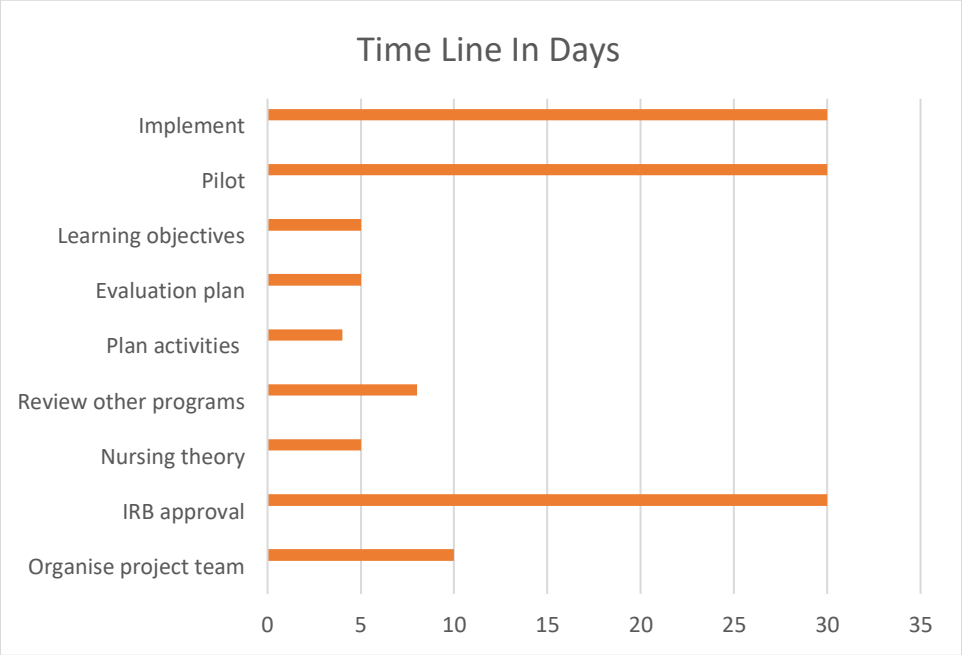

Figure 1. Gantt chart with project time line in days.

Data Collection and Analysis

The data were collected at a single site in the natural setting of the ED of the practicum site (Groves, Burns, & Gray, 2013). Health information technology has created an innovative era in health care and allowed for the use of software to capture essential statistics (Gruber, Cummings, LeBlanc, & Smith, 2009). I received the list of patients with a discharge diagnosis of sepsis from the director of the ED, who in turn received it from a management system engineer

from the quality institute department. I began surveying the EMR to retrieve the variables for the research project. The list of patients with discharge diagnosis of sepsis was always provided at least two to three months after the patients had been discharged or died.

Data collected from the EMR included the following: clinical data including time of arrival to the triage department, patient complaints, vital signs, method of arrival to the ED including via ambulance or patients who walk in to the department. Data collection was approved by Walden University's IRB (see Appendix A) (07-06-16-0490691). Permission to obtain data from the EMR was granted from the Informatics department, the hospital review board and the risk management department. All collected data was stored on an external hard drive and kept in a locked office on the fourth floor of the hospital.

The collected data were used to track trends, medication, and to obtain crucial diagnostic test results. Retrospective sepsis data from the ED's electronic medical record from February 2014 to July 2015 provided valuable data before the educational program. The data indicated the length of time from patient's arrival to triage to time of blood culture and lactic acid sample collection, time of antibiotics and intravenous fluid administration (Society of Critical Care Medicine, 2015).

Additionally, data retrieved from February 2014 to July 2015 examined specific points. Data for January 2015 was not available; therefore, the graphs did not have variables for the month. Significant points included an analysis of patients with a discharge diagnosis of sepsis, patients who met the sepsis criteria in the ED, all sepsis interventions within 3 hours and missing vital signs in triage department. This data was abstracted and entered in a spread sheet and then displayed in bar graphs (see Figures 2 and 3).

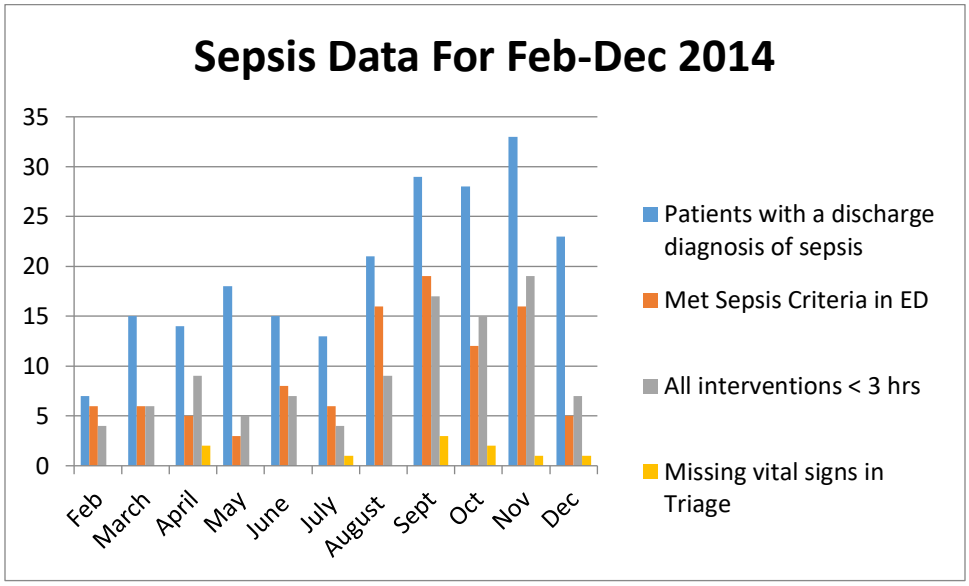

Figure 2. Sepsis data for February–December 2014

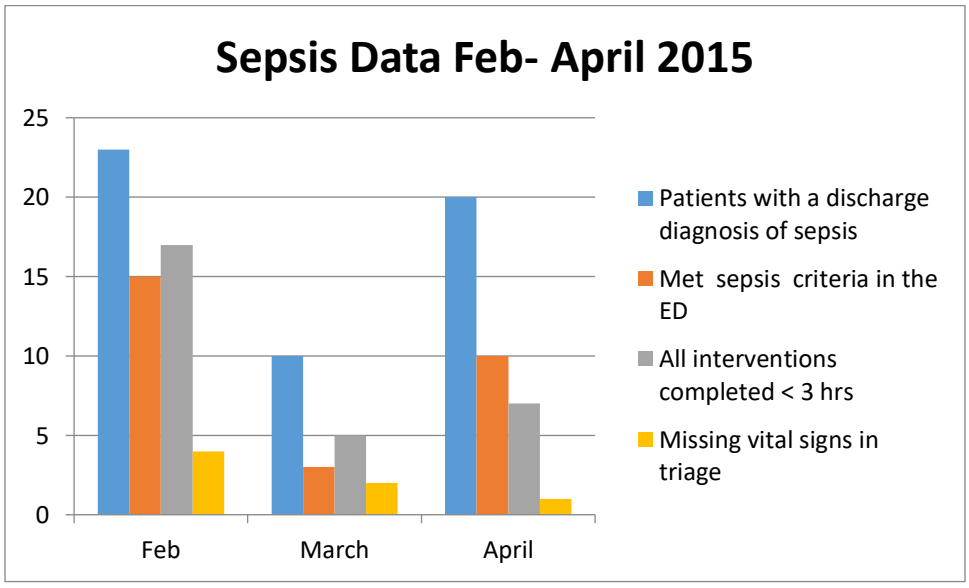

Figure 3. Sepsis data for February- April 2015

A flyer was made, inviting RNs working in the ED to participate in a research project about ED nurse's perception about sepsis education. The RNs were asked to complete an anonymous demographic data form and a sepsis questionnaire. Then five nurses from each shift were randomly selected, resulting in a total of twenty nurses. The nurses selected for the pilot program were chosen from the 7AM to 7PM, 11AM to 11PM,3PM to 3AM, 7PM to 7AM and the 3AM to 3PM shifts. They represented the target population of nurses from the ED (Grove, Burns & Gray, 2013). The nurses were given an introduction letter to describe the reason for the educational program. The duration of the pilot class is two hours and the nurses receive two continuing education credit hours from the Alabama State Board of nursing for attending the class. Participants are required to evaluate the class upon completion.

Descriptive statistics analyzed the nurse's demographic data including gender, assigned shift and length of time working in the ED (Grove, Burns & Gray, 2013). This data was represented using graphs and tables. Quantitative research is very valuable in examining the efficiency of an intervention (Terry, 2012). Due to time constraints, the comparison of the usage of the SSC bundle before the class and after the class using a one-way Analysis of Variance (ANOVA) was not done. The ANOVA can be useful to analyze the variation in the 3-hour window of lactic acid and blood culture collection, and administration of antibiotics and intravenous fluid administration before the educational class and at three months' conclusion of the class. The use of one-way ANOVA in this educational program would be beneficial as it can examine comparisons in the means of sepsis order set usage and three-hour implementation of the four components before and after the class.

