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An Evidence Based Approach to Sepsis: Educational Program

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AN EVIDENCE BASED APPROACH TO SEPSIS: EDUCATIONAL PROGRAM

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Abstract

Evidence-based guidelines for recognizing and treating sepsis have been available for decades, yet healthcare providers do not adhere to the recommendations. Sepsis can progress rapidly if not recognized early. Literature reports reveal that sepsis is the leading cause of death in non-cardiac intensive care units (ICUs), and it is one of the most expensive conditions to treat. A hospital in the Las Vegas, Nevada area had previously introduced sepsis management prescriptions in 2011 with no formal education of sepsis guidelines to nurses. The original hospital's sepsis management prescription sets followed guidelines dated 2008. The purpose of this project was to revise sepsis management prescriptions, develop a sepsis protocol, and develop and present a sepsis education presentation for nurses. The subject population for the educational presentation included registered nurses from critical care departments, medical-surgical departments, women's departments, and the emergency department (N=243). The method included utilizing evidence-based standards to ensure that sepsis treatment prescription sets were up-to-date. The Doctor of Nursing Practice (DNP) student, in collaboration with the sepsis multidisciplinary committee developed a sepsis protocol. The DNP student developed an educational project to inform nurses of the newly revised treatments and management prescriptions and protocols that were going to be introduced into the hospital. The Iowa Model of Evidence-Based Practice model guided the change project. The majority of the education program evaluation results for each question regarding learning objectives met were reported as "good" or "excellent." The participants' subjective interpretation and identification of important things that they will apply or use from the presentation suggested that the participants benefited from attending the face-to-face sepsis education program.

Keywords: sepsis, sepsis protocol, sepsis educational program

Acknowledgments

I would like to acknowledge my family for all the support and encouragement during this doctoral project. I would also like to acknowledge my committee chairperson for all of the guidance during the project.

Dedication

Dedicated to the loves of my life, Chris Fuchs, Abigail Perez, and Alexander Fuchs.

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CHAPTER 1

Introduction

An evidence-based educational program to improve nurses' understanding of current evidence-based guidelines to care for patients with or at risk of developing sepsis was implemented in a Las Vegas, Nevada acute care hospital. The program began with investigating evidence-based standards for the recognition and management of sepsis in the acute care setting. Current evidence-based standards were identified and utilized to update current management and treatment prescriptions, as well as develop a new standardized sepsis protocol, and develop the sepsis education presentation. The project was an educational program aimed at informing nursing personnel of current and updated treatment prescriptions, protocols, and pathways. The project was important to the acute care hospital because sepsis management protocols were previously introduced in 2011 with no success. The hospital failed to involve key personnel, such as physician or emergency department staff, to champion the initiative. The hospital also introduced the sepsis protocols, but no formal education was conducted to educate nurses. Standardizing evidence-based protocols and providing education to hospital nursing personnel was critical because nurses had no current evidence-based guidance to manage the septic patient.

Overview of Sepsis

Sepsis is a systematic response to infection. It is characterized by the cardinal signs of inflammation—vasodilation, leukocyte accumulation, and increased microvascular permeability. Sepsis is a response to infection that is no longer localized, but rather systemic with an exaggerated response to inflammation that manifests into severe sepsis or septic shock. Severe sepsis is associated with Multiple Organ Dysfunction Syndrome (MODS), hypoperfusion, or hypotension. Septic shock is sepsis-induced hypotension (systolic blood pressure below

90mmHg, mean arterial pressure of less than 70mmHg, or a systolic blood pressure decrease of 40mmHg or more from a normal for age blood pressure) with no response after fluid resuscitation, and the presence of perfusion abnormalities. Hypoperfusion is defined as infection-induced hypotension, elevated lactate, or oliguria. Multiple Organ Dysfunction Syndrome (MODS) refers to progressive multiple organ dysfunction (Neviere, 2013a).

Sepsis disease progression includes the initial insult, systemic inflammatory response syndrome (SIRS), sepsis, severe sepsis, septic shock, MODS, and death. The initial insult commences by the invasion of microorganisms that activate the release of proinflammatory mediators. The mediators affect clotting and redistribution of blood flow to the tissues causing selective vasoconstriction. The mediators also affect the capillary membrane permeability causing misdistribution of circulating blood volume. The endothelial damage and coagulation cascade may cause bleeding and hemorrhage by widespread microvascular thrombosis, and an impaired anti-clotting mechanism. Activation of a central nervous system (CNS) and endocrine system response to sepsis leads to the release of norepinephrine, epinephrine, antidiuretic hormone, aldosterone, and cortisol resulting in selective vasoconstriction of renal, pulmonary, and splanchnic vasculature, and subsequently causing organ hypoperfusion. Cardiovascular hemodynamics are altered by cytokines and endothelial damage, causing massive peripheral vasodilation, and effective hypovolemia. Increased capillary permeability causes loss of intravascular volume, reduces preload and cardiac output, leading to decreased tissue perfusion, inadequate oxygen delivery, and systemic imbalance between cellular oxygen supply and demand resulting in cellular hypoxia, damage, and death (Neviere, 2013b).

Background

Sepsis is the 10th leading cause of death in the United States (U.S.) and is expected to increase as the population ages, as greater use of implantable devices emerge, as there are more immunocompromised patients and increased use of life-sustaining technology, and greater resistance of bacteria to antimicrobial therapy. Currently, the sepsis mortality rate is approximately 28.6%, and it increases to 40% to 60% for those who progress to severe sepsis or septic shock (Vanzant & Schmelzer, 2011). Healthcare costs for patients with sepsis in the U.S. exceeds $17 billion (National Institutes of Health [NIH], 2012). Severe sepsis is reported in 2.26 cases per 100 hospital discharges, and one in five Intensive Care Unit (ICU) admissions (Patient Safety Council, 2010).

Early detection and intervention measures, including starting antibiotics within one hour of recognizing sepsis, can reduce mortality, morbidity, and total healthcare costs (Institute for Healthcare Improvement [IHI], 2014). Medical interventions, such as fluid resuscitation are important to maintain blood flow and prevent organ damage and death. Sepsis has a comparable mortality rate to myocardial infarctions (MI); however, patients with sepsis are not categorized with the same high priority to initiate life-saving treatments (Vanzant & Schmelzer, 2011).

Acute care hospitals across the nation are implementing evidence-based practice (EBP) to manage patients with sepsis. Acute care hospitals often turn to organizations such as the Institute for Healthcare Improvement (IHI) for guidelines and implementation strategies. Nonetheless, not all hospitals are successful in translating research into practice. The acute care hospital of interest, ABC Hospital, introduced sepsis protocols based on the current treatment guidelines in 2011. Education was provided to the nurses in the ICU only. After the initial education program, sepsis protocols were not being utilized in the facility. Developing EBP sepsis protocols and providing education is not all that is required for successful implementation of protocols. During

any new implementation phase, follow-up and re-assessing is necessary. ABC Hospital did not have a post-implementation data collection plan to track improvement of protocol utilization, mortality, morbidity, costs, or reduction of patient hospital days. The hospital did not continue the education for new staff.

Problem Statement

ABC Hospital implemented sepsis protocols in 2011 with no post-implementation plan. The hospital provided minimal education to ICU nurses. ABC Hospital did not track whether patients with sepsis were identified, or that sepsis protocols were being followed appropriately. Moreover, the hospital did not emphasize the importance or urgency of acting rapidly in recognizing and managing sepsis. The original hospital's sepsis protocols were outdated and did not follow current EBP sepsis guidelines. The original hospital's sepsis protocols were in need of revision because they followed guidelines dated 2008. The new sepsis guidelines are dated 2012 with publication in 2013, and include changes in identifying, managing, and treating sepsis. The original hospital's sepsis protocols had antibiotic recommendations that are not currently recommended or available in the pharmacy formulary.

Purpose Statement

The purpose of this project was to revise sepsis management prescription sets, develop a sepsis protocol, and develop and present a sepsis education presentation for nurses. This project included researching evidence-based standards in the recognition and management of sepsis in the acute care setting, and utilizing the research to revise the sepsis management prescription sets, and develop the sepsis protocol. The sepsis education presentation for nurses was used as a method to close the gap between evidence and current practice.

CHAPTER 2

Review of Literature

The aim of the literature review was to determine EBP management guidelines for the creation of the sepsis protocol, revision of management prescriptions, and development of an education program to inform registered nurses of the new protocols and rationale for implementing them. The literature search method included the search keywords "sepsis," "sepsis protocol," and "sepsis educational program." The search engines used included "Google Scholar," "Cochrane Database," "CINHAL," and "PubMed." The search engines return over 12,000 related articles. The literature search was limited to English publications, full-text articles, core clinical journals, clinical trials intended for the adult population, and published in 2008 or later.

Evidence-Based Guidelines

Jacob et al. (2012) conducted a prospective before and after evaluation of the intervention (n=426) and observational cohorts (n=245) with severe sepsis in the hospital medical unit. The intervention cohort received early, monitored sepsis management by a dedicated study medical officer. The intervention included fluid resuscitation, early antibiotics within the first hour of identification of sepsis, and regular monitoring in the first six-hours of hospitalization. The observation cohort received care from the primary medical team, and treatment included fluid resuscitation, antibacterial administration, and patient monitoring. The comparative data collected included the effects of early, monitored sepsis management on 30-day mortality between the intervention and the observation cohorts enrolled from July to November 2006. The results indicated that a higher fluid volume was administered to the intervention cohort than to the observation cohort. The intervention cohort received antibiotic therapy within one hour more

often than the observation cohort. Mortality was lower in the intervention cohort than the observation cohort. Study conclusions indicated that early, monitored management of severely septic patients improved survival, and it was feasible and safe.

Jones et al. (2010) conducted a multicenter randomized, non-inferiority trial that included patients with severe sepsis and evidence of hypoperfusion or septic shock admitted to the emergency department (ED) from January 2007 to January 2009. The aim of the study was to address the potential utility of lactate clearance as a substitute for central venous oxygen saturation (ScvO2) monitoring. The interventions included assigning patients to one of two groups using a resuscitation protocol. One group included resuscitation with a goal to normalize central venous pressure (CVP), mean arterial pressure (MAP), and central venous oxygen saturation (ScvO2) to at least 70%. The lactate clearance group was resuscitated to normalize CVP, MAP, and lactate clearance of at least 10%. The researchers indicated that lactate clearance of 10% produced similar effects as using ScvO2 measurements to determine adequate tissue oxygen delivery.

