

Early Recognition of Sepsis in Outpatient Ambulatory Settings: An Educational Program for
Primary Care Providers in Rural, South Central Kansas

By

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Submitted to the School of Nursing and The Graduate Faculty of the University of Kansas in partial
fulfillment of the requirements for the degree of Doctor of Nursing Practice.

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Abstract

Background and Review of Literature: Sepsis is a life-threatening, dysregulated human response to infection. It claims more lives than breast, lung or prostate cancer. Sepsis affects annually, 1.7 million Americans and 10,000 Kansas. The mortality rate can reach 50-80% if treatment is delayed. Early identification, prevention, and intervention, beginning in the community, before emergency room admission, is necessary. It is important to educate primary care providers and community members on early sepsis prevention, early identification, treatment, and recognition of high-risk groups.

Purpose: The purpose of this quality improvement project was to increase knowledge about sepsis among community-based, primary care providers such as nurse practitioners, physician assistants, and physicians in ambulatory settings in rural, South-Central Kansas.

Methods: A single group, pretest-posttest approach was used for this quality improvement project. An online educational module on sepsis early identification and treatment, created by TMF Health Quality Institute (2018), was synchronously presented to primary care providers employed in a rural, primary care health organization. Knowledge acquisition was measured using a test provided by TMF(2018).

Result: Three providers participated. The overall percent increase in test scores from pretest to posttest was 16.6%. Pretest scores were low ranging from 40% -70%. Posttest scores were 70%.

Discussion: Low pretest scores indicated a need for this education. The results showed an average 16.6% increase on test scores. Test score improvement demonstrated knowledge attained from the education provided and that this educational method and material was effective. This or similar projects delivered to primary care providers in an outpatient clinic could be beneficial.

Keywords: sepsis, early recognition, ambulatory setting, primary care

Quality Improvement Project: Sepsis Education for Nurse Practitioners in a Rural, South Central Kansas Ambulatory Clinic

Sepsis is a potentially deadly illness. Sepsis is a life threatening, dysregulated response by a person to infection that can cause organ dysfunction (Global Sepsis Alliance, 2017). Early recognition and treatment are necessary to prevent adverse effects. Due to its lethality and the disabilities that often affect sepsis survivors, concerted efforts to train healthcare providers in the in-patient hospital settings have been initiated (Global Sepsis Alliance, 2017). Despite these efforts, the incidence of sepsis continues to rise (Global Sepsis Alliance, 2017). There have been several national campaigns to educate in-patient providers in the emergency department and intensive care settings on early identification of and intervention for sepsis. This has resulted in a slight decrease in deaths related to sepsis with an average of 12.5% mortality overall (Paoli, 2018). The incidence of sepsis is still on the rise and still too high. The incidence of sepsis in the US has increased by 8% to 9% annually (Martin, 2018; Paoli et al, 2018). National disease prevention groups such as the Centers for Disease Control and Prevention (CDC) have called for steps to provide earlier identification and intervention for sepsis that would commence even before the admission of a septic patient to the emergency room (CDC, 2019). The CDC is advocating for early awareness campaigns in the primary care setting to further decrease negative sepsis consequences such as septic shock, disability, or death (CDC, 2017; Global Sepsis Alliance, 2017). The purpose of this quality improvement project is to increase knowledge about sepsis among community-based, nurse practitioners, physician assistants, and physicians in an ambulatory setting in rural South-Central Kansas.

Background

Incidence and prevalence of sepsis

Sepsis is a serious and at times fatal medical condition that is preventable to an extent (Hajj, Blaine, Salavaci, & Jacoby, 2018). Each year, more than 30 million people develop sepsis worldwide (Prescott & Angus, 2018; Rhee & Epstein, 2017; Sagar, 2017); 1.7 million residents of the United States develop sepsis (CDC, 2016). This is up from 751,000 cases in 1995 (Angus, 2001). Some 10,000 individuals in Kansas will suffer from the same (Kansas Sepsis Project, 2015).

While the incidence of sepsis is increasing (Martin, 2018; Paoli, 2018), the death rate has decreased in recent years (Stoller et al., 2015). Death rate was 46.9 % in 1991-1995 (Stevenson et al., 2014), 29 % 2006-2009 (Stevenson et al., 2014) and 12.5% in 2018 (Paoli, 2018).

Consequences of Sepsis

Of those who develop sepsis, 15–25 % die in higher socioeconomic countries and approximately 50% die in third world countries (Sagar, 2017; Hotchiss, 2017; Hershey, 2017). Each year, sepsis claims more lives than lung, breast, prostate and bowel cancer combined (Daniels, 2017). Apart from leading to death, 50% of the 14 million who survive sustain long term disability related to enduring sepsis including post-traumatic stress, disfigurement, and the inability to live independently (Prescott & Angus, 2018).

Early Recognition and Identification

Early identification and treatment can impact outcomes. For every hour of treatment delay, mortality increases by 8% (Hajj et al., 2018). Therefore, early initiation and treatment of sepsis are integral to preventing as many adverse outcomes as possible, especially mortality (Hajj et al., 2018; Reinhart, 2017). If treatment is needed and started before the patient reaches the hospital then the prognosis is often more favorable (Gilham, 2016). The Surviving Sepsis Campaign (2016) now recommends starting treatment for sepsis with broad-spectrum antibiotics

within the first hour. Known as the “The one-hour rule”, it is currently the gold standard for sepsis treatment in a tertiary or ambulatory setting such as emergency rooms (Rhodes, Evan, Alhazzani, et al., 2016). Patients arriving by emergency services to the hospital often have a higher rate of death because sepsis usually begins in the community before encounters with the hospital (Breeda, 2017; Loots, 2017; Reinhart, 2017).

Education regarding early identification and treatment of sepsis has been advocated in the secondary setting for years. Now the focus is broadening to include primary care providers (CDC, 2019; Gilham, 2016; WHA, 2018) This is necessary because sepsis is community-acquired in the majority of situations (Epstein, 2016; Gilham, 2016; Sepsis Trust, 2017). This shift in education focus is necessary to improve outpatient early recognition, high-risk individual identification and rapid treatment if indicated (Gilham, 2016; Sepsis Trust, 2017; WHA, 2018).

Sepsis identification is often missed in the primary care setting (Brown, 2015; Gilham, 2016, Loots, 2017). Gilham (2016) suggested that the reason some cases may go undetected in the primary care setting is due to the limited time that the primary care providers spend with the patient. Providers in the hospital and emergency room settings spend hours if not days observing a patient (Gilham, 2016). Primary care providers have on average 10 minutes to evaluate a patient. This makes education on rapid identification vital in the primary care setting (Gilham, 2016).