Interdisciplinary Project Team

Selection of the team members was based upon their skills; experience and their role in the ED and in decision making capability related to new hospital projects (Woods & Magyary, 2010). They also had key roles in the project and have the authority to revolutionize current practices (White & Dudley-Brown, 2012). Managing change, networking with other team members, and using the latest innovations in information technology are strategies for achieving these goals and having successful program outcome (Groves, Burns & Gray, 2013). According to McGrath et al., (2008) visible participation of the senior management is crucial in encouraging the transformation process.

The health care team is more prone to accept the proposal if they believe it can help them or make the work easier; therefore, the project team must sell the idea as a great innovation. Team work, communication, trust and collaboration support the program (Nash et al., 2011). The authors recommended allowing all viewpoints to be heard and using the Delphi technique of using a group consensus and setting precedence of what is most important in the quest for success in improving compliance. Team approach is essential to a successful training program for the nurses in the ED program. Collaboration amongst the project team is crucial to prepare and deliver a successful program using EBP to develop the curriculum and for the implementation process**.**

The most complex aspect of any project is the execution (McGrath et al., 2008); however, professional guidance can provide strategies to guide the approach and changes.

The team members of this quality enhancement project included the following:

1.The team leader and author of this project served as the facilitator.

2. Clinical nurse educator of the ED provided contribution and guidance on the curriculum.

3.The ED director endorsed and supported the program.

5.The ED nurse manager endorsed and supported the program.

6.The Chief Nursing officer of the hospital representing the three-hospital system supported the project.

7. Director of professional practice department provided input regarding orientation process and continuing education.

Review of Evidence

The team members were provided with a detailed list of the research literature and theoretical framework that support nurse's education. Two frameworks guided the educational program, Benner's Novice to Expert model (Benner, 1984) and the Steltler Model. The combination of the Stetler model and the Novice to Expert model can be effectively used to plan and execute the sepsis training curriculum for the ED nurses. According to Kettner, Moroney and Martin (2008) the Stetler model assess, develop, implement, sustain and evaluate the educational program. Benner's theory provides a solid underpinning for support and skills application, clinical understanding and proficiency (Benner, 1984). Policy makers and financial health care investors want to know pertinent data about cost control and positive health outcome of the interventions (Bodenheimer & Grumbach, 2012).

Clinical practice reformation and program planning must be guided by principles and goals; the care should be timely, unbiased, competent, patient centered and safe (Ridenour & Trautman, 2009). When each RN in the ED is educated about caring for the sepsis patient from an evidence base perspective, attitudes towards caring can be transformed. This would alter the

current delivery of care to one of quality health care (Bodenheimer & Grumbach, 2012). The goal is to use this knowledge to provide evidence-based care to the patients and by extension their families. The use of philosophy and knowledge development should result in better patient care (Groves, Burns & Gray 2013).

Ethical Considerations

Ethics is the moral values and principles that guide decision-making and conduct (Nash, et al., 2011). I submitted the essential paperwork to obtain authorization from Walden University, the internal review board of the sponsoring hospital and the policy and procedure committee of the hospital prior to developing the RN training program. Additonally, application and approval for two contiuning credit hours was obtained from the Alabama State Board. Addressing ethical issues relating to patient and staff must be considered when planning an educational program. According to the Society of Public Health Education (*n.d*), the health educator should protect the privacy and dignity of the individuals, both patients and staff. Therefore, no names or identification were used in this research project.

Procedures were taken to ensure ethical protection of the ED nurses. Walden University Intuitional Review Board (IRB) granted approval (#0706160490691) for the project which allowed data to be collected. The information section of the Sepsis Survey Questionnaire and Demographic Data Collection Tool (See Appendix C) informed the participants that anonymity is assured and there is no identifying information collected, and they were advised to refrain from putting names on the paper. The information section stated that the completion of the questionnaire and demographic data denote consent for participation in the project. The section goes on to say that there is no compensation for participating in the study. Additionally, the study

is voluntary and they will not be treated differently if they withdraw from the study project. The participants were also informed that the data are to be stored in a locked office for at least 5 years and then disposed of per the facility's protocol.

Develop RN Training Program

Curriculum Development

The planned intervention aimed at designing a core curriculum to support the RN in the ED of the hospital. There were interviews with essential team members including the nurse educator, director and manager. This was done to establish the educational needs and topics to be included. The curriculum component was created based on topics identified during planning and from retrospective sepsis audits. The curriculum modules (see Appendix B) included: SSC, ED nurse's role in sepsis identification, hall mark signs and symptoms of sepsis, practicum site sepsis data for one year and sepsis mortality rates.

The IOM (2010) reported that the competencies in health profession education includes providing patient centered care, collaborative team work and EBP. The Emergency Nurses Association (ENA) (2011) recommends specialized education exceeding what is essential for licensure, this is crucial to guarantee safe practice in the ED. The American Nursing Association (2015) recommends that health care leaders should devise inventive strategies to build a safer patient environment for the patient and for the RNs to deliver health care. Improving RNs education aim to smooth the progress of the efficient use of bundled health care strategies (Palleschi et al., 2014). Nurse's knowledge can develop with education (Benner, 1984); they will be able to apply early goal therapy and other principles of the SSC guideline. The RNs would be knowledgeable about the rationale for timely blood draw of lactic acid and blood culture, timely

administration of antibiotics and fluid as outlined by the Society of Critical Care Medicine (2015).

Educational Delivery Modality

The curriculum was developed solely for the nurses in the ED of the main campus and I as the project leader understood that adults have different learning styles (Bradshaw & Lowenstein, 2011). Strategies planned for the delivery of the education (see Appendix B) included writing activities, self-appraisal and skill development discussion (Hodges & Videto, 2011). Additionally, two sepsis video (each 5 minutes' duration), questions and answer session and group discussion were planned. Problem based learning strategies would be beneficial for the educational project (McEwin, & Wills, 2011). This included the use of case studies and medical/clinical situations to promote inter-professional communication, critical thinking, technology use and self-direction. The ENA (2011) supports the use of teaching strategies such as case studies, simulations, class room lectures. The case study (see Appendix F) outlines a patient who was admitted with left knee pain and ended with a diagnosis of sepsis, renal failure and left above knee amputation. The case study authenticates the life changing impact of sepsis on the patient's life.

Content Validation

Data from successful RN educational syllabuses were used to develop the curriculum and were tailored to meet the need of the program (Hodges & Videto, 2011). The manager of clinical education corroborated the clinical content of the program and awarded the continuing education credit from the Alabama State Board of Nursing.

Develop Implementation Plan

I, the project team leader worked in partnership with the interdisciplinary team to plan the implementation. Two frameworks guided the implementation plan. Benner's theory proposes that the nurse who is an expert in one area can be considered a novice in a new environment or nursing situation (Benner, 1984). The new emphasis was on sepsis training, which was a new situation for the ED nurses. The preparation phases of the Stetler model involved determining a purpose for the change in practice and validated it with research (Stetler, 2001). The basis provisional plan for implementation is highlighted below:

Pilot Project

- The Stetler Model was used to organize, corroborate, comparative evaluation and resolution making, transformation and application and evaluation (Stetler, 2001).
- Benner's theory proposes that nurses learn from clinical example (Benner, 1984) therefore the pilot project can reveal growth or reduction in the nurse's clinical skills and practice during the pilot and in the implementation of the program.
- Factors taken into consideration included the existing ED, hospital and educational budget and the break-even analysis.
- The project team outlined an execution plan for the pilot phase of the program.
- Education of 20 ED nurses (5 from the following shifts- 7AM-7PM, 7PM- 7 AM, 3AM-3PM, 3PM- 3AM and 11AM - 11PM).
- The pilot was planned for twenty nurses.

Expanded Implementation

- The Stetler Model and the Novice to Expert models was used to plan implementation of the program, categorize evidence base data for dissemination and modify plans.
- Validation phase (Stetler, 2001) scrutiny of supporting scholarly writings to identify the scientific strength.
- Education for the other member of the ED staff including the patient care technicians, phlebotomists and pharmacists prior to the go live date.

Develop Evaluation Plan

Evaluations should begin at the start and continued throughout a project. The objective of evaluation is to determine the success of the sepsis education in improving sepsis management and reducing sepsis related complication and or death. The DNP leader provided evaluation options and presented the project team with the two theoretical frameworks. Evaluation strategies included ensuring nurses have the educational knowledge to understand the EBP process (Woods, & Magyary, 2010). The CDC (2016) recommends asking evaluation questions; these includes- who, what, why and when about the project, to guide in the appraisal process. Evaluation focuses on which results meet the intended outcome goal (Bradshaw & Lowenstein, 2011). Evaluation strategies also included observation of the nurses caring for septic patients, questions and EMR audits (Zaccagnini & White, 2011). The evaluation phase of the Steler model recommends evaluating the approach, system modifications and the conclusion of the study. Per Stetler (2001) evaluation can be informal or formal. Informal evaluation can include discussion with the ED nurses and the other stake holders. Formal evaluation includes both retrospective,

real time audits and the evaluation of the outcome of the project. Additionally, evaluation at the end of the class can evaluate the learning activity.