Puskarich et al. (2011) conducted a pre-planned analysis of a multicenter non-blinded randomized controlled trial of early sepsis resuscitation in three urban U.S. EDs. The trial took place from 2007 to 2009. The participants were adults with confirmed or suspected infection, two or more systemic inflammatory response (SIR) criteria, and hypoperfusion. The interventions included a resuscitation protocol in the ED targeting the CVP, MAP, and central venous oxygen saturation or lactate clearance. The measurements included an initial dose of antibiotics after presentation to the ED, based on time from triage and time from shock recognition to the initiation of the antibiotic. The primary outcome was in-hospital mortality. The researchers' results indicated that the ED patients had no increase in mortality with each hour

delay of administration of antibiotics from triage to septic recognition; but, if antibiotics were administered after shock recognition, an increase in mortality was observed.

Cannon et al. (2012) conducted a multicenter before and after observational study to examine the in-hospital mortality effect of an initiative called GENeralized Early Sepsis Intervention Strategies (GENESIS). GENESIS was a continuous quality improvement initiative. The initiative consisted of an institutional assessment of the sepsis prevalence and mortality, identification of high-risk patients or a sepsis alert, mobilization of resources, timely intervention of the 6-hour sepsis bundle via a sepsis team or sepsis order sets, quality indicators to assess compliance, quantification of health care resource consumption, assessment of outcomes, and a program that included feedback and continuing education. Inclusion criteria were a sepsis diagnosis with a lactate greater or equal to 4mmol/L, vasopressor use, or organ dysfunction. Exclusion criteria for participants included age less than 18 years or an advanced directive. The control group consisted of (n=1,554) patients before the resuscitation bundle, and the treatment group consisted of (n=4801) patients after the resuscitation bundle implementation. The resuscitation bundle included confirming suspected infection source, measuring serum lactate level, obtaining blood cultures before administering antibiotics, administering broad-spectrum antibiotics, delivering a fluid resuscitation and vasopressors for hypotension, and achieving a central venous pressure of greater or equal to 8mmHg or a central venous oxygen saturation of greater than or equal to 70% for patients with persistent hypotension despite fluid resuscitation. The study concluded that patients in the treatment group experienced an in-hospital mortality reduction of 14% (42.8%-28.8%, $P<0.001$) and a 5.1-day decrease in hospital length of stay (20.7 vs. 15.6, $P<0.001$) compared to those not receiving the resuscitation bundle. The

researchers concluded that early sepsis intervention strategies were associated with one life being saved for every seven treated.

Miller III et al. (2013) conducted an observational study of a severe sepsis and septic shock bundle as part of a quality improvement project in 18 ICUs in 11 hospitals in Utah and Idaho. The study period was conducted in three stages. The first stage was the baseline and bundle development state (n=1314) conducted from January 1, 2004 to December 31, 2004. The second stage was the implementation stage (n=4115) and occurred from January 1, 2005 to December 31, 2007. The third stage was the tracking stage (n=9590), which occurred from January 1, 2008 to December 31, 2010. Patients included in the study were ICU or ED patients admitted to the hospital. Exclusion criteria were patients who were not admitted to the ICU or ED, or were younger than 18-years-old. The intervention for the first stage included identifying bundle elements and eligibility, and coordinating a data collection process. The intervention for the second stage included a large-scale education program about elements and sepsis bundle. The intervention for the third stage included making compliance with sepsis bundles a corporate initiative. The Surviving Sepsis Campaign's resuscitation and maintenance bundle was the study intervention. Results included a mortality decrease of 59% post-intervention, 21.2% in 2004 to 8.7% in 2010 ($P<0.0001$). All-or-none total bundle compliance increased from 4.9% in 2004 to 73.4% in 2010, a 68.5% increase in bundle use. The compliance with lactate measurement, blood cultures, and compliance with antibiotic administration, predicted ineligibility for the six-hour bundle recommendations, since the patient did not progress to a more severe disease in the first 24 hours. The six-hour bundle recommendations ineligibility included inotropes and red cell transfusions (odds ratio [OR], 1.40: 95% confidence interval [CI], 1.10-1.79), glucocorticoids (OR, 1.30: 95% CI, 1.06-1.60), and use of a lung protective ventilation (OR, 1.48: 95% CI, 1.14-

1.91). The researchers concluded that increased compliance with the Survival Sepsis Campaign's bundles were substantially associated with a reduction in hospital mortality, as well as ineligibility for subsequent bundle elements.

Liu, Morehouse, Soule, Whippy, and Escobar (2013) conducted a retrospective study of patients with sepsis aged 18 years or older admitted to the hospital through the ED. The study was conducted from July 2010 to June 2012. The study's objective was to evaluate the association between lactate clearance, intravenous fluid administration, and mortality in patients with intermediate lactate values between 2mmoI/L and 4mmoI/L. The study population (N=9,919) included patients with sepsis and intermediate lactate values. The lactate values were recorded for changes in value from initial identification of sepsis and at 4, 8, and 12-hours with corresponding weight-based fluid volumes. The study's results included a correlation of 9.4% (95% CI=7.8-11.1%) increase in hospital deaths for every 10% increase in lactate value. Mortality was substantially decreased (4.7%) for patients with more than 60% lactate improvement at 12 hours. The results showed that within four hours, patients received 32 (± 18) ml/kg of fluid. Each 7.5 ml/kg increase of fluid was associated with a 1.3% (95% CI=0.6-2.1%) decrease in repeat lactate. The researchers concluded that early fluid administration, less than 45 ml/KG, was associated with improved lactate clearance and mortality.

Program Development

Buck (2014) reported on the formation of a team of 15 members to work on a new sepsis alert program. The members included clinical nurse specialists, physicians, critical care nurses, nurse educators, nurse managers, nursing directors, an information service architect and application system analyst, a project manager, and quality improvement specialists. The team was responsible for developing the program framework, implementing the program, and making

ongoing changes to the sepsis alert process. The team goal for the sepsis alert program was to rapidly identify and provide intervention and treatment to hospitalized patients in the early stages of sepsis before they progressed to severe sepsis or septic shock. One of the team actions was to develop a computer-generated alert system that would identify patients with early sepsis indications. The program focused on medical-surgical units rather than intensive care units. The team developed three different Power Plans, or order sets, one each for sepsis, severe sepsis, and septic shock. The team decided that once the computer-generated trigger would alert, an overhead announcement for the rapid response team would also be generated. The program was piloted in a medical-surgical unit, and the team noted alarm fatigue from too many alerts. The rapid response team was also being pulled away from their other job duties to respond to the rapid response alerts from sepsis indicators.

After piloting the program, the team members tightened the parameters for the computer-generated trigger alerts, excluded patients on dialysis and on total parenteral nutrition, changed the rapid response responders to only signal the critical care registered nurse (CCRN) on duty, developed a sepsis alert tool for the CCRN to complete with each sepsis alert, and allowed the CCRN to order a lactic acid level based on nursing assessment. The program rollout included providing education to nurses on sepsis, sepsis alert, and the role of the nurse for the sepsis alert program. The CCRNs also received education on their role and the role of the other multidisciplinary team members for the sepsis alert program. The study period, with an average of four triggers per day, was eight months during which 995 sepsis alerts were triggered for 617 patients admitted to the medical-surgical units. Twenty-two percent (n=217) of sepsis alerts were triggered by patients with a surgical procedure. Patients admitted via the emergency department (ED) were three times more likely to trigger a sepsis alert than other admitted patients (n=738

total ED alerts, n=257 total direct admission alerts, n=280 total admitted through ED alerts). During the study period, 102 of the 617 patients who triggered a sepsis alert had a discharge diagnosis of sepsis, severe sepsis, or septic shock. During the analysis of the cases, it was discovered that 40% (n=394) of the 995 sepsis alerts had indeed required an intervention. The team concluded that the sepsis alert program was successfully identifying patients before further deterioration would occur.

Capuzzo et al. (2012) designed a study to assess the trend of the mortality rate of adults admitted to the hospital in relation with a hospital staff educational program dedicated to severe sepsis/septic shock. The study was conducted in six Italian hospitals. The medical wards had one senior attending physician, fellow physicians, and residents. The ICU wards had at least one physician specialist present at all times. The nurse-to-patient ratio was 1:2, and the hospital did not have a rapid response team. The educational program objectives focused on educating hospital staff on the early detection and effective treatment of sepsis, severe sepsis, and septic shock. The aim was to follow interventions of early recognition, early initial resuscitation, microbiological diagnosis, source identification, and early antibiotic treatment. The educational packet included information on epidemiology, morbidity and mortality, scientific literature, an electronic presentation, format of clinical cases for training, and booklets reporting clinic and laboratory signs of sepsis, severe sepsis, and septic shock. During early stages of the study, researchers coordinated multidisciplinary team meetings composed of doctors, nurses, microbiologists, and pharmacists from various departments such as infectious disease wards, intensive care unit, and emergency department. The core team received all of the education on the topic, as well as teaching methods for adult learners. The core team then delivered the educational program to their units at each of the hospitals. The education program was delivered

in four-hour short lectures, discussions, and scenarios, and was offered to nurses and physicians from emergency departments and intensive care wards. The education program was voluntary with continuing education units awarded to attendees. The researchers analyzed mortality by selecting adult patients, admitted at least one night, who died. The results included total staff educated of 30.6% during the study period, a pre-education relative risk of death for in-patients of 0.93 (95% CI, 0.87-0.99, p 0.0251), and post-education relative risk of 0.89 (95% CI, 0.81-0.98, p 0.0128). The researchers' analysis suggested that an educational program given specifically on severe sepsis and septic shock was associated with a decrease in hospital mortality of admitted patients.