In addition, there is often a lack of consensus among providers as to what qualifies as sepsis. This results in a delay in treatment because the sepsis decision algorithms may not be initiated if the provider diagnoses a symptom such as fever or confusion as the diagnosis and fails to label it as sepsis, resulting in possible delay in treatment (Brown, 2015). This disparity in the identification of sepsis among primary care providers can result in negative health outcomes

for the sepsis patient (Loots, 2017; Weiss, 2015). Educating primary care providers can help standardize diagnosis and the correct labeling of conditions as sepsis so that valuable time is not lost (Gilham, 2016; Sepsis Trust, 2017). National and international campaigns to stop sepsis agree that providing continuing education to providers in the family practice and urgent care settings on the early recognition of sepsis, recognition of patients that are high risk for developing sepsis and prompt treatment of sepsis can save more lives (CDC, 2017, Reinhart, et al., 2017, Sepsis Trust, 2017).

These organizations agree about the need to expand sepsis education to ambulatory, outpatient clinics. They agree that sepsis occurs in the community more often making it necessary to help intercept sepsis even earlier than the emergency department (Breeda, 2017; Reinhart, 2017; Sepsis Trust, 2017). It is necessary to identify sepsis earlier, in the outpatient setting, because patients arriving in the ambulance with sepsis, have a higher death rate (Smyth, 2016). This is because sepsis was missed in the primary or community setting and precious time has been lost in rapidly initiating sepsis treatment (Gilham, 2016).

Problem Statement

With the high incidence of sepsis worldwide, nationally, and in Kansas, there is a need to intervene in the sepsis disease progression earlier to help improve outcomes (Global Sepsis Alliance, 2017). Since sepsis usually starts before the patient reaches the hospital, primary care providers need to be adept at identifying the early signs of sepsis and initiate timely treatment (Global Sepsis Alliance, 2017; Rhodes, Phillips & Beale, 2015). With this in mind, the project sought to increase knowledge by raising awareness for sepsis early identification and management among community-based, primary care providers, including nurse practitioners, physician assistants, and physicians in a rural, South-Central Kansas, ambulatory setting.

Improving the ability of primary care providers to rapidly identify high-risk patients would potentially improve patient outcomes (Gilham, 2016; Sepsis Trust, 2017; WHA, 2018). Health care providers with better awareness would potentially be better able to identify sepsis early and start treatments earlier (Gilham, 2016; Sepsis Trust, 2016; WHA, 2018). Primary care providers often see patients first and are ideally positioned to identify high-risk patients (Gilham, 2016). Also, they can educate the public on early sepsis recognition and encourage them to seek prompt treatment should they develop signs of sepsis as 50% have not heard of sepsis (Sepsis Awareness Survey, 2017). Reinhart (2017) estimated that 55% of Americans had not heard of sepsis.

Goals, Objectives and Expected Outcomes

The goal of this quality improvement project was to increase knowledge about early sepsis identification and treatment by providing updated sepsis information and education to primary health care providers (HCP), including nurse practitioners, physician assistants, and physicians in a rural South-Central Kansas ambulatory setting. The expected outcome for the HCP in the South-Central Kansas organization was that they would gain knowledge regarding the early identification of sepsis. Additionally, the expected outcome for the HCP regarding the early identification of sepsis is that they would potentially be more successful at identifying and treating those patients with a higher risk for sepsis.

Review of Literature

Databases including CINAHL, PubMed, and ProQuest were searched for the keywords and phrases relevant to this project; terms used were sepsis identification or recognition, early sepsis identification, sepsis and children, incidence and prevalence, continuing education, ambulatory care or primary care or primary care provider, outpatient, USA, United States, or America. Alerts were requested from CINAHL regarding updates on the saved articles related to

the topic. Boolean terms such as AND, OR, were used to link keywords in searches. Limits such as after 2014 were set in the advanced search settings.

Prevalence and Burden of Sepsis

Sepsis affects at least 30 million people worldwide (Fleischmann, et., al., 2016; Prescott, 2018; Sagar, 2017) and 1.7 million Americans yearly according to the CDC (2016) acquire sepsis. Some 10,000 Kansans develop sepsis yearly (Kansas Sepsis Project, 2015), but the state of Kansas does not require sepsis reporting (KDHE, 2016). The current numbers for sepsis prevalence in Kansas and internationally may be less than the actual incidence of sepsis (Weiss, 2015; Epstein, 2015) because there is an overall lack of global epidemiology surveillance (WHA, 2018). For example, Epstein (2016) found that the coding of sepsis and the cause of death on death certificates resulted in under-reporting of sepsis. There is also a lack of agreement on the definitions of sepsis in research versus. clinical settings (Brown, 2015; Wiess, 2015).

Each year sepsis kills approximately 5.3 (Fleischmann, 2016) to 6 million (WHO, 2018) people globally. Mortality from sepsis globally can reach 15-30% in higher socioeconomic countries and near 50% for low socioeconomic countries (Hotchiss, 2017; Hershey, 2017; Sagar, 2017). It kills almost 270,000 US citizens (CDC, 2016). The statistics for sepsis deaths in Kansas are not available since the state of Kansas simply reports deaths on categories that could be classified as sepsis such as pneumonia and cellulitis (KDHE, 2016)

Sepsis is the most expensive reason for hospitalization in the United States (Torio et al., 2013). The cost of hospitalization from sepsis was estimated to be \$20.3 billion in 2013 (Torio et. al., 2013) and jumped to 24 billion in 2018 (Paoli, 2018). Other costs related to sepsis in the United States are estimated to be \$16 billion per year (Armstrong-Briley, 2015). Hospitalization costs from sepsis are at least twice that of other reasons for hospitalizations with an average stay

costing \$18,023 if sepsis is present on admission or \$51,002 if sepsis developed or was not diagnosed at admission to the hospital (Paoli, 2018).

For those 14 million that survive sepsis, at least 50 % have lasting mental or physical disabilities (Prescott, 2018). Culbertson et. al. (2013) cited decreased physical and mental functioning. Depression is another one of the symptoms of post sepsis syndrome (Winterman, Brunkhorst, & Petrowski, et al., 2015)

Benefits of Early Recognition

Early recognition of sepsis leads to the provision of more effective treatment in the ambulatory care and primary care levels (Camm et.al., 2018; Fleischmann, et al. 2016). In 2004, the Surviving Sepsis Campaign Guidelines called for the initiation of treatment protocols called bundles including broad-spectrum antibiotics within the first six hours of diagnosis of sepsis (Dellinger, Levy & Rhodes et al., 2013). Early treatment, which includes strong compliance with the Surviving Sepsis Guideline (Dellinger, Levy & Rhodes et al., 2013)), can potentially lead to fewer deaths from sepsis (Levy et al., 2015; Rhodes et al., 2016). The 2018 statistics show that Kansas sepsis deaths were down 5.8% from 8.1% in 2017 and 9.9% in 2016 after a concerted sepsis education effort among the various Kansas emergency rooms involved in the Kansas Sepsis Project (Kansas Sepsis Project, 2018).