Team meetings discussed evaluation and decision of any modification that was needed. Clinical leadership is critical to success of the EBP; therefore, the evaluation can disclose the support or lack thereof from the leadership team (McGrath et al., 2008). The Stetler model (Stetler, 2001) recommends routine evaluations. The author goes on to say that comparative evaluation: substantiate the evidence, verify that the evidence can be used in the health environment, check practicability of using the research result and concerns with the current practice at the hospital.

Short- term evaluation goals include improved compliance in sepsis protocol which would be evident by improved retrospective sepsis compliance audit results. As cited in Hodges & Videto (2011) impact evaluations measure short term transformation in the target group (the ED nurses) and monitors behaviors modification. Additionally, the questionnaire surveys can indicate the nurse's comprehension of sepsis prior to the class (Terry, 2012). Likert scale measures factors including staffing matrix, and knowledge of SSC. It also provides pertinent data including nurse's gender, age, educational background and length of time working in the ED (Wendel et al., 2010).

Long term evaluations determine the overall effectiveness in reducing the existing sepsis mortality rate from 24.77% to 20% within one year. Outcome evaluation determine whether the long-term goals were achieved (Hodges & Videto, 2011). It also establishes the nurses' awareness, attitudes, and perception of sepsis. The positive goals outcome included: visible measurable changes in the organization including increase survival of septic patients, a reduction

in sepsis deaths, timely intervention and treatment, 100% compliance with SSC and improved sepsis mortality rating scores. The expectancy is that all ED RNs attend a sepsis update class annually to ensure continued competency and the class will be a part of the orientation for each new ED RN.

Per the CDC (2016) frequent monitoring ought to be done during the evaluation process. Therefore, weekly review of the electronic medical record can evaluate the use of the SSC guidelines in the management of the septic patients in the ED. The data collected during February 2014 to July 2015 provided valuable data before the educational program. The evaluation is to determine the nurses' compliance with SSC principles after the education. The proposal is that the ED Clinical nurse educator audit the EMR of five septic patients monthly for three months using the sepsis audit tool (see Appendix G) to conduct real time audit. The Sepsis Performance Improvement Data Collection Tool (see Figure 4) was designed to identify challenging issues during the three months. The data will be discussed with the team in the fourth month and the team determine the next phase.

Sepsis Performance Improvement Data Collection Tool

Evaluate compliance with SSC for 5 patients monthly for a total of 3 months	Feasibility Rating 1=easy to gather data 2=possible to gather data 3=not possible to gather data	Identify issues, challenges, consideration	RN Name	
Month 1 Date Patient 1 Patient 2 Patient 3 Patient 4 Patient 5				
Month 2 Date Patient 1 Patient 2 Patient 3 Patient 4 Patient 5				
Month 3 Date Patient 1 Patient 2 Patient 3 Patient 4 Patient 5				

Figure 4. Sepsis Performance Improvement Data Collection Tool

Summary

Early recognition of sepsis and timely intervention by the ED nurse reduces sepsis mortality. Reducing sepsis is a nursing quality measure that is best dealt with using detailed interventions. Quality improvement projects such as the RN sepsis training program is needed to increase sepsis awareness and empower the nurses to use best practice method for early identification, interventions and treatment of sepsis. This section of the proposal provided a general idea of the team approach to the development of the project and curriculum, the implementation process and data collection for evaluation.

There would be an evaluation of the pilot class and changes made before the implementation of the training class. The long-term goal is that the sepsis class be made mandatory for all ED RNs. The recommendation is that the training classes be held once monthly over a three-month period to ensure that all the ED nurses are educated about sepsis management. Short term and long term evaluations provides valuable information to the team. Section 4 discuss the finding, discussion and implication of the project.

Section 4: Findings, Discussions and Implications

The purpose of the quality improvement was to create and maintain a RN sepsis training program to support nurses in the ED. The project included an execution and an evaluation plan. Between February and August 2014, I collected data from the medical records of patients in the ED at the practicum site. Retrospective chart audit done indicated that 103 patients had a discharge diagnosis of sepsis, but only 20 sepsis order sets were used to initiate tests and medication for these patients (see Figure 5).

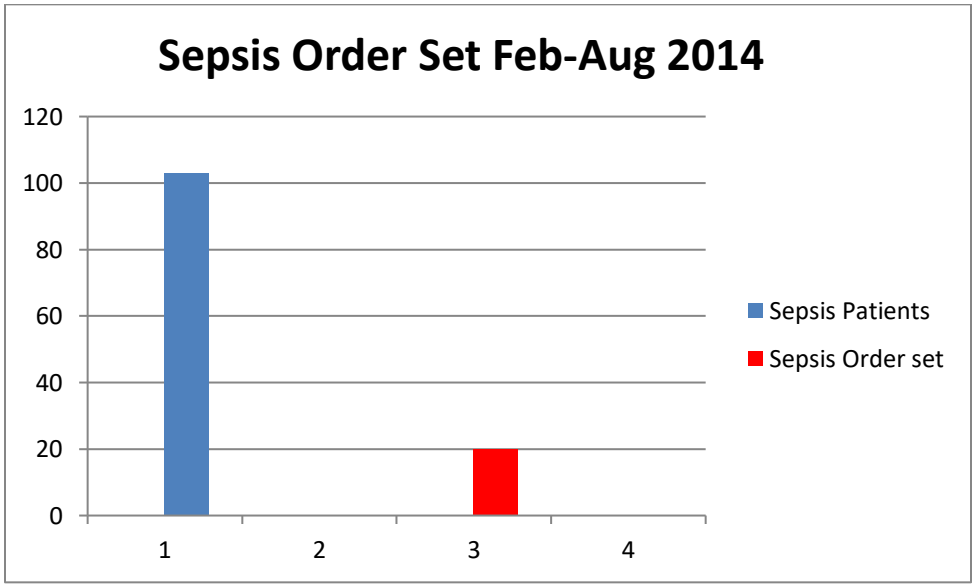

Figure 5. Sepsis order set February- August 2014

Additionally, 135 patients with a sepsis diagnosis were admitted via the ED during the months of March to July 2015; of these 30 died (see Figure 6).

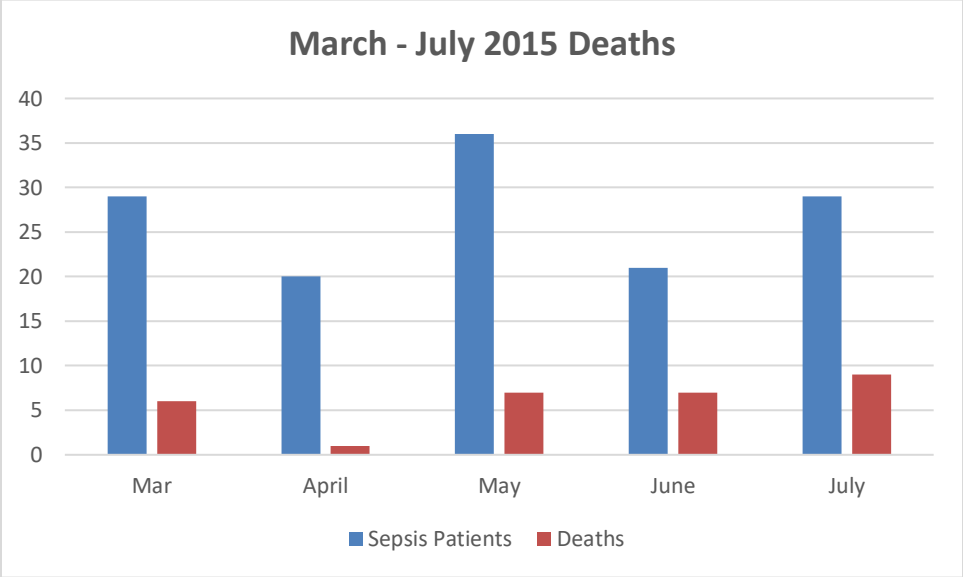

Figure 6. Sepsis deaths March -July 2015

The Society of Critical Care Medicine (2015) recommends that within 3 hours of admission patients with sepsis should have blood cultures and lactate levels drawn; they ought to receive antibiotics along with 30ml/kg crystalloid for hypotension or lactate ≥4mmol/L. However, data collected from the ED medical record revealed that the length of time from triage to one or more of these interventions was over 14 hours. This data supports the need for ED RNs to have need further training on sepsis management.

Research and planning can help the researcher in the development of a project. I appraised the literature, developed the curriculum, and was the leader in the research, preparation, planned implementation and delivery, using a collaborative team approach to deliver the education program. The ED nurse's role includes triaging, medication administration, and other medical interventions (McHugh, 2010). The ED of the practicum site has a vacancy of 35 nurses. Short staff can impact the care provided to the patients. The RNs in the ED at the

practicum hospital usually have five or six patients all requiring immediate treatment and therefore she cannot provide simultaneous treatment to all the patients. The project could not be implemented primarily because of short staffing.