Dumont and Harding (2013) reported that Southcoast Health System (SHS) developed and implemented resources and systems necessary to support early recognition and interventions for patients with sepsis. SHS is a community-based health delivery system with three hospitals. The first step taken was to conduct a review of patients whose death was related to sepsis, and revealed a delay in recognition of sepsis. The team then developed two sepsis order sets, one for the emergency department and one for the in-patient units. The team also developed and implemented new standardized assessments that included interventions such as automatically ordering a lactic acid level for patients whose physician had ordered blood cultures. After completing the needs assessment and gap analysis, the team implemented the Southcoast Sepsis Program. Some of the barriers that SHS experienced included shifting the paradigm so that sepsis was not considered a benign illness but as serious as a stroke or MI. The education initiative was conducted by a master's-prepared registered nurse and a physician leader using a variety of methods such as formal classes, hands-on activities, and informational flyers. Computer-based learning modules were developed and disseminated to all nursing staff and

physicians. The education program included pathophysiology of sepsis, laboratory tests, signs and symptoms, risk factors, mortality reduction strategies, screening and early interventions, adequate fluid optimization, medications, treatments, goals of the sepsis program, statistics, role of the rapid response team, and keys to success. The program began in January 2013 with SHS creating an electronic-screening process in the electronic medical records that would trigger an alert if the patient had met SIRS criteria. The trigger would then display an "S" in red next to the patients' name to indicate sepsis. After the positive trigger for sepsis had been met, protocols were initiated. The ED nurses had standing prescriptions for beginning patient management, including patient monitoring, drawing blood for cultures and lactic acid level, IV solution administration, antibiotic administration within three hours, oxygen, and a portable chest radiograph. It was challenging for SHS to obtain central venous access devices on patients, therefore a non-invasive hemodynamic cardiac output method was used to determine fluid responsiveness. The device provides continuous noninvasive readings of cardiac output, noninvasive blood pressure, mean arterial pressure, heart rate, stroke volume, cardiac index, and stroke volume index. The device was used as a tool, providing simple bedside hemodynamic information during a passive leg raise. A passive leg raise is the act of briefly elevating the legs at a 45-degree angle to allow more blood volume to flow into the heart ventricle, allowing more contractions and increased blood flow within the vascular system. If the stroke volume index changed by 10% during a passive leg raise, that would signify that the patient would benefit from a fluid bolus. The team implemented the process of activating the rapid response team to assess and initiate treatment. Some advantages observed were the rapid response team preventing further worsening of systems, reduction in mortality rates, reduction in organ dysfunction, and increased use of the sepsis guidelines. The rapid response team documented the nurse-driven

protocol used for treatment and data collection. The team also developed audit tools to measure compliance and patient outcomes. The program has shown that it has the potential to reduce mortality related to sepsis when implemented, and guidelines are followed. The program had been in effect for less than one year, and it was too soon to report outcomes.

Noritomi et al. (2014) conducted a pre- and post-intervention study in 10 private hospitals (1,650 beds) in Brazil from May 2010 to January 2012. The purpose was to evaluate whether a multifaceted, centrally coordinated quality improvement program in a network of hospitals could increase compliance with the resuscitation bundle, and improve clinical and economic outcomes. The interventions included a first phase in which each institution created a local committee and established screening procedures to detect sepsis early, treatments, guidelines for empirical antimicrobial therapy, and specific routines to enable timely laboratory sampling and administration of antibiotics. The second phase included an objective intervention of collecting data and reporting on compliance rates and mortality with a benchmark within the network hospitals. The results showed an improvement in patients who received all of the required items for the resuscitation bundle from 13% (95% CI, 8-18%) at baseline to 62% (95% CI, 54-69%) in the last trimester ($p<0.001$). Hospital mortality decreased from 55% (95% CI, 48-62%) to 26% (95% CI, 19-32%, $p<0.001$). Full compliance with the resuscitation bundle was associated with lower risk of hospital mortality with a corrected risk ratio of 0.74 (95% CI, 0.56-0.94, $p<0.02$). The total cost per patient was reduced from $29,300 (95% CI, 23.9-35.4) to $17,500 (95% CI, 14.3-21.1) from baseline to the last three months. The researchers concluded that utilizing a multifaceted approach to screening and treating patients with severe sepsis, and septic shock can lead to high compliance with the SSC resuscitation bundle, reduced mortality, and is cost-effective.

Nguyen, Schiavoni, Scott, and Tanios (2012) conducted an observational cohort study of patients presenting to the emergency department at a community-based teaching center with indications of severe sepsis or septic shock between 2003 and 2006. The aim of the study was to assess clinical outcomes associated with the implementation of sepsis management guidelines and to evaluate the utility and effectiveness of a sepsis education program. The study's design began with implementing a quality improvement program/sepsis education program following Surviving Sepsis Campaign (SSC) 2004 guidelines. The committee of pharmacists, nurses, and critical care physicians developed quality indicators in accordance with the SSC guidelines. The education program was given before implementation of sepsis bundles, and included a lecture series to medical staff and attending physicians. The SSC guidelines were also reinforced during daily teaching rounds by using laminated SSC guidelines placed in medical charts, and reminders regarding the implementation of the SSC guidelines/sepsis bundles throughout the units. The participants included 96 total patients with severe sepsis—34 control group and 62 SSC group. Both the control and SSC group had similar ICU lengths of stay (3 versus 3 days, $p=0.647$). Participants in the SSC group had a higher survival rate (45% versus 73%, $p=0.006$). Both groups showed similar care with appropriate early antibiotics (85% versus 90%, $p=0.459$). The greater difference was in regards to early fluid resuscitation (2 liters versus 3 liters, $p=0.006$) over the first 3 hours, and a difference remained significant at 6 hours (4.2 liters versus 6.3 liters, $p=0.013$). The researchers concluded that implementing the SSC guidelines through an educational program was feasible, and resulted in early therapy with aggressive fluid administration and appropriate antibiotics.

Palleschi, Sirianni, O'Connor, Dunn, and Hasenau's (2014) pre- and post-intervention study to improve early identification and treatment for sepsis was conducted in three phases:

phase one chose patients (n=50) during the week when the sepsis trigger alert activated; phase two chose patients (n=47) before education intervention; and phase three chose patients (n=53) post-education intervention. The study period was conducted between September 2010 and February 2012. The study focused on improving steps in the first 6 hours—measuring serum lactate as early as possible from the presentation of the patient to the ED, obtaining blood cultures, and administering broad-spectrum antibiotics within 3 hours for ED admissions and 1 hour for non-ED ICU admissions. The study hospitals implemented a sepsis protocol following SSC guidelines and early goal-directed therapy. Another intervention implemented was a checklist to assist nurses with all of the bundle components. Other interventions included instituting an automated process of identification of patients with possible sepsis via an electronic trigger alert, and testing patients using serum or point of care (POC) lactate. The rapid response team receives the sepsis alert and then assesses and triages the patient. The role of the rapid response team also includes communicating with providers to ensure that appropriate interventions are addressed. The main objective of the study was to investigate whether interprofessional education improves the care of patients at-risk for sepsis. Providers, RNs, and rapid response team members received the education. Registered nurses also received a mandatory self-learning module in conjunction with in-service education. The education included pathophysiology, prevalence, epidemiology, SSC guidelines, sepsis alert, SIRS, use of serum or POC lactate, blood cultures before antibiotics, early treatment standards, timely antibiotics, fluid administration, and urgency of treatment. Posters and badge extenders were distributed to units as reminders of the guidelines. The study results showed sepsis alerts activated on 81 out of the study participants in ED (53%) and 70 patients in acute care (47%). There was a statistically significant improvement between the phases for lactate completion

(X=16.908, p<0.01) after education intervention compared to the pre-education group. The frequency of blood cultures drawn before antibiotic administration showed some improvement (p< 0.054). The results showed an improvement in time to antibiotic administration between phase two and three with a mean time in minutes of 182.09 (SD=234.06) versus 92.6 (SD=167.99). The researchers concluded that providing organizational structure using the sepsis alert, and education as tools for staff, improves compliance in acting in a timely and appropriate manner. A successful outcome improvement was made through education and process change for those who care for patients with severe sepsis in non-ICU settings.

The Agency for Healthcare Research and Quality (2012) introduced a before and after comparison study conducted in a 1,100-bed tertiary care facility. The researchers incorporated initiatives such as sepsis screening criteria, antibiotic recommendation sheet, a treatment order set, a sepsis protocol, and a medication kit to support prompt identification and treatment of patients with sepsis. The planning and development process included senior management approval, the formation of an interdisciplinary team, program design and development, team review and refinements, education and training, and continuous quality improvement. The results showed a significant decrease in mortality, morbidity, length of stay, and time to antibiotic administration and fluid resuscitation. Further data collected from October 2012 indicates that between the program's start and April 2012, mortality was further reduced to 15.68 percent, and ICU length of stay was reduced from 11.9 to 4.1 days. Overall compliance in using the SSC bundles increased from 28.6 to 45 percent of patients. Actual financial data was not assessed, however, a decrease in length of stay and fewer nursing home admissions can generate savings for the system and enhance revenues by freeing up beds to accommodate new admissions.

Literature Review Synthesis

The Surviving Sepsis Campaign Guidelines are best practice guidelines intended to provide clinical recommendations. A committee of 68 international experts, representing 30 international associations, recommended that the greatest improvement in the care of patients with sepsis can be related to formal education programs and formal audits or feedback performance improvement initiatives, which will influence bedside healthcare practitioners' behaviors to reduce the burden of sepsis worldwide (Dellinger et al., 2013). The DNP student focused on initial resuscitation, antimicrobial therapy, hemodynamic support, and adjunctive therapy based on some of the guidelines from the Surviving Sepsis Campaign to synthesize the literature review, create a sepsis protocol, and develop the educational program for this project.

Initial resuscitation and antimicrobial therapy within the first six hours is essential. Jacob et al. (2012) concluded that patients with severe sepsis receiving early monitored management (first six hours of admission) had a 30% decrease in mortality compared to patients receiving standard management. Antimicrobial therapy in this study was administered sooner in the intervention cohort as compared to the observation cohort. Jones et al. (2010) acknowledged that an initial resuscitation should be complete within the first six hours of admission, including therapy such as antibiotic administration, specimen collection for cultures, blood pressure measurements, fluid administration, vasopressors for low blood pressure, blood transfusion if the hematocrit was low, and laboratory blood testing. Puskarich et al. (2011) verified that initial resuscitation within the first six hours is crucial for patients with sepsis. The researchers also indicated that antibiotic therapy after shock recognition increased mortality with hourly delays, concluding that antibiotics should be administered before the recognition of shock. Cannon et al. (2012) verified that early and aggressive fluid administration reduces vasopressor support, which

is associated with a decreased mortality. Liu et al. (2013) determined hat early fluid administration is associated with lactate clearance and improvement in mortality.

Hemodynamic support and adjunctive treatment include interventions to maintain adequate perfusion to organs. Jacob et al. (2012) concluded that when the intervention cohort received 2500-4000 milliliters (mL) within the first six hours, they showed an increase in systolic blood pressure (SBP) at six hours over the observation cohort. Jones et al. (2010) reported that hemodynamic measurements should include CVP, MAP, and tissue oxygen delivery. Some of the best methods to determine tissue oxygen delivery and consumption include using the central venous oxygen saturation (ScvO2) or mixed venous oxygen values. The researchers argue that measuring lactate concentrations from two blood samples drawn at different times can be a more accessible method to assess tissue oxygen delivery. Cannon et al., (2012) reported the early identification of patients with sepsis resulted in a decrease in the time-to-fluid challenge, lactate measurement, antibiotic therapy, and hemodynamic target attainment. Early administration of fluids was consistent with a reduction of vasopressor support need.