The treatment recommendations have become more stringent over the last several years and, early identification of sepsis is more important than ever (Rhodes et al., 2016). There is a high mortality rate associated with sepsis, especially if treatment does not commence promptly (Singer, Deutschman, & Seymour, 2016). Studies such as the one conducted by Dellinger, Levy, and Rhodes (2013) observed that mortality rate could be reduced by reducing the time of treatment beginning within the first three hours and the Surviving Sepsis Campaign Guidelines

were updated to reflect this (Surviving Sepsis Campaign, 2012). In 2016, the Surviving Sepsis Campaign Guidelines were changed to recommend initiating appropriate therapy within the first hour because early therapy reduces mortality (Rhodes et.al., 2016; Surviving Sepsis Campaign, 2016). The sepsis one-hour rule for tertiary care and ambulatory settings for sepsis treatment, implies that earlier identification and treatment in the primary care setting, before admission to the emergency room, would be beneficial (Rhodes et.al., 2016; Surviving Sepsis Campaign, 2016), thereby implying that even earlier identification and treatment in the primary care setting, before admission to the emergency room, would be beneficial.

Current Campaigns for Early Sepsis Identification

Several international and national campaigns have begun promoting sepsis education. First, they sought to educate the hospital healthcare providers, then the nurses and now they are promoting primary, ambulatory care providers and calling for better patient education by providers (Gilham, 2016, Surviving Sepsis Campaign, 2016, Sepsis Trust Foundation, 2018).

Some of the groups that are promoting sepsis education include but are not limited to the following list: The Surviving Sepsis Campaign, The Atlantic Quality Innovation Network (AQIN) Community Based Sepsis Initiative, Sepsis Trust Foundation in the United Kingdom, Kansas Sepsis Project, World Health Organization and World Health Organization Assembly, The former Texas Medical Foundation -TMF Health Quality Institute and the Sepsis Alliance.

The Community Based Sepsis Initiative has as its goal to bring sepsis education to the community to help prevent negative consequences from sepsis. They are sponsored by the Atlantic Quality Innovation Network. The Atlantic Quality Innovation Network was founded in 1984 and is one of 14 Quality Innovation Network-Quality Improvement Organizations funded by Medicare in the United States. The AQIN is a New York-based company lead by IPRO, a

non-profit organization comprised of multi-disciplinary healthcare professionals that works to implement innovative programs with patients, government agencies and providers. Their goal is to bring clinical expertise, data solution and new technology to these organizations. They support early identification and treatment of sepsis and have sponsored a sepsis campaign with training for healthcare professionals and patients. Their motto is “Better healthcare, realized” (AQIN, 2019).

The Kansas Sepsis Project is the Midwest Critical Care Collaborative. They partnered with the University of Kansas Department of Continuing Medical Education. They have as their goal, to improve the treatment and recognition of severe sepsis by quality improvement and education projects for healthcare professional including RN’s, nurse practitioners, physician assistants and nurse practitioners. They offer continuing education credits to those participating in their programs (Kansas Sepsis Project, 2015).

The Sepsis Trust Foundation is based in the United Kingdom. They state that they exist to fight sepsis, save lives and help support the survivors of sepsis. They have issued a mandate to educate the community and medical providers in the United Kingdom. Their goal is to reduce mortality from sepsis. They state that worldwide every 3.5 seconds someone dies from sepsis. On their informational page, they state that sepsis is easily treated with early diagnosis (Sepsis Trust Foundation, 2017).

The World Health Organization is a health organization reaching around the globe. They do studies to provide epidemiological data and then make best practice recommendations for improving practice to improve patient care (WHO, 2018). One such finding was published in their article “Improving the Prevention, Diagnosis and Clinical Management of Sepsis”. Which calls for early identification and treatment of sepsis and community sepsis awareness education.

The World Health Organization drafted a resolution transcribing their recommendations into a World Health Assembly directive which is designed to help countries by providing guidance in prevention, early identification, management of sepsis in a comprehensive fashion (WHA, 2018).

TMF Health Quality Institute is a Texas organization that is dedicated to improving healthcare by education to the community, healthcare providers in hospitals and out (TMF, 2018). They provide many educational programs on a variety of topics and one series focusing on sepsis early recognition, treatment and prevention. This DNP project used the material and education pre and posttest from a TMF module developed for long term care facilities in Texas (TMF, 2018).

The Surviving Sepsis Campaign (SSC) is an organization comprised of an expert opinion panel that is dedicated to the education of all healthcare providers on the early recognition and treatment of sepsis. Their authority comes from a synthesis of research studies on sepsis treatment, the importance of early identification of sepsis, the consequences of sepsis, as well as determining the most efficacious treatment of sepsis (Surviving Sepsis Campaign, 2016).

The Sepsis Alliance is a group of individuals dedicated to raising awareness that sepsis is a medical emergency. Their outreach extends to all 50 United States. They were founded by Dr. Carl Flatley in 2007 after he had lost his daughter, Erin Flatley, to sepsis. They seek to educate both healthcare providers and the public that rapid identification and treatment of sepsis saves lives (Sepsis Alliance, 2019).

The federal accrediting agency, Medicare, national initiative of the Sepsis Alliance and clinical data nationally and internationally supports early sepsis recognition and claims that treatment is required to curtail the lethal nature of sepsis (Angelelli, 2016; Baker, 2016; Delaney, Friedman, Dolansky, & Fitzpatrick, 2015; Singer et al., 2016; Torio, 2013, Tsertsvadze et al.,

2016). Medicare has listed sepsis as a core measure in the Medicare reporting requirements. This means that sepsis prevention plans and interventions are being tracked by Medicare and that they are important (Santistevan, 2016).

A specific diagnostic tool is not available to make the diagnosis of sepsis (Epstein et al., 2016, ; Tsertsvadze et al., 2016). The diagnostic and treatment decision process for this complex disease is not forthright and requires keen analytical and observational skills by the providers. Those people who are at high risk of developing sepsis require extra consideration. All these factors plus the evidence-based practice guidelines should be synthesized by the providers to make the diagnosis for sepsis at the earliest point possible. (Baker, 2016; ; Delaney et al., 2015; Singer et al., 2016). Since sepsis is usually present prior to the patient presenting in the emergency room, the primary care providers are ideally situated to be able to intercept sepsis in its early stages and prevent the progression of sepsis to septic shock or end-organ damage (Baker, 2016;). This is the triggering factor that drives the need for change and is ensured through educational initiatives (Gilham, 2016; Loots et al., 2017; Sepsis Trust, 2017).