Evans and Kohl (2014) highlighted the interventions that was done in a busy ED. The education council developed a 4-hour skill day and focused on 13 skills that were recognized as crucially important for the nurses; these skills included restraints, sepsis, stroke and triage. The goal was to increase the nurse's skills and knowledge and improve positive patient outcome. Another facility used a multi modal approach which included interactive online presentation, videos, pre-and posttest and simulation scenarios. 82 nurses in the ED and critical care participated in the yearlong sepsis education program. The purpose of the study was to determine the effect of sepsis education on the nurse's ability to recognize, intervene and manage the patient with sepsis (Delaney, Friedman, Dolansky, & Fitzpatrick, 2015). A hospital in Detroit provided sepsis education to doctors, nurses and respiratory therapist using mandatory self-learning units together with in-services. The education was done over a two-month period and the education was reinforced with posters in the department and badge extenders sepsis guidelines (Palleschi, Sirianni, O'Connor, Dunn & Hasenau, 2014).

Summary and Evaluation of Findings

I used primary source data, national nursing and nursing practice organizations including the Society of Critical Care Medicine (2015) and the Emergency Nurses' Association (2011). The 2012 guidelines outlined in the SSC (Society of Critical Care Medicine, 2015) provided a wealth of educational resources.

Literature review indicated that ED sepsis management is a problem in the United States. A research done by Burney, Underwood, McEnvoy, Nelson, Dzierba, Kauari, and Chong (2012) examined barriers to early detection and treatment and implementation of a sepsis protocol. The barriers identified included limited space in the ED and insufficient nursing staff.

Timely management of sepsis reduces inpatient stay and 28-day mortality rates in patients with sepsis or septic shock (Madsen et al., 2014). The Society of Critical Care Medicine (2015) developed the SSC to guide in sepsis management. Shiramizo et al., (2011) concluded that there are many phases and performance appraisal in the process of execution of the SSC guidelines. The SSC is not the only approach to reduce sepsis, but its application is positively impacting sepsis onslaught on patient's lives.

Conceptual frameworks including Benner's Novice to Expert and Stetler model supports nursing education. Both these frameworks were used as a foundation to support the education program. The application of the two conceptual frameworks offered a rich foundation to sustain the sepsis training program for ED nurses.

Implications

Presently, there is no sepsis training or formal sepsis education for the ED nurses at the practicum hospital. When the nurses cannot adequately identify sepsis then interventions will not be performed in a timely manner. The training program purpose was to equip the ED nurse to recognize sepsis and to provide early goal therapy. This comprehension can translate into effective clinical practice. Ultimately, the patient benefits from early interventions, have shorter length of stay and reduced sepsis related mortality (Society of Critical Care Medicine 2015). Nurses can be a great asset in delivery of evidence based clinical practice because they are the

ones at the bedside. The nurses ought to be knowledgeable of the disease process and the required intervention to effectively prevent and treat diseases.

Impact for Future Research

The SSC was introduced to the facility in 2013, and a computerized sepsis order set was developed by the informatics department. The ED nurses were encouraged to implement the sepsis order set when patients exhibit signs and symptoms of sepsis. Retrospective chart audit done during February – August, 2014 revealed that 103 patients had a diagnosis of sepsis; only 20 Sepsis order sets were used to initiate tests and medication for these patients. The RN training program was developed to educate the nurses and contribute significantly to support the nurses in the endeavor to combat sepsis. However, sepsis audits and further research to identify barriers to compliance and sepsis education needs are required to help with education and management of sepsis in the ED.

Madsen et al., (2014) recommend that early interventions be continued to prevent the complications of sepsis and recommended further research to explore the issue of sepsis and treatment inequality. The application of EBP models and nursing theories have positive impact on clinical practice problems (Grove, Burn & Gray, 2013). The result of research has positive effects in the practice of using the SSC. Therefore, continued sepsis education is recommended for the ED nurses and further research on the ED nurses role in early sepsis identification and management. Additionally, further research is needed on achieving sepsis management when the ED is challenged with RN short staff.

Impact for Social Change

Sepsis education for the ED RNs has the potential to affect social changes. Patients, their families, the hospital and the nurses are all impacted by this education. Training can facilitate improvement in assessment skills, a sense of urgency and increased confident in sepsis management for the nurses. Continued nursing education and competency is supported by the IOM (2009), American Nurses Association (2015), National Council of State Board of Nursing (2017) and the National League for Nursing (2014). The ED nurse do not function independently in sepsis management.

The interdisciplinary team all have important roles in providing quality safe care to the patients and should be provided with training and education (White & Dudley-Brown (2013). Sepsis education can be beneficial for ED interdisciplinary team members. Sepsis education is not only envisioned for the nurses. Other members of the health care team can benefit from education, including the patient care technician, phlebotomist and the pharmacist.

Patients benefit from the nurse's sepsis education. Untreated sepsis or severe sepsis can lead to organ dysfunction, disability or death. Patients can remain in the ED for many hours before being transferred to a specialized department or the ICU. Early detection and treatment enable the nurses to use critical judgement, draw labs and to start the three hour and six hour bundles in the ED. This includes antibiotics and fluid resuscitation. Early treatment of the patients can result in reduced mortality, morbidity and increased survival rates (Critical Care Medicine, 2015). The nurses can also educate the patients on causes of sepsis and management of the effects of sepsis after discharge. The effective treatment can result improved patient and family experiences.

The community can be impacted by the nurses' sepsis education. At risk population including the elderly, immunocompromised, babies and persons recovering from surgery can present to the ED with other health problems. The nurse can educate these patients about signs and symptoms of sepsis, thus increasing their awareness of possible health complications.

The hospital will benefit from the nurses' education. Reducing infections is an important factor in health care. Education can contribute to early identification and thus ensure that the society at large is receiving quality sepsis care. The Center for Medicare and Medicaid Services (2015) pays health care institution based on performance. Positive social change will be heightened by having a trained ED nurses who are competent to work in the department and can identify sepsis and other devastating health related problems.

Patients will benefit from the nurse's education. Patients with sepsis have a lengthier hospitalization than those without sepsis. Early detection and treatment reduces hospitalization, sepsis related complication and mortality rate (Madsen et al., 2014). Sepsis comorbidity places a large economic burden on the hospitals. Reduced inpatient stay results in less finances spent on sepsis. This program aimed at educating the ED RNs but has great implications for healthcare and the community.

Nurses are called upon to develop knowledge that help people in the society (McCurry, Revell, & Roy,2010). Education empower the nurses and they can transition from sepsis novice to expert over a period (Benner, 1984). The nurse is the first medical personnel to conduct a physical assessment on the patient. Additionally, the nurse has continuous interaction with the patient and thus would be able to identify subtle changes in vital signs or changes in lab values.

The RN can use the hospital sepsis protocol to begin treatment immediately. Educating nurses to provide optimum care will improve morbidity outcome and decreased mortality (Terry, 2012).

One social impact of this quality improvement project is the enhanced knowledge amongst the ED nurses caring this patient population. Increased sepsis knowledge would translate into practice and the nurses would be more prepared to intervene in a timely manner and do a social good by providing timely sepsis treatment and management. Patients receiving care from specially trained ED nurses possibly will have an improved health care experience. The research conducted during this project provided evidence that an educational program will be beneficial to improve the ED nurse's assessment skills and timely intervention (The American Nurses Association (2015), Emergency Nurses Association (2011), Society of Critical Medicine (2015) and The National League for Nursing (2014). Section 5 discusses the recommendation and conclusion.

Section 5: Recommendation and Conclusions

Introduction

In the U.S. A., the hospitalization rate of patients with septicemia or sepsis more than doubled from 2000 to 2008 (Hall et al., 2011). This project focused on sepsis education for the nurses who work in the ED at the practicum hospital.

Project Strengths and Limitations

Strengths

Two conceptual frameworks, Benner's Novice to Expert and the Stetler model guided the development of the project. Nurse's education and the application of EBP models and nursing theories have a positive influence on clinical practice problems (Grove, Burns & Gray, 2013). The Emergency Nurses' Association (2011) supports the use of teaching strategies such as case studies, simulations, class room lectures, discussions and self-learning modules. Educational resources and materials were obtained from valid resources including the American Nurses Association (2015), Emergency Nurses Association (2011), Society of Critical Medicine (2015) and The National League for Nursing (2014).

Limitations

The project was not implemented during the practicum due a few reasons. The ED is experiencing a severe nursing shortage, there are vacancies for 35 nurses and there have been multiple leadership changes within the last few months. The new manager stated that due to staff shortage, he is not able to consent for the ED RNs to attend a two-hour class because they were needed to staff the department. Time constraints did not permit the pilot class because there is no prediction as to when the staffing crisis will be over. The education plan did not include

education of other members of the ED team including the doctors, patient care technician, ED pharmacist and the phlebotomist. Possible limitation to the study is the training was planned for only one ED and did not include the ED at the other hospital. Another possible limitation is that the sample for the pilot class would be slightly diverse with respects to gender because the ED nursing staff is predominately females.