During any program development, a well-informed team, formal education plan, audits, feedback, and process improvement initiatives are key for success. Buck (2014) rolled out the sepsis program by including education on sepsis, sepsis alert, and the role of the nurse during a sepsis alert. The program was successful because the group did a pilot study first, used a model for improvement, defined a successful alert, and had a data collection plan. Cappuzzo et al.'s (2012) project included a voluntary education to the core team, with an attendance rate of 30.6%, but senior staff offered additional education. The direct education offered by the senior staff added learning and experience that was not measured. The study measured pre-education mortality data versus post-education mortality data. The post-education mortality data positively

decreased in-hospital mortality of admitted patients. Other researchers such as Dumont and Harding's (2013) educational initiative included formal sessions, computer learning modules, flyers, and posters. The team also developed metric and audit tools to collect data and record compliance. Noritomi et al.'s (2014) quality improvement program utilized case reviews quarterly with feedback as a way to improve the process. The program included multidisciplinary educational sessions and a consultant who offered benchmarking and performance feedback. The program resulted in decreased mortality and increased compliance with sepsis guidelines. Nguyen, Schiavoni, Scott, and Tanios's (2012) quality improvement program included a comprehensive educational program, which improved adherence to quality indicators, enhancing the use of therapeutic interventions, fluid resuscitation, appropriate use of antibiotics, and survival. Palleschi, Sirianni, O'Connor, Dunn, and Hasenau (2014) added an interprofessional education program that resulted in an increased lactate acid completion, timely antibiotic administration, and blood cultures before antibiotics.

Literature Review Summary

A review and analysis of the literature demonstrated that sepsis management requires early recognition, early resuscitation, and hemodynamic support. To accomplish these goals, sepsis protocols were developed. The study by Jacob et al. (2012) used a protocol that included a healthcare team who would respond to the sepsis alert to ensure the sepsis protocol was started immediately and followed appropriately. Jones et al. (2010) and Puskarich et al. (2011) all concluded that early resuscitation (within six hours) includes early fluid resuscitation and early administration of antibiotics. Jacob et al. (2012) showed that hemodynamic therapy included fluid administration and vasopressors, demonstrating a link between administration of adequate fluid resuscitation and the need for fewer vasopressors for hemodynamic stability of the patient

with sepsis. The DNP student collaborated with a multidisciplinary team in the development of a sepsis protocol that included an algorithm for the first six hours after the identification of the presence of sepsis, and a sepsis alert triggering a response by the rapid response team. Implementing the protocol and changing current practice presented a challenge. To address this challenge a comprehensive educational program for nurses aided in the communication of changes and an understanding of the new sepsis protocol guidelines.

Needs Assessment and Description of the Project

Sepsis cases in the U.S. are on the rise. Some of the contributing factors are the aging population, increase in longevity of people with chronic diseases, the spread of antibiotic-resistant organisms, an increase in invasive procedures, and broader use of immunosuppressive and chemotherapeutic agents. The treatment of sepsis usually involves care in the ICU, antibiotic therapy, laboratory tests, oxygen, intravenous fluids, medications, mechanical ventilation, dialysis, and surgery. The treatment often requires a prolonged stay in the ICU, leading to an estimated $17 billion annually spent to treat patients with sepsis (National Institutes of Health [NIH], 2012).

Population

The population identified in this project is from Las Vegas, Nevada located within Clark County. Recent Nevada hospitalizations have increased more than 500% despite only a 36% rise in Nevada's population. Twelve years of Nevada hospital admissions data demonstrate an increasing burden on the regional healthcare system, with sepsis accounting for a progressive increase of hospital admissions over time. In 2012, patients with a principal diagnosis of septicemia averaged an increased in inpatient hospital claims from $54,687 to $128,404. During the same time, patients with septicemia showed an increase in length of stay from 5.3 days to 9.7

days. During 2013, patients with septicemia showed a readmission rate of 8.5% (Doolen, Schreiber, & Greenway, 2015).

The population for the educational program implemented by the DNP student included nurses from the emergency department and inpatient nursing units. The inpatient departments included all units that admit general medicine adult patients such as the medical surgical units and critical care units. The scope of the multidisciplinary team that created the sepsis protocols included emergency department physicians, intensivists, internal medicine physicians, infection control physicians, pathologists, pharmacists, and all registered nurses in the adult units. The multidisciplinary team attended monthly meetings to implement the newly developed sepsis protocols.

Project Sponsors and Stakeholders

The DNP Project sponsors included a hospital in Las Vegas, Nevada ("ABC Hospital"), part of the ABC Hospital system's ICU committee team. The ICU committee included the Chief Nurse Officer (CNO) for one of the five hospitals in the system, all Intensive Care Unit Directors, Pharmacy Directors, Respiratory Directors, and nursing educators. The key stakeholders were emergency department physicians, nurses, intensivists, nurse educators, hospital administration, and department directors.

Organization Assessment

ABC Hospital's mission and vision includes being committed to providing high-quality care to patients, and providing high-quality sepsis care has the potential to improve patient outcomes. Other hospitals in the ABC Hospital system, along with system leaders, supported the need for and actively participate in this project. The organization had existing sepsis management prescription sets in need of revision, and the organization recently adopted an

electronic medical record system for documentation with the capability to alert if any of the identified sepsis indicators were triggered.

Team Formation

The sepsis protocol developed for this project was organized by a multidisciplinary team, which included this DNP student, to provide evidence-based care through formally defined protocols, flow processes, and ongoing nursing staff education. The multidisciplinary team that planned the implementation of the protocols consisted of the following members: executive leaders, heads of departments, pathologists, rapid response team leaders, clinical leaders, intensive care leaders, medical and nursing staff, pharmacists and this DNP student. The DNP student was able to assist with the development of the protocol, present education classes to registered nurses, re-evaluate the educational program, and evaluate the course evaluation data.

Needs Assessment Summary

The needs assessment indicated that the hospital's sepsis protocols were not current and in need of revision. The multidisciplinary team was available as a resource during the development and implementation of the educational program to communicate the revised EBP guidelines for sepsis management. The scope of the project included various medical departments that manage the patient population identified as high-risk to develop sepsis. The representation and participation from each identified department was essential for the successful transition of care following the newly developed protocols and education of the primary stakeholders. A multidisciplinary team was needed to transition to a new EBP approach to sepsis management.

Mission, Goals, and Objectives

To improve early sepsis recognition and management, an updated, evidence-based sepsis management protocol was developed and presented as an educational program to registered nurses in a Las Vegas acute care hospital. The objectives of the project included: a) researching evidence-based standards in the recognition and management of sepsis in the acute care setting, b) utilizing evidence-based standards to update existing sepsis management and treatment prescriptions, c) developing a new standardized sepsis protocol, and d) developing an educational program to inform registered nurses of updated sepsis management and treatment prescriptions and protocols. The key to improving an individual's sepsis survival remains rooted in early identification and management.

CHAPTER 3

Theoretical Foundations

The change project was guided by the Iowa Model of Evidence-Based Practice. The Iowa Model of Evidence-Based Practice ("Iowa Model") is an application-oriented model used to create systematic changes. It includes identifying a problem-focused trigger, determining if the problem is a priority for the organization, forming a competent team, reviewing literature, determining whether evidence is sufficient, piloting the change, evaluating the change, and integrating the change into the organization's daily care (Cullen & Adams, 2010).

Model Application

The "trigger" was ABC Hospital's ICU committee team goal for 2014 to have a sepsis protocol formalized across all hospitals in the system. All five facilities in the system were practicing sepsis management differently causing confusion on what protocols to follow in each facility. Another trigger was that the hospital system was not the only stakeholder wanting to standardize the sepsis protocol, as the umbrella corporate system developed an alert that was triggered based on inclusion guidelines in the computer-based patient chart. Even though the program was implemented in one hospital out of the five in the system, organizational support was needed to proceed successfully, since the hospital's system leadership planned to implement the protocol at the other four system hospitals. The next step was forming a competent team of multidisciplinary members who would be the "champions" or "clinical change agents" to assist in implementation and stakeholder buy-in. Forming a coalition to increase power to lead is essential, and required the DNP student and the multidisciplinary team to include representatives from each department involved in the care of patients with sepsis during all phases of the DNP sepsis change project. The multidisciplinary team members are the "champions" who will

motivate and guide the change. The results of a literature review of the best evidence and best practices in sepsis identification and management were utilized to develop the new guidelines for approaching sepsis, and were reviewed with the clinical change agents. Communicating the new vision for identification and management of the patient with sepsis involved the development and presentation of education classes, and the strategic disbursing of information during the project. Piloting the new sepsis protocols began with the emergency department, and then moved across the entire hospital.

CHAPTER 4

Project Plan

Setting

The sepsis management project was implemented at ABC Hospital in the Intensive Care Unit, Intermediate Care (IMC) unit, Emergency Department, Medical-Surgical departments, and women's department. The project also involved ancillary departments such as pharmacy, respiratory, radiology, and laboratory. ABC Hospital is an acute care facility in Nevada. The facility is a 237-bed hospital, employing about 600 registered nurses.

Population of Interest

The population that the new sepsis protocol addressed was adult patients with all admission status options (observation or full admit), and any indications of Systemic Inflammatory Response Syndrome (SIRS), sepsis, severe sepsis, or septic shock. As this project was a multidisciplinary approach to sepsis identification and management, it required the involvement of both clinical and ancillary personnel. The clinical personnel included Advance Practice Nurses (APNs), physicians, administrators, directors of nursing departments, quality improvement nurses, registered nurse (RN) supervisors, RNs, Certified Nurses Aids (CNAs), and Emergency Department technicians. The ancillary personnel consisted of pharmacists, pharmacy technicians, respiratory technicians, radiology technicians, and laboratory technicians. The involvement of clinical and ancillary personnel was needed during the development of the sepsis protocols, since they are the frontline staff providing care to patients with sepsis.