The above organizations are all focusing on the education of medical providers and citizens regarding early sepsis identification, prevention and treatment. They have similar goals to educate the hospital providers and the Sepsis Alliance, The Sepsis Trust and the World Health Organization are also focusing on the out-patient clinics and patients. The united goal is to reduce sepsis and its negative consequences such as hospitalizations, disability, and death.

Deficits in Primary Care Provider Knowledge and Education on Sepsis

Many physicians differ in their ability to arrive at a correct diagnosis of sepsis and truly label it what it is. One of the symptoms present on an exam may become the diagnosis such as fever or hypotension. The tendency to not synthesize a cluster of symptoms and match that

pattern to a diagnosis may result in an incorrect diagnosis and delay in the treatment of sepsis (Weiss, 2015). Pediatricians are more likely to attribute symptoms to sepsis than internal medicine doctors (Brown, 2015). Standardization of definitions of sepsis (Singer, 2016; Vincent, J., Opal, S., Marshall, J., 2013) and treatment protocols are needed to decrease the variation diagnosis and thus increase the likelihood of early identification and treatment of sepsis (WHA, 2018). Physicians, families and communities are recommended to work as a team to stop sepsis by early identification and timely treatment (CDC, 2017; CDC, 2019; WHA, 2018).

Breuer (2018) observed that bedside nurses are experts at identifying advanced sepsis patients but are less proficient in identifying the early signs of sepsis. Another study found that some providers are not aware of the current data on recognition and early treatment of sepsis (Loots et al., 2017).

Loots (2017) noted there were no known studies that sought to analyze the aptitude of health care providers in early sepsis identification and treatment. In response to this observation, Loots (2018) did a later study on primary care early diagnosis sepsis. He found that many primary care providers were lacking in their knowledge of sepsis (Loots, 2018). The World Health Organization released a statement recognizing a lack of studies regarding studies on maternal sepsis related to childbirth and urged more studies to be done (WHO, 2017)

Roest (2017) was also interested in early sepsis recognition in the ambulatory setting and did a study on sepsis recognition by ambulance personnel. The study found that many ambulance personnel failed to identify sepsis which had negative consequences on sepsis progression and patient mortality (Roest, 2017).

Sepsis is missed in the primary care setting and the diagnosis is often difficult to make (Frankling, 2016; Loots, 2018; Roest, 2017). The delay in diagnosis results in higher mortality

than those that were diagnosed with the first contact with primary care (Loots, 2018; Roest, 2017). Loots (2018) found that only 6% of patients in the retrospective study had been diagnosed with sepsis. In 43 % the diagnosis was not even suspected, and the mortality was 41.9% for those whom the primary care providers missed the diagnosis compared to 17.6% mortality on those for whom the prompt diagnosis of sepsis was made by primary care. Roest et al. (2017) found that 42% of sepsis diagnosis was missed by ambulance healthcare providers. The mortality rate for those with a missed sepsis diagnosis was 26% vs 13 % for those that were identified as having sepsis early on.

Methods

Project Design

The purpose of this quality improvement project was to increase knowledge about sepsis among community-based, nurse practitioners, physician assistants, and physicians in an ambulatory setting in rural, South-Central Kansas. A single group pre and posttest approach was used; providers received a home-based educational intervention. The education was delivered via a virtual, synchronous, interactive platform that utilized Blackboard Collaborate™, a teleconferencing application. The outcome, knowledge acquisition, was measured by the change in pre and posttest scores.

Project Site and Sample

Project site. The site for this project is a Federally Qualified Health Center with four primary care clinic locations in rural south central Kansas. The Center provides primary healthcare services for three rural Kansas counties and sees patients from newborns to the frail elderly. The primary care providers at the Center are physicians, nurse practitioners, and physician assistants.

Sample. The targeted population were the primary care providers who are employed by the Federally Qualified Health Center. In total, there were twenty potential participants. The targeted goal was fifty percent or ten participants. Of the twenty invitations sent out, three participants (i.e. 15% response rate), one family physician and two family advanced registered nurse practitioners, participated in the project.

Theoretical Framework for the Sepsis Awareness Quality Improvement Project

The theoretical framework for this study was the Iowa model of evidence-based practice (IME, 2017). This model uses empirically supported evidence, the most effective methods, and economical healthcare delivery to attain quality healthcare and best patient outcomes (Melnik & Fineout-Overholt, 2015). The model states that the learners' baseline knowledge should be assessed initially to effectively teach evidence-based practice (IME, 2017). Each learner starts with a different level of knowledge on any given subject (Melnik & Fineout-Overholt, 2015, p. 356). The pre-test in this project was utilized for determining the baseline knowledge level. The post-test assessment of this project was used to assess the incorporation of evidence-based practice information in the primary care providers' knowledge (Melnik & Fineout-Overholt, 2015, p. 348). The pre and post-testing were performed to verify whether the HCP had incorporated the evidence presented into their knowledge base.

The revised Iowa model of evidence-based practice starts with identifying the triggering issues or opportunities (University of Iowa, 2015). The education coordinator of the South-Central Kansas Clinics had indicated that sepsis awareness education had not been provided to their primary care providers in the out-patient clinics.

Creating a plan to conduct the required training (University of Iowa, 2015) was the next step and this was designed and conducted by the project director. The Sepsis Alliance and the

Stop Sepsis Campaigns provided a body of scientific evidence for the educational content (Sepsis Alliance, 2019; SSC, 2016). The design to accomplish change (University of Iowa, 2015) was done by delivering a sepsis education session using a Microsoft PowerPoint™ mediated lecture format.

The Iowa model of evidence-based practice describes the use of media and presentations as an effective way of communicating knowledge to nurse practitioners (Iowa, 2019). Because research demonstrates the improvement in sepsis outcomes following delivery of sepsis education, a synchronous, online, learning format using Blackboard Collaborate™ chosen as the format for this project intervention (Ferrer, 2014).

The content for the program was provided by TMF Health Quality Institute (2018) which obtained material from the National Surviving Sepsis Campaign (Surviving Sepsis Campaign, 2016; TMF, 2018). Evidence-based guidelines exist for early identification and treatment of sepsis in acute care settings and has been the focus of educational initiatives of state and national initiatives such as the Surviving Sepsis Campaign (2016), TMF Health Quality Institute (2018) and The Sepsis Alliance (2019). The focus of these groups then broadened to include the outpatient settings including long term care and ambulatory primary care clinics (Sepsis Alliance, 2019; Surviving Sepsis Campaign, 2016; TMF, 2018). A need to identify sepsis early in a long-term care setting was identified and the TMF designed evidence-based educational content to assist in sepsis education aimed at reducing sepsis and its negative consequences (TMF, 2018).