Recommendations for Remediation of Limitations

I developed a mandatory computer based learning (CBL) module that covers crucial pertinent data of the sepsis training program. The CBL includes sepsis, a case study and has nine questions (See Appendix G). The CBL has been designed for the ED RNs at the two-emergency departments. Furthermore, when the staffing challenges are resolved a pilot class can be done at both the EDs of the hospital and should not be limited to the main campus. Three months after implementation of the educational program, data from the EMR should be collected to determine if there are improvement in the timeliness of treatment and the mortality rate of sepsis, severe sepsis and septic shock in the department. The ED chief of staff can be responsible for educating his medical staff and holding them accountable for sepsis orders compliance. Education ought to be provided for the patient care technicians and the phlebotomist about the importance of timely blood sample collection. The ED pharmacy staff shall be asked to dispense the antibiotics and intravenous fluids as soon as the orders have been verified in the EMR. Further research should be performed to explore other methods of educating the ED nurses in diverse learning setting including seminars, continued education and the effectiveness of the education in improving sepsis management.

Analysis of Self

Scholar

As a DNP scholar, I am tasked to be a change agent (Terry, 2012) for quality improvement in the delivery of health care. Per the American Association of Colleges of Nursing (2006) the DNP scholar should use advance processes to initiate quality enhancement and patient safety initiatives. I have researched EBP literatures and other scholarly evidence to become knowledge about the ED and sepsis management to effectively lead this project. The purpose of the quality improvement project aims to enhance the delivery of care to the septic patients, educate and empower the nurses to provide timely interventions.

Practitioner

As a DNP practitioner, I have an important task to ensure the nurses demonstrate professional competency (American Nurses Association, 2015). Therefore, I have a crucial part providing a favorable environment to enhance competent training. This atmosphere can be promoted by ensuring the nurses are educated on the EBP care of sepsis management. The AACN (2006) stated that I should be prepared to develop and appraise health care delivery methods to meet the requirement of the patient populace. The DNP practitioner is well equipped to explore a problem, develop solution, achieve, deduce and synthesize research (Zaccaginini & White, 2011). As a DNP practitioner, I have researched the problem of sepsis and the devastating effect on patient's life. Literature research have provided EBP guidelines to support the nurses and improve sepsis management.

Project Developer

The objective of this quality improvement project (Terry, 2012) was to make a significant contribution in solving the problem of early sepsis identification and timely management in the ED. The project developed from identifying the health care problem, preparation, organizing, execution and assessment. As a project developer, I had the privilege of taking the project through various steps including; identifying the problem, needs assessment, literature analysis, drafting the premise, proposal, and submission to Walden University Institutional Review Board.

Future Professional Development

This project can become the forerunner for future professional development classes. Sepsis is a problem in the United States, and more than 220,000 lives are lost annually (The Joint Commission Center for Transforming Healthcare, 2014). Additionally, sepsis management places a financial burden on the health care system. The training class provide an opportunity for the nurses to participate in educational opportunities in the work place. Additionally, the RNs receive continuing education credit hours. Two theoretical framework support the sepsis training program and the class offers an opportunity to educate and empower the nurses to become adept at early sepsis identification and management.

Summary and Conclusions

This quality improvement project endeavored to standardize sepsis care in the practicum ED by providing an RN sepsis training program on the use of the SSC bundles for patients presenting to the ED with sepsis, severe sepsis or septic shock. This increased sepsis awareness aimed to empower the nurses to use best practice method to manage and treat sepsis (Alligood & Tomey, 2010). Using a multidisciplinary team approach, I led the development of the core

curriculum, using interactive multifaceted approach to develop the project. The evaluation can determine the overall effectiveness of educating the nurses resulting in reducing the existing sepsis mortality.

Nurses are at the bedside constantly and if adequate sepsis training is provided, can identify sepsis, notify the doctors and implement sepsis interventions in a judicious manner (Ferrer et al., 2008). Application of the educational program can support and guide the ED nurses in the sepsis care and can ultimately decrease the sepsis mortality rate in the city.

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Appendix A

Institutional Review Board Approval 07-06-16 # 07060490691

Appendix B
Curriculum Modules

Title of Activity/Session: Sepsis Training Pilot Class for ED Nurses

Identified Gaps: Gap in knowledge, practice and skills

Purpose:
To create a dependable foundation from scholarly writing on which to sustain the foundation of a sepsis training program for the nurses in the ED applying: The Stetler model of research (Grove, Burn, & Gray, 2013) and Benner's Novice to Expert theory (Benner, 1984). The class is designed for the nurses who work in the ED at the practicum hospital.

Objectives	Content	Time Frame (Minutes)	Teaching methods (materials & resources)
	Introduction	5	
Learners will be able to describe what is sepsis	• Causes • Risk factors • Signs • Symptoms	15	• Power point • Video presentation **Resources** • Society of Critical Care Medicine (2015).
Learners will be able to identify deficits caused by sepsis	• Permanent • Temporary • Disability	15	• Writing activities **Resources** • Society of Critical Care Medicine (2015
Learners will be able to outline effective strategies for the management of sepsis in the ED	**Diagnostic tests** • Blood culture • Lactic acid **Treatment** • Broad spectrum antibiotics • Crystalloid • Vasopressors • Reassessment of tissue	20	**Case study** **Resources** • Electronic medical record • Hospital policy • Society of Critical Care Medicine (2015).

	perfusion and fluid volume **ED's Team role** **Nurses** • Triage nurse, primary nurse, charge nurse **Inter-disciplinary team approach** • Patient care technician • Pharmacist • Physicians • Phlebotomists • Other members **Timely Intervention and treatment** • 3-hour intervention • 6-hour intervention		
Break	Break Time	10	
Learners will be able to summarize the guidelines in care of patients with sepsis/septic shock	The Surviving Sepsis Campaign is designed to guide in the management of sepsis commencing in the ED. • The Joint Commission Center for Transforming Healthcare • World Health Organization	20	• Case study continued **Resources-** • World Health Organization (2000) • The Joint Commission Center
Learners will be able to review the impact of sepsis	• Increase patient length of stay • Sepsis related financial burden on the hospital and patients	15	• Data from the facility's Electronic medical record • Audit result from 2014-2015

	• Untreated sepsis can result in multi-organ failure • Death.		
Questions/answer		10	
Evaluation	• Evaluation	10	
References			Emergency Nurses Association. (2011). Retrieved Fromhttps://www.ena.org/SitCollectionDocuments/Position%20Statements/TriageQualifications.pdf Society of Critical Care Medicine. (2015). Retrieved from http://www.sccm.org/Research/Quality/Pages/Surviving-Sepsis-Campaign.aspx The Joint Commission Center for Transforming Health Care. (2014). Retrieved from http://www.centerfortransforminghealthcare.org/projects/ detail .aspx?Project=8 World Health Organization. (2000). Retrieved from http://www.who.int/whr/2000/media_centre/press_release/en/

Appendix C

Sepsis Survey Questionnaire and Demographic Data Collection Tool

Information

This survey is being conducted to obtain valuable data about the ED nurse's sepsis educational knowledge and need. The result of the survey is important because it will provide valuable information to guide in meeting the educational need of the department. ED nurses were chosen to participate in this survey because the proposed educational plan will be geared towards the nurses in the ED. It is vitally important that honest answers be provided for the survey. There is no compensation for participating in the study. The completion of the questionnaire and demographic data denote consent for your participation in this pilot class. Anonymity is assured and there is no identifying information collected, therefore please refrain from putting your name on the paper. The data will be stored in a locked office for at least 5 years and then disposed of per the facility's protocol.

Voluntary Nature of the Study

This study is voluntary. Everyone will respect your decision of whether you choose to be in the study. No one at the hospital and Walden University will treat you differently if you decide not to be in the study. If you decide to join the study now, you can still change your mind later. You may stop at any time.

Risk

Being in this type of study involves some risk of the minor discomforts that can be encountered in daily life, such as fatigue or stress. Being in this study would not pose risk to your safety or wellbeing.

Directions

Please follow the directions in each section and fill out survey in its entirety. Upon completion of the survey questionnaire please place the completed survey in the survey box located on the desk to the front of the classroom. Please contact me at 404 XXX XXXX or daphne.davis-patrick@waldenu.edu if there are any questions about the survey. Thank you for taking time out of your busy schedule to participate in this survey.