Resources and Risks

Initiating a hospital-wide change project involving several departments cannot be done by one individual, but requires identification of resources (strengths and opportunities), and risks

(weaknesses and threats) using the Strengths Weaknesses Opportunities Treats (SWOT) analysis. The first strength identified was that sepsis is an emergency similar to other emergencies such as a heart attack or hemodynamic instability. The second strength identified was the current computer system capability of alerting nurses that a possible sepsis trigger has been activated. The third strength was that the system hospital's ICU committee had identified standardized sepsis protocols across all five local hospitals as a goal for 2014, increasing buy-in for protocol changes. The fourth strength was that the other five facilities collaborated on standardizing the orders and protocol for identifying and treating sepsis.

Beneficial resources included a multidisciplinary team of physicians, pharmacists, infection control specialists, and other expert staff members who collaborated on the development of the sepsis protocols. Clinical expertise was a resource and included the organization's ED physician champions, epidemiologists, and other experts. The DNP project and the movement to improve the management of sepsis patients was supported by the hospital's CNO. The opportunities present were all hospitals and organizations that have published implementation and improvement protocols with sepsis bundles. These organizations included the Society of Critical Care Medicine, European Society of Intensive Care Medicine, Institute for Healthcare Improvement (IHI), Agency for Healthcare Research and Quality (AHRQ), Intermountain Healthcare Hospital, and Dignity Health Hospital. The organizations can apply for disease-specific certifications since they already have active sepsis protocols, and promote a culture of excellence, and quality across the organization.

The weaknesses identified in the SWOT analysis included full bed capacity of patients in the ED and throughout the hospital, shortage in staff in various departments causing extra workload and responsibility to respond to "sepsis alerts", and staff turnover requiring sepsis

protocol education and training throughout the year for new staff. The threats identified in the analysis were the unknown patient census or acuity from day-to-day, and the Joint Commission's disease-specific certification on sepsis, which is part of reimbursement calculation to hospitals. The disease-specific sepsis certification offers benefits such as improved processes of care, aids in achieving a culture change, and enhances the hospital's profits by attracting more patients, and leveraging certification as a tool in external stakeholder contract negotiations (The Joint Commission, 2015).

Timeline and Project Tasks

During the project timeframe, nurses received ongoing sepsis education and updated sepsis protocol information. Sepsis educational program attendance was tracked and shared with department managers and directors. A sepsis educational program evaluation tool was utilized to evaluate if any educational changes were required, as well as nurses' attitudes towards the educational program and protocol.

The timeline for the project was 2014 to 2015. During April 2014, revisions to the project proposal were completed. The proposal was presented to the University of Nevada, Las Vegas (UNLV) School of Nursing DNP student committee for approval, and final modifications to the project were completed. Following approval by the committee, the project continued with the formation of the hospital multidisciplinary team, review of the literature with the team, and updating of the sepsis treatment protocol and policy. In November 2014, preparation of the sepsis protocols were finalized. The design, implementation, and evaluation of the educational program occurred from November to December 2014. During January 2015, the submission of the proposal to the UNLV Biomedical Review Board's IRB application was completed, and approval for this DNP Project was granted. The implementation and evaluation of the

educational program took place from May to July 2015. Formal education program conclusions, interpretations, recommendations, and evaluations were completed thereafter (Appendix A). In piloting a successful change project, a multitude of tasks must be performed, and various personnel are required at different stages. The project tasks were guided by the Iowa model principles. Diligent planning and careful assignment of tasks were required for this project. Roles of key staff are identified in Appendix B.

Interventions

The educational program topics were developed following evaluation of other successful educational programs from the literature review. The education program that was provided to registered nurses from the identified patient care units was a 38-slide presentation. The 1.5-hour educational program allowed time for discussion and a question and answer session. Presentation handouts were available for participants (Appendix C).

Evaluation Plan

Evaluating the readiness of the program involved scheduled meetings with the multidisciplinary team members, and identifying barriers to the implementation of the program. There were minimal identified financial resources required of the DNP student for project development and implementation. ABC Hospital was in possession of needed resources specifically, a conference room with visual and audio capabilities to deliver the education class. ABC Hospital is a licensed Continuing Education Unit (CEU) provider, and no additional costs are required to provide nurses who completed the education program with CEU credits. The DNP student, as the change liaison, is an employee of the hospital, and the CNO granted permission to implement the sepsis protocol aimed at helping to meet the hospital goals for 2014-2015. The sepsis education presentation was voluntary for all registered nurses to attend,

and it was included in each department's budget as an education allowance. The program's total costs were absorbed by the sponsoring facility and there were no additional budgetary needs for the DNP student to implement the project.

Data Collection Instrument

Beyond ongoing interactions with participants during the course of the program, additional evaluation information of the education program presentation was obtained with the use of a data collection instrument prepared by the presenter. The data collection instrument designed by the DNP student was a "Sepsis Education Evaluation Form" submitted by the participants upon completion of the education class. The evaluation form was a five-item questionnaire using a Likert scoring system from (1) indicating "poor" through (4) indicating "excellent," to evaluate objectives met, materials used, speaker, and classroom environment. The questionnaire also included two open-ended questions where participants could write in the two most important things that they would apply to his/her practice from the education presentation, as well as any comments or suggestions. A relatively simple data collection instrument was utilized in this project because the focus was on the delivery of the current, evidence-based sepsis protocol information. Follow-up on the application of new knowledge to practice, in the short or long-term, was not the goal of this project. The data collection instrument is provided in Appendix D.

CHAPTER 5

Results and Discussion

Implementation

A multidisciplinary sepsis committee was formed in a Las Vegas, Nevada hospital with the following objectives: to standardize treatment order sets for patients with sepsis, to develop an evidence-based sepsis protocol, to improve sepsis identification, and to improve adherence to sepsis guidelines throughout the hospital system. After formation, the multidisciplinary sepsis committee met on a monthly basis to discuss the status of protocol development. The hospital medical executive committee approved the updated sepsis management and treatment prescriptions in November 2014. The protocol was finalized in March 2015. The sepsis protocol allowed the rapid response team to use nurse-driven protocols for fluid resuscitation and order the laboratory study to test lactic acid clearance for patients experiencing signs or symptoms of sepsis, or who triggered a sepsis or severe sepsis alert by the computer-generated system and who were unstable. Implementation of the sepsis educational program consisted of receiving expedited IRB approval, finalizing the schedule of classes offered, and posting the class schedule. The program classes were offered during the months of May and June 2015. Eleven classes were scheduled, but only nine were completed with two classes being canceled due to no scheduled participants. Participants registered using a computer scheduling system. The class material was printed for each participant, and participants were given sufficient time to read the "Exempt Research Study Information Sheet" at the commencement of the educational course, and decide if they wanted to continue with the sepsis education program, or complete a different form of sepsis education. A total of 243 registered nurse participants (N=243) attended the classes over the two-month period.

Barriers

Identified project barriers that created limitations included encouragement of registered nurse staff to participate in the education program, and continuation of the program for newly hired staff members after the initially scheduled classes were completed. Other barriers included the need to educate staff from both the day shift and night shift. Strategies to overcome the barrier of program participation from the day shift and night shift included scheduling various educational sessions over different days of the week with morning and evening classes. Strategies to overcome the barrier to educating newly hired staff included the development of a schedule to continue to offer classes after the study period to educate nursing staff members who began employment after the originally scheduled classes were completed.

Monitoring

Monitoring of the project included: ensuring that all initial participants signed in and stayed for the entire class, assuring that participants submitted an evaluation form before leaving, and ensuring that everyone in the room was able to see the presentation displayed on the projector screen, and could hear the presenter clearly. To assure program content was received and understood, verbal and non-verbal feedback was used. Data collection began with gathering the participants' evaluation forms (N=243), and separating each participant's Likert-scale responses from written responses to the open-ended questions. The IBM SPSS predictive analytics software for Macintosh, version 22.0 was utilized to analyze the data.

Results

The sepsis education program was successfully implemented to a study population that included registered nurses from ICU, IMC, medical-surgical departments, post-partum unit, labor and delivery unit, and ED (N=243). The facility attendance goal was to achieve a minimum

attendance of at least 80% of RNs from the hospital's ICU, IMC, medical-surgical departments, post-partum unit, labor and delivery unit, and ED was not met. Sixty-five percent of the potential population of registered nurses' at the hospital attended the education program. The data collection instrument may be found in Appendix D.

On completion, the sepsis education program participants rated the program as either "good or excellent" on the data collection instrument (see Table 1, Appendix E). The results of the survey questions indicated most participants provided a rating of "Good" (3 on a 4-point scale) or "Excellent" (4 on a 4-point scale) for: (1) Objectives met, (M=3.67, Mdn=4.00, Mo=4, SD=0.471), (2) knowledge increased (M=3.56, Mdn=4.00, Mo=4, SD=0.596), (3) materials (M=3.59, Mdn=4.00, Mo=4, SD=0.639), (4) speaker (M=3.62, Mdn=4.00, Mo=4, SD=0.557), and (5) classroom environment (M=3.51, Mdn=4.00, Mo=4, SD=0.700).

Sepsis education program participants also had the opportunity to identify important things that they will apply or use in practice from the presentation. Thematic analysis was used to evaluate the open-ended question responses. Responses to the question, "What are the two important things that you will use or apply from today's presentation?" were categorized by the main topic of the response. The main topics were sub-categorized into the following five categories: (1) sepsis criteria (33.6%), (2) guidelines (31.6%), (3) triggers (18.1), (4) process (13.2%), and (5) other (3.4%). The majority of participants identified that sepsis criteria and guidelines are the most important topics that they will apply in their practice. Sepsis criteria include signs and symptoms, SIRS, sepsis, definitions of sepsis, and risk factors, while guidelines include sepsis bundles, protocols, and care (Appendix F). Participants were asked to provide additional suggestions or comments on the evaluation form. Responses were categorized by comments and suggestions, and were further categorized into comments regarding the

presenter or the presentation, and suggestions to the presenter or the organization. Of the total 243 participants, 196 (81.0%) did not provide any comments or suggestions. Of the participants who did offer additional comments or suggestions, 31 responses were comments and 18 suggestions (see Appendix G). The comments and suggestions were utilized to improve ongoing future sepsis presentations.

Discussion

Organizations are faced with challenges such as delivering quality, safe, and cost-effective care for patients. Initiatives to improve such challenges for the patient with sepsis included the creation of the sepsis protocol, revising the organization's sepsis treatment and management guidelines, and communicating the practice changes to nurses using an educational sepsis program. Updating the sepsis treatment prescription sets, developing a sepsis protocol, and providing the educational program was important for nurses to stay abreast current research and ensure that they are following the most up-to-date sepsis management guidelines.