Ethical Considerations/Protection of Human Subjects

Ethical considerations were ensured at all junctures of the project. The Health Insurance Portability and Accountability Act of 1996 HIPPA and Standards of Care assisted the project director to ensure that confidential information such as name and other personal identifiers such

as emails were not disclosed (HIPPA, 1996). The proposal was submitted to the IRB and was determined to be a quality improvement project (Appendix A).

Implementation Plan/Procedures

Recruitment. A support letter from the South East Kansas Community Health Care group (SEK) was obtained (Appendix B). Phase one of the recruitment was to introduce the project director to clinic managers and encourage clinic managers to support and encourage provider staff to participate in the educational program (Appendix C). Phase two was emailing invitations directly to primary care providers in the SEK system. The education director of the organization provided work emails for participant recruitment. All emails were sent via secure email using the University of Kansas and the SEK secured email to ensure the confidentiality of the participants.

Preparticipation activities. Participants were sent invitation emails with the date and time of the online educational project and asked to RSVP (Appendix D). A return RSVP email signified voluntary participation in the project. Upon receipt of the RSVP email, the participants were emailed invitations containing links to REDCap™, the platform used to collect the pre and posttest assessments. Links within the emails took the participants to a registration page and to the pretest which they were asked to complete before the scheduled presentation (Appendix E & F).

Intervention. The project PowerPoint™ presentation was delivered via Blackboard Collaborate™ in an online synchronized session with participants. The presentation titled, “Early Identification and Treatment of Sepsis,” was presented (Appendix H). The objectives included: 1) to identify the early signs and symptoms of sepsis; and 2) to explain evidence-based treatment. The presentation described sepsis and elaborated on the pathophysiology of the

illness. The presentation reviewed the early signs and symptoms of sepsis and outlined the steps to be adopted should sepsis be suspected in a patient in an ambulatory care setting (Surviving Sepsis Campaign, 2018; TMF, 2018). Time was reserved at the end of the PowerPoint™ presentation for a question and answer session.

Post participation activities. The participants were asked to complete the posttest via REDCap™ (Appendix G). The project director graded the tests using the rubric provided for the tests (TMF, 2018). The pre and posttest grades were recorded using the participants' personal identification numbers (PIN) assigned to them by REDCap™. The test scores were analyzed by determining the change in scores for each participant. A positive trend in the posttest scores was used to demonstrate knowledge acquisition.

Measurement Instruments

The pre and posttest sepsis education tests were comprised of 10 multiple choice questions designed to assess knowledge regarding the causes of sepsis, interventions required, and signs and symptoms of sepsis. The questions were developed by the TMF (2018) based on data obtained from the Surviving Sepsis Campaign (2016) and the Sepsis Alliance (2019) whose original purpose was to increase sepsis early recognition and treatment in Texas long term care settings. For this project, the pre and posttests were modified to be more applicable for ambulatory clinical settings. This was done by substituting the word "Patients" in place of the original word "Residents".

Data Collection Procedures

Data were collected via REDCap™ where the participants completed the pretest before the educational intervention and the posttest after the intervention. The tests were scored by the project director using the rubric provided for the tests by TMF (2018). The results were tallied

and recorded for each participant using their unique PIN to protect their identities.

Results

Of twenty invited primary care providers, there were three who agreed to participate, one family physician and two family advanced registered nurse practitioners. Age, length in practice, or practice history was not collected.

The data analysis focused on the differences in the pre and posttest scores by conducting a comparative analysis. The outcome of the single intervention was measured by comparing the participant's pretest score with their posttest score with the desired outcome being an increase in posttest score.

The pre and posttest scores are listed in Table 1 and 2 below, respectively. Pretest scores ranged from 40% to 70%. The mean score and percentage across all participants was 5.3 out of 10 or 53.3%. The mean posttest score was 70%; all three participants scored 7 out of 10 or 70% on the test. Table 3 shows the percent change in scores from pre to posttest. Two of the three participants increased their test scores by 20 and 30%, respectively, while one participant scored the same from pre to posttest. The mean increase in score percentage for the group was 16.6%.

Table 1

Pretest Assessment Scores per Participant

Participant	Total Points Scored	Percent Score
1	5/10	50%
2	7/10	70%
3	4/10	40%

Table 2

Posttest Assessment Scores per Participant

Participant	Total Points Scored	Percent Score
1	7/10	70%

2	7/10	70%
3	7/10	70%

Table 3

Exam Score Difference per Participant

Participant	Pretest % score	Posttest % score	% Difference
1	50%	70%	20%
2	70%	70%	0%
3	40%	70%	30%

Discussion

The participation in this project was less than desired. Future sepsis education projects may have a better attendance rate if the marketing were improved. Such things as offering continuing education for taking the course might entice more providers to sign up for the class. Making it mandatory for an outpatient primary care clinic orientation class or annual training would be another way to ensure that this timely education reach ambulatory care providers. Providing asynchronous, prerecorded sessions may accommodate busy schedules and encourage attendance.

The lower pre-test scores demonstrated that participants had knowledge deficits regarding sepsis early recognition and treatment. The 16.6% increase over the pretest scores indicated some increase in knowledge for the group, while the two individual increases in scores were greater.

Therefore, the program material and delivery method appeared effective in increasing knowledge in this group of participants. Ferrer (2008) also found that provider education was worthwhile in increasing provider knowledge. This education module would likely benefit other similar primary care providers and registered nurses. This educational format may be an option

for other rural healthcare organizations to offer and disseminate content to healthcare providers.

Limitations

The number of project participants was small and limited the ability to generalize the results of the quality improvement project to the larger target population of primary care health care providers in ambulatory settings. Only descriptive statistics, such as frequencies, percentages, and means, and simple comparisons of change scores for the three participants could be calculated, thus no statistical conclusion could be made based on the test scores. Finally, the technical skill level and familiarity with Blackboard Collaborate™ may have affected knowledge acquisition and test performance of the participants.

Conclusion

A need to increase the early identification and treatment of sepsis and thus decrease the incidence of sepsis, a potentially lethal though avoidable condition, was instrumental in this project. This project was designed to provide sepsis education on early detection and treatment to healthcare providers. It was intended to coordinate efforts with the Surviving Sepsis Campaigns (2016) and several other organizations seeking to increase sepsis awareness. Since frequently tertiary care units such as emergency rooms and intensive care units have already received sepsis awareness education, the primary care, walk-in ambulatory care clinics are the new area of focus for sepsis education. The aim of this project was to provide an educational update to enable providers to be able to rapidly identify sepsis, identify those at higher risk for developing sepsis, give prompt treatment or referral to an emergency room if needed. The goal was to show an increase in participant knowledge as evidenced by an increase in test scores. The overall percent increase in test scores from pretest to posttest was 17% so knowledge was gained by the participants.