Demographics Data Collection Tool

Please check the appropriate boxes-

1. What is your professional role?
   - ☐ RN
   - ☐ Clinical Coordinator
   - ☐ Manager
   - ☐ Other _____
2. Gender
   - ☐ Male
   - ☐ Female
3. What is your highest education level?
   - ☐ Associate Degree
   - ☐ BSN
   - ☐ MSN
   - ☐ PHD/DNP
   - ☐ Other _____
4. How many years have you been working in this ED?
   - ☐ 0-3 years
   - ☐ 3-6 years
   - ☐ 6-9 years
   - ☐ More than 9 years
5. How many years have you been working in this hospital?
   - ☐ 0-3 years
   - ☐ 3-6 years
   - ☐ 6-9 years
   - ☐ More than 9 years

6. What is the nurse to patient ratio?
   - ☐ 1-4
   - ☐ 1-5

- ☐ 1-6
- ☐ 1-7
- ☐ More than 1-7

7. How often do you initiate the sepsis protocol?
   - ☐ More than 1-time daily
   - ☐ Daily
   - ☐ Once weekly
   - ☐ More than once weekly
   - ☐ Other _____

8. Where do you work mostly?
   - ☐ Triage
   - ☐ Urgent Care
   - ☐ Main 1-3
   - ☐ Rapid Medical Evaluation (RME)
   - ☐ Other_____

9. In your opinion, which of the following are the most common ED diagnosis/complaints? (More than one answer is allowed)

   - ☐ Respiratory failure
   - ☐ Hypertensive crisis
   - ☐ AMS
   - ☐ Fever
   - ☐ Chest pain
   - ☐ Sepsis
   - ☐ Falls
   - ☐ Other_____
   - ☐ GI bleed

10. Do you receive information about Sepsis?

    - ☐ Yes
    - ☐ No

11. If the answer to question 10 is yes, then from which of the following sources (more than one answer is allowed)

    - ☐ Guidelines/policies
    - ☐ Workshops/seminars
    - ☐ Medical/ nursing journals
    - ☐ Continuing educational courses
    - ☐ Colleagues

☐ Other _____

12. In the last year, did you attend any sepsis educational classes in your hospital?

☐ No
☐ Yes

13. Do you feel you need more information about sepsis?

☐ No
☐ Yes

13. What will help you in your endeavor to identify sepsis? More than 1 answer is allowed

☐ Team work
☐ Education
☐ MD's cooperation
☐ Management input
☐ Other _____
☐ Enhanced staffing

Sepsis Questionnaire

The following questions relate to general perception and belief about sepsis and sepsis education.
Please specify how true each sentence is for you by using the following scale

		Not at all true			Somewhat true		Very true	
	Questions	1	2	3	4	5	6	7
1	I feel confident using the MD ordered protocol for Sepsis initial orders							
2	I feel confident using the Sepsis Severe and Septic Shock initial resuscitation order set							
3	It is easy to find the sepsis protocol in the policies and procedures							
4	If a patient present with more than 3 of the SIRS criteria, I usually initiate the Sepsis protocol							
5	The ED sepsis protocol is easy to activate							
6	Management usually keeps me informed about things I want to know about sepsis							
8	I feel comfortable caring for patients with sepsis							
9	I believe that I have been appropriately trained to identify sepsis							
9	I believe that I have an important role in sepsis prevention and reduction							
10	My knowledge of the sepsis protocol is very good							

Appendix D

XXXXX Medical
877701 Mosby Road
Mosby, GA XXXXX

EVALUATION FORM

PURPOSE: The purpose of this activity is to enable learners to identify and assess and manage patients with sepsis/septic shock and become competent to deliver appropriate interventions and treatment

ACTIVITY NAME: Pilot Sepsis Class for ED Nurses

ACTIVITY DATE: _____ CONTACT HOURS: 2. 0 ASNA

CIRCLE THE WORDS THAT YOU THINK BEST EVALUATES THIS ACTIVITY

TEACHING EFFECTIVENESS OF INDIVIDUAL PRESENTER:

Daphne Davis-Patrick Yes No Somewhat

ENABLES ME TO ACHIEVE THE SESSION OBJECTIVES:

1. Learner will be able to describe the:
   - I. Causes of sepsis Yes No Somewhat
   - II. Risk factors Yes No Somewhat
   - III. Signs/Symptom Yes No Somewhat
2. Learners will be able to describe the deficits caused by sepsis:
   - I. Permanent Yes No Somewhat
   - II. Temporary Yes No Somewhat
   - III. Disability Yes No Somewhat

3. Learner will be able to describe treatment of the patient with sepsis or septic shock
   Yes No Somewhat
4. Learners will describe the guidelines in care of patients with sepsis/septic shock
   Yes No Somewhat
5. Learners will be able to describe the impact of sepsis
   Yes No Somewhat

PROVIDED OBJECTIVES RELATIVE TO THE GOALS
Yes No Somewhat

EFFECTIVELY USED TEACHING METHODS AND LEARNING AIDS

Yes No Somewhat

PROVIDED PHYSICAL FACILITIES CONDUCIVE TO LEARNING:
Yes No Somewhat

ENABLED ME TO MEET MY PERSONAL OBJECTIVES:
Yes No Somewhat

FREE OF COMMERCIAL BIAS: Yes No Somewhat

CIRCLE THE NUMBER THAT BEST REPRESENT YOUR KNOWLEDGE ACTIVITY

LEGEND: 1= Poor 2 = Fair 3 = Good 4 = Very Good 5 = Excellent

ON A SCALE OF 1-5 KNOWLEDGE OF TOPIC BEFORE THE CLASS:
1 2 3 4 5

ON A SCALE OF 1-5 KNOWLEDGE OF TOPIC AFTER THE CLASS:
1 2 3 4 5

ADDITIONAL COMMENTS/ SEPSIS CLASS I WOULD LIKE TO ATTEND:

XXXX Medical *is an approved provider of continuing nursing education by the Alabama State Nurses Association, an accredited approver by the American Nurses Credentialing Center's Commission on Accreditation*

Appendix: E

Initiative/Program/Intervention Oversight and Data Use Agreement when Researcher has Dual Roles

Partner Site- XXXX Medical
Partner Contact Information – M.C.
XXX.XXX.XXXX

6/6/16

Daphne Davis-Patrick is involved in the development of **a Quality Improvement initiative program for the nurses in the ED, a sepsis training program** initiative which is being conducted under our organization's supervision within the scope of our standard operations. We understand that Daphne Davis-Patrick seeks to write about this initiative as part of a doctoral study for Walden University. To this end, we agree to share a de-identified dataset with the student for research purposes, as described below.

The student will be responsible for complying with our site's research policies and requirements.

The Walden University Institutional Review Board (IRB) will be responsible for ensuring that the student's published study meets the university's ethical standards regarding confidentiality (outlined below). All other aspects of the implementation and evaluation of the initiative are the responsibility of the student, within her role as our employee.

The doctoral student will be given access to a Limited Data Set ("LDS") for use in the doctoral project according via the ethical standards outlined below.

This Data Use Agreement ("Agreement"), effective as of **6/6/16** ("Effective Date"), is entered into by and between **Daphne Davis-Patrick** ("Data Recipient") and **XXXX**("Data Provider"). The purpose of this Agreement is to provide Data Recipient with access to a Limited Data Set ("LDS") for use in research in accord with laws and regulations of the governing bodies associated with the Data Provider, Data Recipient, and Data Recipient's educational program. In the case of a discrepancy among laws, the agreement shall follow whichever law is more strict.

1. *Definitions. Unless otherwise specified in this Agreement, all capitalized terms used in this Agreement not otherwise defined have the meaning established for purposes of the "HIPAA Regulations" codified at Title 45 parts 160 through 164 of the United States Code of Federal Regulations, as amended from time to time.*
2. *Preparation of the LDS. Data Provider shall prepare and furnish to Data Recipient a LDS in accord with any applicable HIPAA or FERPA Regulations*
3. *Data Fields in the LDS. No direct identifiers such as names may be included in the Limited Data Set (LDS). In preparing the LDS, Data Provider or shall include the data fields specified as follows, which are the minimum necessary to accomplish the research:* Age, gender, sepsis diagnosis, time of arrival to the emergency room, mode of arrival to the emergency room, vital signs, patient's complaints, time of antibiotic administration, time of intravenous fluid administration, time of blood collection for

Lactic Acid and time of physician orders for antibiotics, Lactic Acid and intravenous fluid.