The literature review conducted for this project required the inclusion of a detailed pathophysiology discussion and review of, signs and symptoms of sepsis and treatments, to develop the sepsis protocol, update treatment prescription sets, and develop the sepsis education program. Since early detection and treatment is the goal to improving sepsis mortality, it was extremely important for nurses to understand how sepsis progresses quickly and the evidence-based recommendations for treatment. Nurses needed to understand the difference between an autoimmune response to an infection and sepsis. An autoimmune response to sepsis can progress to MODS or death quickly if left unmanaged. Thus, nurses needed to understand the urgency and importance of following sepsis protocols promptly. The participants' responses showed that the educational program content of sepsis pathophysiology, risk factors, signs and

symptoms, and guidelines were appropriate to include in the education and were useful for participants. Overall, the education presentation learning objectives were met.

Nurses are faced with new practices, techniques, treatments, or medications constantly. It is vital for nurses to obtain education on new protocols or processes to ensure that they can deliver the best nursing care possible. The sepsis education program accommodated day and night shift nurses by offering the course different days of the week and morning and evening classes. Considering the various work shifts and number of classes offered is important to accommodate more nurses. The scheduled nine courses accommodated sixty-five percent of the potential population of registered nurses' at the hospital, and more classes will be offered to existing and newly hired registered nurses.

The sepsis education program added value to nurses by ensuring that their current sepsis practice remained current. The participants evaluated the educational program as either "good" or "excellent". The evaluation form allowed participants to comment on what they felt was important knowledge obtained from the presentation that they will apply or use, and the majority of responses were related to recognizing signs and symptoms of sepsis early and initiating management guidelines within the set timeline. The sepsis protocol was developed, emphasized the screening of potential patients that can develop sepsis, and recognized early indications of sepsis. The sepsis protocol includes set interventions at one, three, and six hours from identification of sepsis that must be followed. Moreover, participants identified information immediately after the education program on algorithms, the process of activating sepsis alerts, and an urgency to accomplish early resuscitation guidelines, evident by written responses of participants in the evaluation form. The goal to improving sepsis mortality is based on early identification and early treatment, thus leading the DNP student to believe that participants'

responses to what they would apply from the presentation to practice was beneficial to the participants and the organization. The sepsis education program engaged participants in new or updated sepsis knowledge for immediate clinical application.

Organization leaders need to consider the importance of education relative to its contribution to quality of patient care, patient safety, staff retention, cost-effectiveness, and overall impact on the health care system. Organizations need to assist in the closing of clinical gaps by using educational methods to disseminate evidence. Narrowing the gaps between best evidence and the current practice has resulted in improved patient outcomes (American Association of Colleges of Nursing [AACN], 2010).

The sepsis education program allowed the DNP student to disseminate the new protocol to the participants. The sepsis education program allowed the DNP student to answer questions by the participants, discuss implementation concerns, and clarify misunderstanding related to the new sepsis protocol. Some of the participants comments included "this class was so informative," "we need more education like this," and "this education needs to be offered to physicians." Some of the questions answered were clarifying normal lactic acid clearance value, the timing of running a STAT laboratory lactic acid, and how to enter a physician telephone sepsis prescription using the computer prescription ordering entering system. Many of the participants voiced their concerns about physicians not following the sepsis protocols, and their concerns were addressed by explaining the organization's plans to educate physicians. The participants' evaluating the program as "good" or "excellent" suggested that the sepsis education program was an appropriate method to communicate this important subject. Sepsis is an important topic and allowing face-to-face interaction with participants was beneficial because time was allowed to clarify misunderstandings and provide immediate feedback.

The DNP project was designed following the IOWA Model of Evidence-Based Practice to create change. The DNP student identified the organization's sepsis priority and the multidisciplinary team was formed. A team approach was beneficial during the updating of sepsis management and treatment prescriptions and protocol formation. The literature search and review served to develop the evidence-based practice curriculum of sepsis, and in the translational process. Lessons learned from the sepsis education program can be used to improve the current program and sustain the program for more nurses to participate. To expand the sepsis education program to the other hospitals in the system, this DNP student will be a guest presenter.

Limitations

The sepsis education project has some limitations. One limitation of this project was the inability to evaluate knowledge retention. Most participants were able to write down two important topics from the presentation that he or she will use or apply, but participants were not evaluated on retention at different time intervals. This project was not designed as a pre- and post-test longitudinal study to test knowledge retention or application; thus, the project was not an original research study leading to the generation of new knowledge, but rather was designed to translate evidence-based guidelines into practice. Another limitation is the short time for the implementation period (2 months). Ideally the project implementation period would be at least six months. The longer implementation period would allow time for the nurses to apply the information learned and patient outcomes to be correlated and measured. Another limitation was the lack of extensive advertising of the sepsis education program. Even though, notification of the sepsis education program offerings was done by posting flyers throughout the different units and in the hospital newsletter, not every nurse was aware of the scheduled courses. Nurses'

statements suggested more classes were needed and better notification of the courses. Another limitation of this project was the amount of time it took for the sepsis protocols to get approved. The sepsis protocols were changed and updated several times before the last draft was approved. The approval process of the sepsis protocol was lengthy since various committees and leaders in the hospital system needed to approve the protocols.

Benefits

The benefit of this project was the ability to provide registered nurses with the most current evidence-based guidelines on the identification and management of patients with sepsis through the educational program. The project also benefitted from the inclusion of a multidisciplinary team approach as a resource during the planning phase. If the expert multidisciplinary team would not have been involved, the program may not have been as comprehensive and approval of the new sepsis protocol might have been delayed and could have prevented buy-in by the stakeholders. Another benefit of the live, educational program was the ability to offer immediate feedback to nurses' questions or concerns, increasing protocol understanding and the ability to successfully implement the protocols.

Implications of results

The IOWA Model of Evidence-Based Practice (Cullent & Adams, 2010), as a guide for the development of a sepsis protocol and sepsis educational program, is an effective guide for successful sepsis change programs. Using the principles of the IOWA Model of building a coalition and a team proved beneficial for updating sepsis management and treatment prescriptions, and developing the sepsis protocol that included nurse-driven orders. Capuzzo et al. (2012) demonstrated that involving a multidisciplinary team leads to a successful sepsis

program. In fact, the multidisciplinary team was an integral part of a successful sepsis program during the sepsis protocol development.

Although the education program did not use a knowledge test to assess increased sepsis knowledge, the participants' subjective interpretation and identification of important things that they will apply or use from the presentation suggested that the participants benefited from attending the sepsis education program. Palleschi et al. (2014) reported that sepsis education is necessary to increase adherence to sepsis guidelines. The key to improving sepsis survival remains early identification and early management of patients with sepsis. Although the DNP student did not test protocol compliance or mortality, or other measures beyond the education program, similar programs conducted by Nguyen et al. (2012) resulted in nurses following appropriate and correct care for patients with sepsis.

Future Study

The sepsis education program informed and alerted inpatient adult unit RNs in early sepsis detection and treatment of sepsis and severe sepsis. Although sepsis mortality, outcomes, or knowledge were not tested in this project, sepsis has the potential to involve any hospital patient; thus, nurses' awareness of the need for early screening and early management is important. The information provided in this project will be useful for hospital administrators and policy makers as they determine a dissemination method for new protocols for nurses.

Future extension of the education program includes continuing the educational classes for new hospital nurses and extending the courses to allied healthcare professionals, including emergency medical services personnel and long-term healthcare facilities near the hospital. Education provided to allied healthcare professionals would be revised for a new target audience and knowledge needs. Future implementation is planned to include tracking metrics to determine

adherence to evidence-based practice guidelines and patient outcomes; such as: bundle utilization, mortality rates, total patient healthcare costs, and length of hospital stay. Future study includes auditing sepsis-related rapid response alerts to determine whether the rapid response team was alerted early, before progression to severe sepsis or septic shock.

Appendix A: Timeline

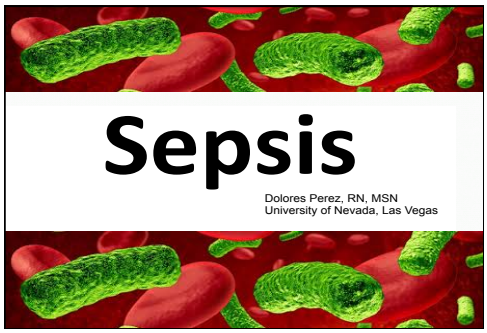
Date	Task
4/18/2014	Approval of project proposal
4/19/2014—4/31/2014	Revisions to project proposal
August 2014	Executive sponsor agreement Sepsis Committee, including leads identified and formed Sepsis pathway developed Antibiotic guidelines developed Sepsis orders developed Sepsis protocol developed Educational program plan developed
November 2014	Sepsis pathway, antibiotic guidelines, orders, and protocol approved Educational materials developed
March 2015	IRB approval
May 2015	Education plan implemented
June 2015	Program evaluation data collection
July 2015	Final conclusions of sepsis project completed

Appendix B: Roles of Key Staff

Executive Support—(ABC Hospital CNO)
1. Endorsement of sepsis protocol as a vital initiative
2. Endorsing the establishment of the sepsis committee
3. Support with resources needed
Change Liaison—(DNP student)
1. Builds the team to guide the change
a. Utilizing medical and nursing clinical leads
i. Heads of departments
1. Emergency department
2. Intensive care unit
3. Progressive care unit
4. Medical surgical departments
5. Women's department
6. Pharmacy department
7. Infection disease department
8. Laboratory department
9. Quality department
10. Risk department
ii. Rapid response team
iii. Medical staff
iv. Nursing staff
2. Creates the sense of urgency

a. Identifying the problem-focused triggers
b. Stakeholder buy-in
3. Creates a new vision
a. Identifying of sepsis identification problem to the organization as a priority
b. Review of literature to update sepsis orders and protocol
c. Update current order sets and protocols
d. Developing “Sepsis Code Alert” algorithms
4. Communicates the new vision
a. Implements a communication plan to engage departments
b. Develops educational plan for sepsis change
5. Removes barriers to change
a. SWOT analysis
b. Ensures sepsis program materials are available to all departments
6. Evaluates the education
a. Assesses the knowledge of participants and educational program
b. Adjusts changes in educational plan if needed
c. Reinforces the new learned education
Medical and nursing clinical leads—(Heads of Departments)
1. Works with change liaison in the development of the educational implementation plan
2. Endorsement of educational plan for staff
3. Coordinates data collection agents
4. Attends Sepsis meetings
5. Provides on-going feedback and progress reports to staff