References

- Angelelli, J. (2016). Financial implications of sepsis prevention, early identification, and treatment: A population health perspective. *Critical Care Nursing Quarterly*, 39(1), 51–57. doi:10.1097/CNQ.0000000000000093
- Angus, D. (2001) Epidemiology of sever sepsis in the united states: analysis of incidence, outcome, and associated costs of care. *Critical Care Medicine*. 2, 1303-1310.
- Armstrong-Briley, D., Hozhabri, N., Armstron, K., Puthottile, j., Benavides, R., Beal, S. (2015) Comparison of length of stay and outcomes of patients with positive versus negative blood culture results. *Proceedings (Bayor Univeristy Medical Center)*. 28(1), 10-13.
- Atlantic Quality Innovation Network (AQIN). (2017). Community based sepsis. *Quality Improvement Organization*. Retrieved from: <https://atlanticquality.org/initiatives/sepsis-initiative/>
- Baker, S. D. (2016). Improving sepsis recognition and utilization of early goal-directed therapy in the prehospital environment: A review of the literature. *Journal of Emergency Nursing*, 42, 387–394. doi:10.1016/j.jen.2016.02.015
- Berwick, D., Nolan, T., & Whittington, J. (2003). The triple aim: Care, health and cost. *Health Affairs*, 27,759–769.
- Breeda, M., Neville, B., (2017). Management of sepsis in primary care. 17th international conference on integrated care, Dublin, 08-10 May 2017. HSE South, Ireland. Brown, T., Ghelani-Allen, A., Yeung, D., & Nguyen, H. B. (2015). Comparative effectiveness of physician diagnosis and guideline definitions in identifying sepsis patients in the emergency department. *Journal of Critical Care*, 30(1), 71–77. doi: 10.1016/j.jcrc.2014.08.009
- Breuer, R., Hassinger, A., (2018) Identifying hesitation and discomfort with diagnosing sepsis:

- survey of a pediatric tertiary care center. *Pediatric Quality & Safety*. 3(5). Retrieved from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6221587/>
- Brown, T., Ghelani, A., Yeung, D., Nguyen, H., (2015). Comparative effectiveness of physician diagnosis and guidelines definition in identification of sepsis patient in the emergency department. *Journal of Critical Care*. 30(1), 71-77.
- Centers for Disease Control (2019). What is CDC doing? . Retrieved from: <https://www.cdc.gov/sepsis/prevention-activities/index.html>
- Centers for Disease Control and Prevention. (2016). Sepsis. data reports. Retrieved from: <https://www.cdc.gov/sepsis/datareports/index.html>
- Centers for Disease Control and Prevention. (2017) Think sepsis. Time matter. *Vital Signs*. Retrieved from: <https://www.cdc.gov/vitalsigns/sepsis/infographic.html>
- Camm, D., Hayward, G., Elias, T., Bowen, J., Hassanzadey, R...Lasseron, D. (2018). Sepsis recognition tools in acute ambulatory care: Association with process of care and clinical outcomes in a service evaluation of emergency multidisciplinary unit in Oxfordshire. *British Medical Journal*, 8(4), doi: 10.1136/bmjopen-2017-020497
- Culbertson, B., Elders, A., Hall, S., Taylor, J., MacLennan, G...Mackenzie, S. (2013) Mortality and quality of life in the five years after sever sepsis. *Critical Care*. 17(2). Retrieved from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4057306/>
- Daniels, R. (2017). The sepsis manual. *Sepsis Trust UK*. Retrieved from: <https://SepsisTrust.org>
- Data USA, (2018). County Data USA. Deloitte Datawheel, UK retrieved from: DataUSA.io.
- Delaney, M. M., Friedman, M. I., Dolansky, M. A., & Fitzpatrick, J. J. (2015). Impact of a sepsis educational program on nurse competence. *The Journal of Continuing Education in Nursing*, 46(4), 179–186. doi:10.3928/00220124-20150320-03

- Dellinger, R., Levy, M., & Rhodes A., Annane, D., Gerlach, H...Kleinpell, R. (2013). Surviving sepsis campaign: International guidelines for management of severe sepsis and septic shock: 2012. *Critical Care Medicine*, *41*, 580-637.
- Damiani, E., Donati, A., Serafini, G., Rinaldi, L., Adrario, E., Pelaia, P., ... Girardis, M. (2015). Effect of Performance Improvement Programs on Compliance with Sepsis Bundles and Mortality: A Systematic Review and Meta-Analysis of Observational Studies. *Plos One*, *10*(5). doi: 10.1371/journal.pone.0125827
- Ecompliance. (2019). Institutional review board, the University of Kansas Medical Center, Dykes Library. Retrieved from: <http://www.kumc.edu/human-research-protection-program/institutional-review-board.html>.
- Epstein, L., Dantes, R., Magill, S., Riore, J. (2016). Morbidity Mortality Weekly Review. *Center for Disease Control*, *65*, 342-345.
- Ferrer, R., Artigas, A., Levy, M., Blanco, J., Gonzalez-Diaz, G...de la Torre-Prados, M. (2008). Improvement in process of care and outcome after a multicenter severe sepsis educational program in Spain. *Journal of the American Medical Association*, *299*, 2294–2203.
- Ferrer, R, Martin-Loeches, I., & Phillips, G., Osborn, T., Townsend, S...Levy, M., (2014). Empiric antibiotic treatment reduces mortality in severe sepsis and septic shock from the first hour: Results from a guideline-based performance improvement program. *Critical Care Medicine*, *42*, 1749–1755. Doi:10.1097/CCM.0000000000000330
- Fleischmann, C., Scherag, A., & Adhikari, N. (2016). Assessment of global incidence and mortality of hospital-treated sepsis. Current estimates and limitations. *American Journal of Respiratory Critical Care Medicine*, *193*, 259–272. doi: 10.1164/rccm.201504-0781OC.