4. *Responsibilities of Data Recipient. Data Recipient agrees to:*
    a. *Use or disclose the LDS only as permitted by this Agreement or as required by law;*
    b. *Use appropriate safeguards to prevent use or disclosure of the LDS other than as permitted by this Agreement or required by law;*
    c. *Report to Data Provider any use or disclosure of the LDS of which it becomes aware that is not permitted by this Agreement or required by law;*
    d. *Require any of its subcontractors or agents that receive or have access to the LDS to agree to the same restrictions and conditions on the use and/or disclosure of the LDS that apply to Data Recipient under this Agreement; and*
    e. *Not use the information in the LDS to identify or contact the individuals who are data subjects.*
5. *Permitted Uses and Disclosures of the LDS. Data Recipient may use and/or disclose the LDS for its research activities only.*
6. *Term and Termination.*
    a. *Term. The term of this Agreement shall commence as of the Effective Date and shall continue for so long as Data Recipient retains the LDS, unless sooner terminated as set forth in this Agreement.*
    b. *Termination by Data Recipient. Data Recipient may terminate this agreement at any time by notifying the Data Provider and returning or destroying the LDS.*
    c. *Termination by Data Provider. Data Provider may terminate this agreement at any time by providing thirty (30) days prior written notice to Data Recipient.*
    d. *For Breach. Data Provider shall provide written notice to Data Recipient within ten (10) days of any determination that Data Recipient has breached a material term of this Agreement. Data Provider shall afford Data Recipient an opportunity to cure said alleged material breach upon mutually agreeable terms. Failure to agree on mutually agreeable terms for cure within thirty (30) days shall be grounds for the immediate termination of this Agreement by Data Provider.*
    e. *Effect of Termination. Sections 1, 4, 5, 6(e) and 7 of this Agreement shall survive any termination of this Agreement under subsections c or d.*
7. *Miscellaneous.*
    a. *Change in Law. The parties agree to negotiate in good faith to amend this Agreement to comport with changes in federal law that materially alter either or both parties' obligations under this Agreement. Provided however, that if the parties are unable to agree to mutually acceptable amendment(s) by the compliance date of the change in applicable law or regulations, either Party may terminate this Agreement as provided in section 6.*
    b. *Construction of Terms. The terms of this Agreement shall be construed to give effect to applicable federal interpretative guidance regarding the HIPAA Regulations.*
    c. *No Third Party Beneficiaries. Nothing in this Agreement shall confer upon any person other than the parties and their respective successors or assigns, any rights, remedies, obligations, or liabilities whatsoever.*
    d. *Counterparts. This Agreement may be executed in one or more counterparts, each of which shall be deemed an original, but all of which together shall constitute one and the same instrument.*
    e. *Headings. The headings and other captions in this Agreement are for convenience and reference only and shall not be used in interpreting, construing or enforcing any of the provisions of this Agreement.*

IN WITNESS WHEREOF, each of the undersigned has caused this Agreement to be duly executed in its name and on its behalf.

Partner Site (Student's Employer)

Signed: M.C.

Print Name: M.C.

Print Title: MSN, RN

Director of Professional Practice

Doctoral Student

Signed: Daphne Davis-Patrick

Print Name: Daphne Davis-Patrick

Print Title: MSN, RN, DNP student

Appendix: F

SEPSIS CASE STUDY

- 50-year-old woman with history of chronic left knee pain
- Steroid cortisone injection in the knee (1-week prior at MD office)
- Pain increased and decreased weigh bearing
- 12/17 /15- Presented to the ED at M. campus with complaint of painful left knee
- Diagnosed with effusion, given pain medications and discharged

12/21/15-Presented to the ED at M. campus with complaints of:

A. Decreased appetite
B. Shortness of breath
C. Cough
D. Generalized weakness
E. Lethargic but easily to arouse

VITAL SIGNS: T 97.8 P 138 R 30 BP 82/ 46 SATs 96%

PAST MEDICAL HISTORY

- Hypertension
- Torn meniscus sustained from a workman's compensation injury to knee

TREATMENT AND INTERVENTIONS

- Antibiotics ordered at 23:31, administered at 00:36
- IV fluid ordered at 23:23, administered at 23:25
- 5 liters of IV fluid
- Lactic acid ordered at 23:23; collected at 2327
- Blood culture ordered at 22:51, collected at 2302

TESTS AND RESULTS

EKG- sinus tach, rate 143, no acute ST changes	Glucose -165
Chest x-ray- mild pulmonary edema, cardiomegaly	BUN- 53
CT kidney- shows hepatomegaly, perinephric stranding	WBC -18.3
Procalcitonin- 166.5	CK total- 7239
Creatinine- 7.5	Lactic acid- 8.3

EKG- sinus tach, rate 143, no acute ST changes	Glucose -165
Chest x-ray- mild pulmonary edema, cardiomegaly	BUN- 53
CT kidney- shows hepatomegaly, perinephric stranding	WBC -18.3
Procalcitonin- 166.5	CK total- 7,239
Creatinine- 7.5	Lactic acid- 8.3
AST- 159	INR- 1.3.

OTHER PROCEDURES

- Central line
- Left knee aspiration- 20 mls of purulent fluid
- Result of fluid- white cells 111,750 and 50,000 red cells, 91% segs.
- Gram-positive cocci
- Orthopedic consult at main campus
- Levophed drip started
- Transferred to ICU at the D.T. campus

ADMITTED TO ICU WITH A DIAGNOSIS OF:

- 1. Sepsis
- 2. Acute renal failure
- 3. Septic joint

TAKEN TO SURGERY

- Irrigation and debridement of left septic knee
- Knee irrigated with 9 liters of normal saline
- Hemovac drain inserted
- Mechanical ventilation & multiple vasopressors

DEVELOPED STREPTOCOCCAL TOXIC SHOCK WITHIN A FEW DAYS

- Blistering & severe involvement of left lower extremity suspicious for necrotizing fasciitis
- Generalized erythema consistent with toxic shock syndrome
- Hemodialysis
- Increasingly vasopressor dependent
- IVIG, Penicillin and Clindamycin
- Left above knee amputation

1/3/16

- CT scan of chest and ECHO
- Large pericardial effusion
- Early tamponade
- Subxyphoid window with chest tube

1/6/16

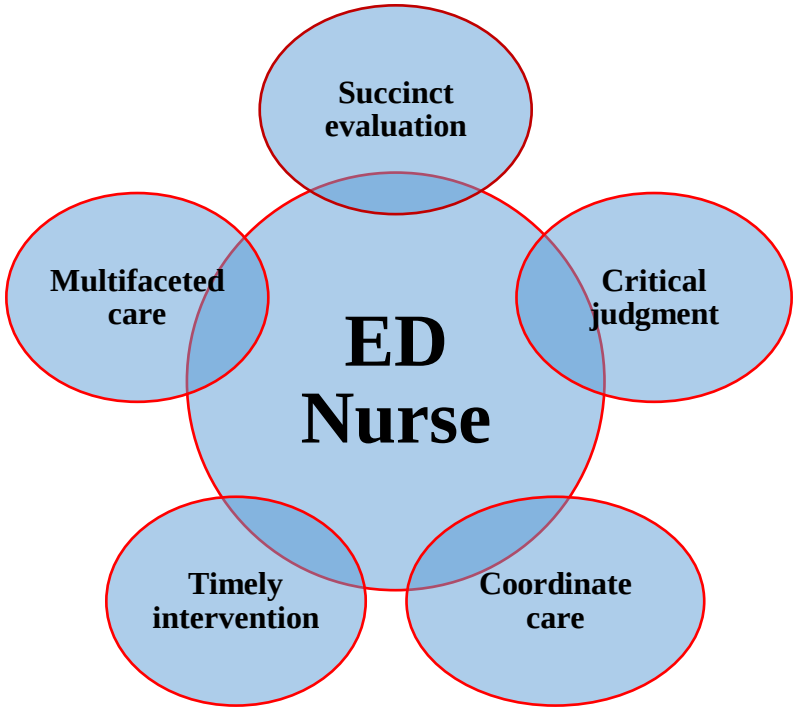
- Revision left above knee amputation.
- Anemia
- Ulcer right heel
- Phantom pain
- Plan- inpatient rehab and prosthesis

1/22/16

- Discharged to inpatient rehabilitation at another facility
- Continues hemodialysis
- Discharge diagnosis- sepsis, acute renal failure

Appendix G: **Computer Based Learning Module (CBL)**

SEPSIS CBL FOR ED NURSES



Sepsis Statistics

- During the years 2000 to 2008- hospitalization rate for septicemia/sepsis increased from 11.6 to 24.0 per 10,000 populations
- Inpatients with sepsis have a 75% longer average length of stay than those without sepsis
- Approximately 220, 000 sepsis related deaths in the U.S annually

Severe Sepsis

- Tissue hypoperfusion/organ dysfunction
- Sepsis-induced hypotension
- Lactate > upper limits laboratory normal

- Urine output < 0.5mL/kg/hr. for more than 2 hrs.
- Acute lung injury with Pao2/Fio2 < 250 (in the absence of pneumonia)
- Acute lung injury with Pao2/Fio2 < 200 (in the presence of pneumonia)

Severe Sepsis Manifested by

- Suspected source of infection- eg wound, UTI
- 2 or more manifestation of systemic infection:
  a. Temperature > 101 F (38.3 C) or < 96.8 F (36 C)
  b. Pulse > 90/min
  c. Respiration > 20/min
- Organ dysfunction evidence by one of the following:
  a. SBP < 90
  b. Acute respiratory failure
  c. Creatinine >2.0, Bilirubin > 2mg/dl, Lactate >2mmol/l
  d. INR > 1.5, Platelets <100,000

Septic Shock

- The presence of severe sepsis
- Persistent hypotension after administration of crystalloid fluid (30ml/kg)
- Persistent hypotension- SBP < 90, mean arterial pressure <65