Appendix C: Sepsis Education Presentation Handouts

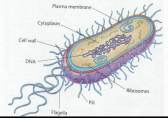


Objectives

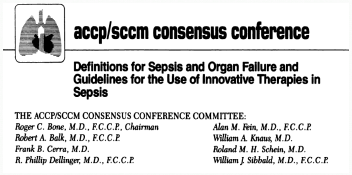
- Define "Sepsis" related terms
- Identify Risk Factors of sepsis
- Identify Urgency of Sepsis recognition and management
- Describe pathophysiology of sepsis
- Identify signs & symptoms of sepsis, severe sepsis, and septic shock
- Verbalize understanding of the Surviving Sepsis campaign guidelines
- Describe Spring Valley Hospital's sepsis protocol and nursing actions

Definitions

- **Infection-**
  - Microbial phenomenon characterized by an inflammatory response to the presence of microorganisms or the invasion of normally sterile host tissue by those organisms
- **Bacteremia**
  - The presence of viable bacteria in the blood



Definitions



Definitions

- **SIRS**
  - Inflammation process independent of its cause
  - Temperature greater than 38°C or less than 36°C
  - Heart rate greater than 90
  - Respiratory rate greater than 20 (tachypnea) or $PaCO_2$ less than 32 mmHg (hyperventilation)
  - Alteration in white blood cell count
    - Greater than 12,000/cu mm
    - Less than 4,000/cu mm
    - More than 10% immature neutrophils (bands)

Definitions

- **SEPSIS**
  - Systemic inflammatory response to infection
    - (2 or more SIRS manifestation + confirmed infection)
- **Severe Sepsis**
  - Sepsis associated with organ dysfunction, hypoperfusion abnormality, or sepsis-induced hypotension.
    - Hypoperfusion abnormalities-lactic acidosis, oliguria, acute alteration of mental status
    - Sepsis-induced hypotension-presence of SBP less than 90 mmHg or a baseline reduction by 40 mmHg

Definitions

- **Septic Shock**
  - Sepsis-induced hypotension, hypoperfusion abnormalities, or organ dysfunction, despite adequate fluid resuscitation
- **Multiple Organ Dysfunction (MODS)**
  - Presence of altered organ function in an acutely ill patient such that homeostasis cannot be maintained without intervention

Risk Factors

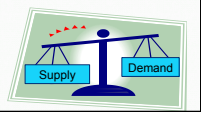
- ICU patients
  - Foley caths, central lines, mech ventilators, invasive devices
- Bacteremia
- Advanced age ≥65 years
- Immunosuppression
- Diabetes and cancer
- Community-acquired pneumonia
- More common in men than women
- African Americans are more prone than other races

The Urgent Reality

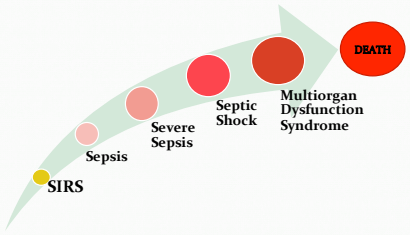
- Leading cause of death in non-cardiac ICU's
- Sepsis or septicemia cases increased from 621,000 in the year 2000 to 1, 141,000 in 2008
- Death is common among patients with sepsis
  - 28% to 50%
  - More than U.S. deaths from prostate cancer, breast cancer, and AIDS combined
- Sepsis is one of the most expensive conditions treated in the U.S.
  - Costs are more than $20 billion in 2011 and are increasing on average annually by 11.9%

Pathophysiology

- Initial invading microorganisms→ release mediators →capillary permeability→ loss of fluids causing low CO→ decreased tissue perfusion→ low oxygen delivery
- Endothelial damage→ Activates CNS and endocrine system→ hypoperfusion→ Cardiovascular hemodynamics altered
- Systemic imbalance between cellular oxygen supply and demand→ results in cellular hypoxia, damage, and death



Cascade of sepsis-induced failure



Early Manifestations of Sepsis

- Fever
- Chills
- Rapid rate or difficulty breathing
- Elevated heart rate
- New confusion, disorientation, drowsiness
- Severe muscle and joint pain
- A sense of impending doom
- Skin rash
- Other manifestations: severe headache, weakness, dehydration, fatigue, diarrhea, nausea, vomiting, abdominal pain, sore throat, unexplained bruising or bleeding

Signs & Symptoms of Sepsis

- **SIRS-systemic inflammatory response syndrome (2 of the following)**
  - Temp >101F or less than 96.8F
  - HR greater than 90 bpm
  - RR > 20 BPM or $PaCO_2$ < 32
  - WBC > than 12,000 cells/ml
- **Sepsis**
  - Infection plus systematic manifestation
    - General variables (high temp, high HR, tachypnea, ALOC)
    - Inflammatory variables (high WBC's)
    - Hemodynamic variables (hypotension)
    - Organ dysfunction variables (oliguria, high creat)
    - Tissue perfusion variables

Severe Sepsis

- **Sepsis plus sepsis-induced organ dysfunction or tissue hypoperfusion**
  - Sepsis-induced hypotension
  - Lactate greater than the upper limits of normal laboratory results
  - Low urine output ≤ 0.5 mL/kg/hr
  - Creatinine 2.0 mg/dL (176.8 mol/L)
  - Bilirubin 2 mg/dL (34.2 mol/L)
  - Platelet count ≤ 100,000
  - Coagulopathy (INR ≥ 1.5)
  - Decreased capillary refill or skin mottling

Septic Shock

- Severe sepsis with refractory hypotension
- Hypotension
  - SBP<90, MAP <60, or SBP decreased by 40 mmHg from baseline
    - Unexplained by other causes
    - Persisting despite fluid resuscitation

Case Study

- Molly is a 32 year old that came in through the ED complaining of SOB, excruciating abdominal pain, nausea, and vomiting. History of DM and Obesity. No allergies. Her work-up included a CBC, electrolytes, abdominal ultrasound, and chest x-ray.
- 1700 Vitals: T 99.0 F, BP 145/65, HR 110, RR 18-24, O2Sat 95%
- Lab results: WBC 13.58, Hemoglobin 9.8, Hemotocrit 36, all lytes are normal, BUN & Cret. normal
- Chest X-ray is normal
- Are you concerned?
- She is placed on observation waiting for ultrasound

Case Study

- 2000 Vitals: Temp 100.2, BP 105/57, HR 115, RR 18-24, O2Sat 92%
- Are you concerned?
- Would you call the MD? If so, what would you say?
- What are your actions?

Surviving Sepsis Campaign

- Build awareness of sepsis
- Improve diagnosis
- Increase the use of appropriate treatment
- Educate healthcare professionals
- Improve post-intensive care unit care
- Develop guidelines for care
- Implement a performance improvement program
- *International Guidelines for Management of Severe Sepsis and Septic Shock: 2012*

Surviving Sepsis Campaign

- **Initial Fluid Resuscitation**
- **Early Goal Directed**
  - CVP 8-12 mm Hg
  - MAP≥ 65 mm Hg
  - Urine Output ≥ 0.5 ml/kg/hr
  - Superior Vena Cava Oxygenation Saturation (Scv_{O2}) of 70% or Mixed Venous Oxygen Saturation (Sv_{O2}) of 65%
  - Target resuscitation to reach goals or normalize lactate level

Surviving Sepsis Campaign

- **Fluid Therapy**
  - Recommend crystalloids as the initial fluid of choice
  - Hydroxyethyl starches (HES) for fluid resuscitation is not recommended
  - Albumin may be used for patients with severe sepsis or septic shock requiring substantial amounts of crystalloids
  - Initial fluid challenge 30ml/kg of crystalloids
  - Fluid challenge may be repeated as long as there is hemodynamic improvement

Surviving Sepsis Campaign

- **Screening for sepsis and performance improvement**
  - Routine screening of potentially ill patients for severe sepsis
    - Increase early identification of sepsis
    - Implementation of sepsis therapy
  - Performance improvement
    - Multidisciplinary team approach
    - Education, protocol development, data collection, feedback, implementation of sepsis bundle

Surviving Sepsis Campaign

- **Diagnosis**
  - Obtain blood cultures prior to antibiotic therapy
    - Without delay (IF >45 minutes for cultures, then start antibiotic)
  - Obtain cultures from suspected infection site prior to antibiotic therapy
    - Without delay (IF >45 minutes for cultures, then start antibiotic)
  - Imaging studies to confirm potential source of infection
    - Chest X-ray, ultrasound

Surviving Sepsis Campaign

- **Antimicrobial Therapy**
  - Administer intravenous antibiotics within the first hour of recognition of severe sepsis or septic shock
  - Initial antibiotic should be empiric anti-infective therapy
    - One or more drugs that have activity against all likely pathogens (bacterial, fungal, or viral)
  - Antibiotic therapy should be reassessed daily for de-escalation
    - Prevent resistance, reduce toxicity, and reduce cost

Surviving Sepsis Campaign

- **Source Control**
  - Remove any source of infection
    - Infected tissue
    - Drainage of abscess
    - Device removal

Surviving Sepsis Campaign

- **Infection Control**
  - Hand washing
  - Follow VAP bundle
  - Use oral chlorhexidine gluconate for oral care
  - Catheter care

Surviving Sepsis Campaign

- **Vasopressors**
  - Vasopressor therapy to target a MAP of 65 mm Hg
  - Norepinephrine as the first-choice
  - Vasopressin (up to 0.03U/min) can be added to norepinephrine to raise the MAP
  - Dopamine may be used as an alternative for patients - low risk of tachyarrhythmias
  - Phynylephrine is the least recommended vasopressor
  - If vasopressor therapy is needed, patients should have an arterial catheter placed

Surviving Sepsis Campaign

- **Inotropic Therapy**
  - Dobutamine infusion
    - Up to 20 micrograms/kg/min
    - Only in the presence of myocardial dysfunction, or hypoperfusion (despite intravascular volume and adequate MAP)

Surviving Sepsis Campaign

- **Corticosteroids**
  - If patient is hemodynamically stable, do not use intravenous hydrocortisone
  - If patient is not hemodynamically stable after fluids and vasopressors, the use of IV hydrocortisone is recommended
  - Use hydrocortisone only if the patient is in septic shock

Surviving Sepsis Campaign

- **Supportive Therapy**
  - Vented patients should maintain the HOB elevated to 30°-45° and daily weaning trials
    - Decrease aspiration risk and prevent VAP
    - If spontaneous breathing trials are successful, suggest extubation
  - Glucose control
  - DVT prophylaxis
  - Stress ulcer prophylaxis
  - Nutrition
  - Goals of care