Signs & Symptoms of Sepsis

- Temperature > 101 F (38.3 C) or < 96.8 F (36 C)
- Pulse > 90 beats/ min
- Respiration rate > 20 breaths/min
- Altered mental status
- Hyperglycemia
- Oliguria

Some Causes of Sepsis

- Bacteria
- Fungal
- Viral
- Wounds
- Urinary tract infection
- Pneumonia
- Intra-abdominal infections

Sepsis Treatment

- Early goal-directed therapy for sepsis save patient's lives
- Goal is to decrease sepsis mortality
- Untreated sepsis can result in:
  a. Permanent loss- (e.g. loss of limb, death)
  b. Temporary loss- (e.g. acute renal failure)
  c. Disability- (e.g. multi-organ failure

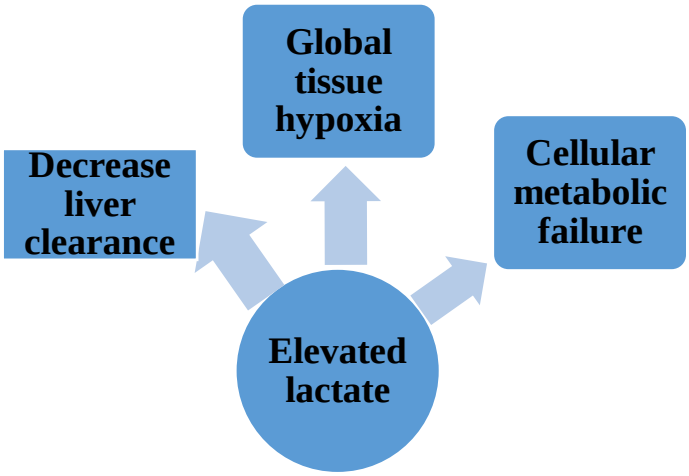
Three Hours Interventions

- Measure lactate level
- Obtain blood cultures prior to administration of antibiotics
- Administer broad spectrum antibiotics
- Administer 30 ml/kg crystalloid for hypotension or lactate ≥4mmol/L

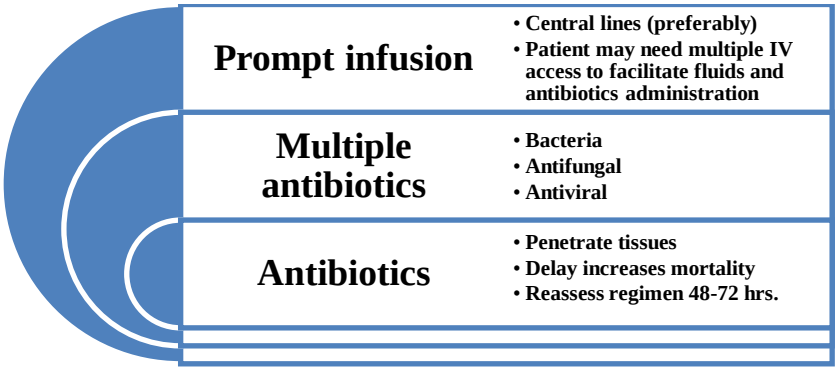
Lactate

- Lactate level identify tissue hypoperfusion
- Hyperlactatemia- anaerobic metabolism due to hypoperfusion or other complex factors
- Lactate > 4 mmol/L (36 mg/dL) -require intravenous fluids to expand circulating volume and restore perfusion

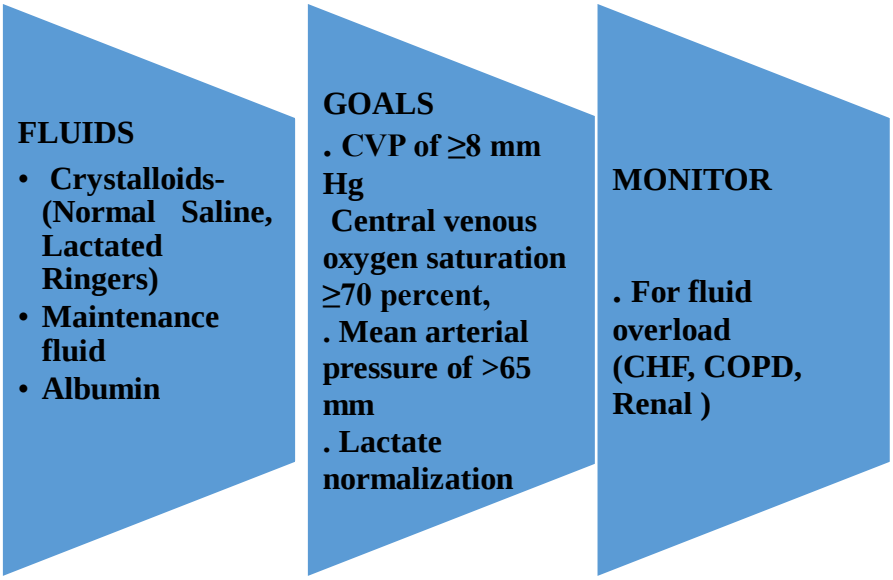
Elevated Lactate Levels



Blood Cultures



Crystalloid (30 ml/kg)



Six Hours Intervention

- **Re-measure lactate if initial lactate elevated**
- **Elevated lactate levels requires aggressive resuscitation**
- **Vasopressors -for persistent hypotension (Norepinephrine Epinephrine,Vasopressin, Dopamine)**
- **Measure central venous pressure (CVP)**
- **Measure central venous oxygen saturation (ScvO2)**
- **Re-assess volume status and tissue perfusion and document**

6 Hour Goals

- CVP of ≥8 mm Hg

- Central venous (superior vena cava) or mixed venous oxygen saturation 70% or 65%
- Mean arterial pressure (MAP) ≥ 65 mm Hg
- Urine output ≥ 0.5 mL/kg/hr

Other Considerations

Goals for Patients

- Shorter recovery time
- Early and timely intervention
- Decreased patient mortality rate
- Reduced sepsis related ICU admission
- Reduced ICU length of stay
- Decreased hospital length of stay
- Early treatment of sepsis reduces inpatient stay and 28-day mortality rates in patients with sepsis or septic shock
- Increase number of patients with improved outcome

Summary

Sepsis is a problem for:

- Patients
- Hospital
- Nurses

Goals- After Sepsis Education

For the patients	**For the hospital**	**For the nurses**
Decreased length of stay	Decreased sepsis mortality	Early recognition of sepsis
Decreased mortality	Improved sepsis rating	Implement intervention in 3 hours

Sepsis CBL Test

Name: _____
Date: _____
Results: _____

Instructions

Read each question carefully and write the letter of the correct answer next to the question

1) _____ **In patients with sepsis have a 65% longer average length of stay that those without sepsis**
   a. True
   b. False

2) _____ **Severe sepsis can cause**
   a. Tissue hyper perfusion/organ dysfunction
   b. Sepsis-induced hypotension
   c. Acute lung injury with Pao2/Fio2 > 250 (in the absence of pneumonia)

3) _____ **Septic shock is manifested by:**
   a. Mean arterial pressure <65, persistent SBP <90
   b. Persistent hypotension after administration of crystalloid fluid
   c. A and B

4) _____ **Untreated sepsis can result in all except:**
   a. Permanent loss- (e.g. loss of limb, multi-organ failure)
   b. Temporary loss- (e.g. acute renal failure)
   c. Disability- (e.g. death)
   d. All of the above

5) _____ **Three hour interventions include:**
   a. Measure lactate level
   b. Obtain blood cultures after administration of antibiotics
   c. Administer 40ml/kg crystalloid for hypotension or lactate ≥4mmol/L
   d. All of the above

6) _____ **Six-hour intervention include:**
   a. CVP of < 8mm/Hg
   b. Central venous pressure 8–12 mm Hg
   c. Mean arterial pressure (MAP) < 65 mm Hg
   d. All of the above

7) _____ **Elevated lactate levels can result in:**
   a. Increased liver clearance

b. Overall cell hypoxia
c. Cellular metabolic failure
d. None of the above

8) _____ **Timely sepsis intervention results in**
a. Increase patient mortality
b. Decrease patient mortality
c. Reduced ICU admission
d. All of the above

9) _____ **Hospitalization rate for sepsis/septicemia decreased between the years 2000 to 2008.**
a. True
b. False

Appendix: H **Sepsis Audit Tool**

The headers on the tool are:

Account number

Arrival date and time

Order set utilized

Mode of arrival

Care providers- MD and RN

Triage time

Temperature, pulse and respiration

Fluid ordered time and fluid start time

Fluid ordered to fluid start (in minutes)

Blood culture order time

Blood culture collect time

Blood culture ordered to collect time (in minutes)

Antibiotics order time

Antibiotics start time

Antibiotic order to start time (in minutes)

Lactic acid ordered (yes/no)

Lactic acid order time

Lactic acid collect time

Lactic acid order time to collect time (in minutes)

Triage time to fluid start time (in minutes)

Triage time to antibiotic start time (in minutes)

Triage time to lactic acid order time (in minutes)