Surviving Sepsis Campaign

- **3 hour bundle (Must be completed within 3 hours)**
  - Measure Lactate Level
  - Obtain blood cultures prior to administration of antibiotics
  - Administer antibiotics
  - Administer 30 ml/Kg of crystalloid for hypotension or lactate ≥ 4mmol/L

Surviving Sepsis Campaign

- **6 hour bundle (Must be completed within 6 hours)**
  - Apply vasopressors (hypotension that does not respond to initial fluid resuscitation) to maintain a MAP ≥ 65 mm Hg
  - If persistent arterial hypotension despite volume resuscitation, or initial lactate of ≥ 4 mmol/L
    - Measure CVP
    - Measure central venous oxygen saturation (Scvo2)
  - Remeasure lactate if initial lactate was elevated

Sepsis Triggers

- Early Notification Trigger
- Nursing Task
  - Notify provider of Sepsis Risk Trigger
  - Notify provider of Severe Sepsis Risk Trigger
- Direct provider notification
  - Provider directly gets notified as well

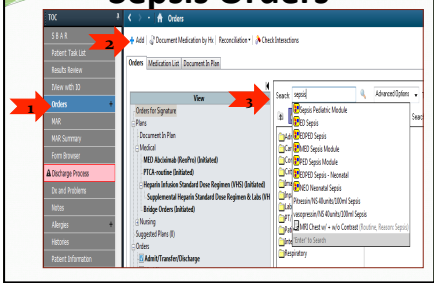
Sepsis Triggers

VARIABLE	Unit of Measure	18-150 Years	
		Triggers when Less Than	Triggers when Greater Than
Alanine Transaminase (ALT) Ranges	mmol/L		60
Arterial Bicarbonate	x10^3/µL	19	
Band Man	%		10
Bilirubin	mg/dL	2	10
Core to Peripheral Temperature Gap	Celsius		3
Creatinine Increase from Baseline	mg/dL		0.5
DecreasedComa Score from encounter baseline	value		3
FiO2	%		50
Heart Rate	bpm		100
INR	mmHg		2
Lactic Acid	mmol/L		2
Mean Arterial Pressure	mmHg	65	
PaCO2	mmHg		65
PaCO2 Increase over 72 Hours	mmHg		20
Respiration Rate	bpm		25
Systolic Blood Pressure	mmHg	90	
Temperature	Celsius	36	38
WBC	x10^3/µL	4	12

Sepsis Triggers

- Obtains trigger notification
- Assess patient for: SIRS, Sepsis, Severe Sepsis, Septic Shock
- Go to your task list
- Use notification form and notify physician in SBAR format (within 15 minutes)
- Call physician to obtain Sepsis orders
- **DO NOT IGNORE SEPSIS TRIGGER.**
- **DO NOT DELAY.**
  - **Time is organs!!! Time is Life!!!**
- IF positive for sepsis → **Call a rapid response alert**

Sepsis Orders



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Appendix D: Program Data Collection Instrument

Sepsis Education

Evaluation Form

Date: _____ Presenter: Dolores Perez, RN, MSN

Read each statement carefully. Write in the number that best reflects your opinion.

4= Excellent 3= Good 2= Fair 1= Poor

CRITERION	RATING
1. The objectives were addressed and met.	
2. My knowledge about the present topic has been increased.	
3. The material presented is applicable to my area of practice.	
4. The speaker was effective, well-prepared and presented the material in an organized fashion.	
5. The room was conductive to my learning experience	

What are the two important things you will use/apply from today's presentation?

_____

_____

Comments/Suggestions:_____

_____

_____

_____

_____

_____

Thank you

Appendix E: Education Program Evaluation Responses

Table 1

Program Evaluation Responses Evaluating Objectives, Knowledge, Materials, and Classroom Environment (Questions One Through Five)

Question	*Value*	*Frequency*	*Percent (%)*	*Mean*	*Standard Deviation*	*Variance*
Q1	1	0	0.0			
Objectives Met	2	0	0.0			
	3	80	32.9			
	4	163	67.1			
	Total	**243**	**100.0**	**3.67**	**0.471**	**0.222**
Q2	1	2	0.8			
Knowledge	2	7	2.9			
Increased	3	88	36.2			
	4	146	60.1			
	Total	**243**	**100.0**	**3.56**	**0.596**	**0.355**
Q3	1	3	1.2			
Materials Used	2	11	4.5			
	3	68	28.0			
	4	161	66.3			
	Total	**243**	**100.0**	**3.59**	**0.639**	**0.408**
Q4	1	0	0.0			
Speaker	2	9	3.7			
	3	74	30.5			
	4	160	65.8			
	Total	**243**	**100.0**	**3.62**	**0.557**	**0.311**
Q5	1	6	2.5			
Classroom	2	11	4.5			
Environment	3	79	32.5			
	4	147	60.5			
	Total	**243**	**100.0**	**3.51**	**0.700**	**0.491**

Appendix F: Presentation Knowledge Application

Table 2

Presentation Knowledge Participants Will Use or Apply

Thematic Category	Key Terms	Characteristics	Frequency of Responses	Relative Frequency
Sepsis Criteria	Signs & Symptoms, SIRS, Sepsis, Definitions, Risk Factors	Early screening, recognition, pathophysiology, early identification.	117	33.6%
Guidelines	Bundles, protocols, care	Fluids, antibiotics therapy, lactic acid orders, blood pressure changes, guidelines.	110	31.6%
Trigger	Sepsis triggers	Improving notification time, how to handle alerts.	63	18.1%
Process	Notification, orders	When to call physician, obtaining sepsis orders, activating rapid response alert.	46	13.2%
Other	Knowledge, reimbursement, mortality	Sepsis core measure, increase overall knowledge, decrease mortality.	12	3.4%

Appendix G: Comments or Suggestions

Table 3

Additional Comments or Suggestions

Thematic Category	***Characteristics***	***No. of Responses***
Comments (Presenter)	"great job Dolores" "well-presented class"	3
Comments (Presentation)	"great slides", "great lecture", "great case study", "good review", and "very informative or educational"	28
Suggestions (Presenter)	"more update and management", "more case studies", "more interaction", "schedule evening classes", "include copy of order sets or one-page guideline summary in packets", and "offer course using computer based learning"	9
Suggestions (Organization)	"Physicians should be required to take this class", "physician response to the sepsis alert calls need to be positive", "sepsis triggers are too sensitive and need to be improved", and "include sepsis education during yearly competency verification"	9

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Curriculum Vitae

DOLORES PEREZ, RN, MSN

EDUCATION

1997/2003	ANTELOPE VALLEY COLLEGE, Lancaster, California **Associate Degree in Nursing**
2004/2007	UNIVERSITY OF PHOENIX, Palmdale, California **Bachelor of Science in Nursing**
2009/2011	UNIVERSITY OF PHOENIX, Palmdale, California **Master of Science in Nursing**
2013/2015	UNIVERSITY OF NEVADA, LAS VEGAS, Las Vegas, Nevada **Doctor of Nursing Practice Candidate**

LICENSES

2006	NEVADA REGISTERED NURSE Active
2003	CALIFORNIA REGISTERED NURSE Inactive

CERTIFICATIONS

2012	AMERICAN HEART ASSOCIATION **BLS and ACLS Instructor**

PROFESSIONAL EXPERIENCE

November 2011-Current

Spring Valley Hospital
5400 S. Rainbow Blvd
Las Vegas, NV 89118

Critical Care Unit educator

- Plan and conduct critical care in-service and continuing educational programs that support the mission of the hospital, and the requirements of all other regulatory agencies.
- Work under the direction of the Chief Nursing Officer.
- Assists in identifying the needs, planning for and implementing education activities for Critical Care areas and other hospital departments as the needs are identified.
- Assists with the Cardiac Surgery Program.
- Assist with hospital's Acute Myocardial Infarction Core Measures.
- Contribute to the evaluation of new Critical Care Unit/Intermediate Medical Care Unit graduate nurses performance.
- Maintain good working relations with physicians and employees.

June 2011-Current

Spring Valley Hospital

5400 S. Rainbow Blvd
Las Vegas, NV 89118

Cardiovascular Coordinator

- Oversee tracking process of data related to the cardiac patient and provide data to the chest pain committee and Cardiology Committee to initiate changes to improve outcomes
- Collaborates with Chest Pain Medical Director and Emergency Medical Services to assure optimal continuity of care from pre-hospital to in-patient.
- Educate nursing and ancillary staff on best practices for patients with acute myocardial infarction and acute coronary syndrome.
- Act as a resource to educate internal staff and the community.
- Coordinate requirements for Cycle IV and V Society of Chest Pain Center re-certification.

June 2007-November 2011 Spring Valley Hospital
5400 S. Rainbow Blvd
Las Vegas, NV 89118

Critical Care Nurse

- Implement Care for 1 to 2 critical patients.
- Implement Nursing process.
- Assess patient status and notify physicians of any clinical changes
- Educate patients and their family, regarding patient health care, needs, conditions, and options.
- Interact with other departments to provide the best patient care.
- Assist in emergent situations during respiratory or cardiac codes.
- Maintain and manage invasive lines and life saving equipment.
- Assist in specialized bedside procedures
- Implement patient admissions, discharges or transfers.
- Monitor and maintain patient charts.
- Follow and implement hospital policies.

December 2003-May 2007 Antelope Valley Hospital
1600 West Ave J
Lancaster, CA 93536
Critical Care Nurse

PROFESSIONAL SOCIETIES

2012-Current AMERICAN HEART ASSOCIATION

2011-Current SIGMA THETA TAU INTERNATIONAL HONOR SOCIETY

2009-Current AMERICAN ASSOCIATION OF CRITICAL CARE NURSES

COMMITTEE APPOINTMENTS

November 2011-Current SPRING VALLEY HOSPITAL CORE MEASURE, Las Vegas, Nevada
Educator/Member

June 2011-Current SPRING VALLEY HOSPITAL CHEST PAIN, Las Vegas, Nevada
Cardiovascular Coordinator/Chair

November 2011-Current	SPRING VALLEY HOSPITAL CARDIOLOGY, Las Vegas, Nevada **Cardiovascular Coordinator/Chair**
June 2011-Current	LAS VEGAS AHA MISSION LIFELINE, Las Vegas, Nevada **Cardiovascular Coordinator/Member**
July 2015-Current	SPRING VALLEY HOSPITAL CODE BLUE/CHILL, Las Vegas, Nevada **Cardiovascular Coordinator/Chair**

RESEARCH PROJECTS

An Evidence-Based Approach to Sepsis: Educational Program
Dolores Perez, December 2015