- Frankling, C., Yeung, J., Dark, P., & Gao, F. (2016). I spy with my little eye something beginning with S: spotting sepsis. *British Journal of Anaesthesia*, *117*, 279–281. doi: 10.1093/bja/aew254
- Gilham, C. (2016). Sepsis: the primary care focus. *British Journal of General Practice*. *66*(644) 120-121.
- Global Sepsis Alliance. (2017). WHA adopts resolution on sepsis. Retrieved from: <https://www.global-sepsis-alliance.org/news/2017/5/26/wha-adopts-resolution-on-sepsis>
- Hajj, J., Blaine, N., Salavaci, J., & Jacoby, D. (2018). The “Centrality of Sepsis”: A Review on Incidence, Mortality, and Cost of Care. *Healthcare*, *6*(3), 90. doi: 10.3390/healthcare6030090 Health and Human Services.(2018). Revised common rule, Office for Human Research Protections. p. 2. Check this
- Hershey, T., Kahn, F., (2017). State sepsis mandates – a new era for regulation of hospital quality. *New England Journal of Medicine*. *376*, 2311-2313.
- Health Insurance Portability & Accountability Act (HIPAA). (1996) Summary of the HIPAA privacy rule. U.S. Department of Health and Human Services. Retrieved from: <https://www.hhs.gov/hipaa/for-professionals/privacy/laws-regulations/index.html>
- Hotchiss, R., Moldawer, L., Opal, S., Reinhart, K., Tumbull, I. Vincent, J., (2016) Sepsis and septic shock. *National Review of Disease Primer* *2*(16045).
- Iowa Model Collaborative, IME. (2017). Iowa model of evidence-based practice: Revisions and validation. *Worldviews on Evidence-Based Nursing*, *14*(3), 175–182. doi:10.1111/wvn.12223.
- Kansas Sepsis Project. (2018). Sepsis Continuing Education. Retrieved from: www.kansassepsisproject.org

- Kansas Department of Health and Humans Services (KDHE). (2016) reportable infectious diseases in Kansas. Retrieved from:
http://www.kdheks.gov/epi/download/disease_summary/dissum16.pdf
- Levy, M., Rhodes, A., Townsend, S., Schorr, C., Beale, R.....Dellinger, R. (2015). Surviving sepsis campaign: Association between performance metrics and outcome in a 7.5-year study. *Critical Care Medicine*, 43(1), 3–12.
- Loots, F., Arpots, R., Van den Berg, R., Hopstaken, R., Geisen, P., & Smits, M. (2017). Recognition of sepsis in primary care: A survey among GPs. *British Journal of General Practice*, 1(2). doi: 10.3399/bjgpopen17X100965
- Loots, F., Smits, M., Steensel, C., Giesn, R., Hopstaken, R., van Zanten, A., (2018). Management of sepsis in out-of-hours primary care: a retrospective study of patients admitted to the intensive care unit. *British Medical Journal* 8(9), e022832.
doi: 10.1136/bmjopen-2018-022832
- Martin, G., Mannino, D., Eaton, S., & Moss, M. (2017). The epidemiology of sepsis in the United States from 1979 through 2000. *New England Journal of Medicine*. 348, 1546–1554.
- Melnyk, B. & Fineout-Overholt, E. (2015). *Evidence based practice in nursing and healthcare. A guide to best practice* (3rd ed.). Philadelphia, PA, Wolters-Kluwer.
- Paoli, C., Reynolds, M., Sinha, M., Gitlin, M., Crouser, E., (2018). Epidemiology and costs of sepsis in the united states-an analysis based on timing of diagnosis and severity level. *Critical Care Medicine*. 46, 1889-1897.
- Prescott, H., & Angus, D. (2018). Enhancing recovery from sepsis, a review. *Journal of American Medical Association*, 319, 62–75.

Reinhart, C., Daniels, R., Kisson, N., Machado, F., Schlatter, R., Finfer, S., (2017).

Recognizing a global health priority—a WHO resolution. *New England Journal of Medicine*, 377, 414-417.

Rhee, C., Dantes, R., Epstein, L., Murphy, D., Seymour, C., (2017) Incidence and trends of sepsis in the US hospitals using clinical vs claims data, 2009-2014. *Journal of American Medical Association*. 3018, 1241-1249. doi:10.1001/jama.2017.13836

Rhee, C., Epstein, L. (2017). Supplementary online content. Prevention epicenter program.

Incidence and trends of sepsis in us hospitals using clinical vs claims data, 2009–2014. *Journal of the American Medical Association*. doi:10.1001/jama.2017.13836

Rhodes, A., Evans, L., Alhazzani, W., Levy, M., Antonelli, M....Dellinger, R. (2016). Surviving sepsis campaign: International guidelines of management of sepsis and septic shock 2016. *Critical Care Medicine*, 45, 486–552.

Rhodes, A., Phillips, G., Beale, R. (2015). The surviving sepsis campaign bundles an outcome: results from the international multicenter prevalence study on sepsis. *Intensive Care Medicine*. 41,1620-1628.

Roest, A. A., Stoffers, J., Pijpers, E., Jansen, J., & Stassen, P. M. (2017, February). Ambulance patients with nondocumented sepsis have a high mortality risk: a retrospective study.

Retrieved from <https://www.ncbi.nlm.nih.gov/pubmed/26237663>.

Santistevan, J. (2016). Quality improvement and patient safety. *Sepsis CMS core measure (sep-1) highlights*. Retrieved from: <https://www.acep.org/how-we-serve/sections/quality-improvement--patient-safety/newsletters/march-2016/sepsis-cms-core-measure-sep-1-highlights/>

Sepsis Alliance (SA). (2019). Raise sepsis awareness and help save a life. Retrieved from:

- Sepsis.org
Sepsis Alliance Survey (2017). Sepsis alliance awareness survey. Retrieved from
<https://www.sepsis.org › resource › 2017-sepsis-alliance-awareness-survey>
- Sepsis Trust Foundation, (2017). The UK sepsis trust general practice sepsis screening and action tool. Retrieved from: <http://sepsistrust.org/wp-content/uploads/2015/08/1409322477GPScreening2014Final.pdf>
- Stevenson, E., Rubenstein, A., Radin, G., Wiener, R., & Walkey, A., (2014). Two decades of mortality trends among patient with severe sepsis. *Critical Care Medicine*, 42, 625-631. doi: 10.1097/ccm.0000000000000026
- Sagar, D., Veillard, J., Niranjana, K., (2017). Reducing the global burden of sepsis. *Canada Medical Association Journal*. 189(1), E2-E
- Singer, M., Deutschman, C., & Seymour, C. (2016). The third international consensus definitions for sepsis and septic shock (sepsis-3). *Journal of the American Medical Association*, 315, 801–810. doi: 10.1001/jama.2016.0287
- Smyth, M., Brace-McDonnell, S., & Perkins, G. (2016). Impact of prehospital care on outcomes in sepsis: A systematic review. *Western Journal of Emergency Medicine*, 17(4), 427–437. doi: 10.5811/westjem.2016.5.30172
- Stoller, J., Halpin, L., Aplin, B., Weis, M., Georgescu, C., & Nazzari, M. (2015). Epidemiology of severe sepsis 2008–2012. *Journal of Critical Care*. 31(1), 58-62. Retrieved from: <https://www.ncbi.nlm.nih.gov/pubmed/26601855>
- Surviving Sepsis Campaign (SSC). (2004) Surviving sepsis campaign guidelines for management of severe sepsis and septic shock. *Critical Care Medicine*. 32, 858-873. Retrieved from: <https://www.ncbi.nlm.nih.gov/pubmed/15090974>
- Surviving Sepsis Campaign (SSC). (2012). Three-hour bundle. Retrieved from:

- <http://www.survivingsepsis.org/SiteCollectionDocuments/Bundle-Three-Hour-SSC.pdf>
- Surviving Sepsis Campaign (SSC). (2016). Surviving sepsis campaign. *Society of Critical Care Medicine*. Retrieved from <http://www.survivingsepsis.org/Pages/default.aspx>
- TMF. (2018). Early identification of sepsis in Texas nursing homes. *Health Quality Institute*. Retrieved from: <https://www.tmf.org/Health-Care-Providers/Nursing-Homes/Early-ID-of-Sepsis-in-Texas-Nursing-Homes>
- Torio, C., Andrews, R. (2013). National inpatient hospital costs: The most expensive conditions by payer, 2011. *Statistical Briefs # 160. Healthcare Cost and Utilization Project (HCUP) Statistical*. Retrieved at: <https://hcup-us.ahrq.gov/reports/statbriefs/sb204-Most-Expensive-Hospital-Conditions.jsp>.
- Tsertsvadze, A., Royle, P., Seedat, F., Cooper, J., Crosby, R., & McCarthy, N. (2016). Community-onset sepsis and its public health burden: A systematic review. *Systematic Reviews*, 5(81), 19. doi:10.1186/s13643-016-0243-3
- University of Iowa hospitals and clinics (2015). The Iowa model revised: Evidence-based practice to promote excellence in health care. Retrieved from: <https://uihc.org/evidence-based-practice>
- Vincent, J., Opal, S., Marshall, J., Tracey, K., (2013). Sepsis definitions: time for change. *Lancet*. 381, 774-775.
- Weiss, S. L., Fitzgerald, J. C., Maffei, F. A., Kane, J. M., Rodriguez-Nunez, A., Hsing, D. D., ... Nadkarni, V. M. (2015). Discordant identification of pediatric severe sepsis by research and clinical definitions in the SPROUT international point prevalence study. *Critical Care*, 19(1). doi: 10.1186/s13054-015-1055-x
- Winterman, G., Brunkhorst, F., Petrowski, K., Straub, B., Oehmichen, F...Resendaul, J. (2015)

Stress disorders following prolonged critical illness in survivors of severe sepsis. *Critical Care Medicine*. 43, 1213-1222. doi: 10.1097/CCM.0000000000000936

World Health Assembly (WHA). (2018). Recommended actions for reducing the global burden of sepsis. Sepsis Resolution. World Health Organization. Retrieved from:
https://www.global-sepsis-http://apps.who.int/gb/ebwha/pdf_files/WHA70/A70_R7-en.pdf?ua=1&ua=1sepsis

World Health Organization (WHO). (2017). Statement on maternal sepsis. Retrieved from:
<http://apps.who.int/iris/bitstream/10665/254608/1/WHO-RHR-17.02-eng.pdf?ua=1>

World Health Organization (WHO). (2018). Sepsis, key fact. Fact Sheets. Retrieved from:
<https://www.who.int/news-room/fact-sheets/detail/sepsis>

Appendix A

Kris Whitaker
Thu 10/10/2019 9:06 AM

□

Thank you for submitting your Quality Improvement Determination request.

The KUMC Human Research Protection Program (HRPP) has conducted a review of the above referenced project. The request meets the criteria for QI project and is approved. In the attachment please find the signed approval.

Any presentation or publication resulting from this project should explicitly state that it was undertaken as quality improvement.

At this time, IRB review is not required. If a quality improvement protocol is revised to undertake a systematic investigation designed to answer a research question or produce knowledge that would be generalizable beyond the local setting, the HRPP will reevaluate your project's regulatory status.

More information about distinguishing quality improvement from research is available on the OHRP website at: <http://www.hhs.gov/ohrp/policy/faq/quality-improvement-activities/index.html>
Best of luck and continued success in this worthwhile endeavor.

Kris Whitaker
Sr. Compliance Specialist
Office of Compliance/HRPP
Kansas City, KS 66205

Appendix B



Community Health Center of Southeast Kansas

JoAnn M. Peterson DNP, APRN, FNP-C, WHNP-C
Project Committee Chair
Kansas University, DNP Program

Dear Dr. Peterson,

Please accept this letter as confirmation that Regina Heidner APRN, KU DNP student has been granted permission to present her sepsis education project to the providers located in our clinics based in Mound City, Pleasanton, Fort Scott, and Arma.

Sincerely,

Reta Baker

Reta Baker MPH, BSN

VP of Clinical Education

Community Health Center of Southeast Kansas

3015 Michigan Avenue

Pittsburg, Kansas 66762

Appendix C



To: Clinic Managers for Arma, Fort Scott, and Pleasanton
From: Reta Baker, VP of Clinical Education
Re: Regina Heidner ARNP, KU DNP Student Project
Date: 09/24/2019

Regina worked shifts for Mercy prior to the transition of the clinics to CHC/SEK. She was granted permission during that time to complete her doctorate project with Mercy employed providers as her intended audience. Following the clinic transition to CHC/SEK, Dr. Linda Bean consented to her completing the project as started with the now CHC/SEK providers as the target audience.

In the near future Regina will be extending an invitation to providers to participate in one of two education sessions related to sepsis. As we all know sepsis has become a serious crisis for some of our patients with early detection being essential for a full recovery.

Please encourage participation to support her project completion.

Reta Baker MPH, BSN
VP of Clinical Education
Community Health Center of Southeast Kansas
3015 Michigan Avenue
Pittsburg, Kansas 66762

Appendix D

EMAIL TO THE SEK PROVIDERS

Dear Colleagues,

Hello. My name is Regina Heidner MSN, APRNc, FNPc. Some of you may remember me from the Urgent Care on National Street and the times that I filled in as a locum at your clinics. I am currently a Doctor of Nursing Practice (DNP) student at the University of Kansas School of Nursing. To complete my DNP, I must do a project.

I have chosen a quality improvement project titled "Early Recognition of Sepsis in Outpatient Ambulatory Settings: An Educational Program for Primary Care Providers in Rural, South Central Kansas". This will be an educational PowerPointTM provided by TMF, formerly the Texas Medical Foundation, that is designed to present the latest recommendations from the Sepsis Alliance for sepsis early identification and treatment.

There have been many educational programs for the hospital settings in the past but very few for the primary care settings. Sepsis often begins before a patient reaches the emergency room. Many patients see their primary health care providers first and since time is so important in the treatment of sepsis, the CDC and many other organizations are recommending continuing education programs on sepsis for primary care providers.

So please join me in an online educational meeting on October 14th at 7:00 pm or October 16th at 12:00 pm. To register for the online meeting, please RSVP to the project coordinator at rheidner@kumc.edu. Once you register you will be emailed a link containing a Blackboard CollaborateTM link. This link will allow you to join the meeting. You will also be asked to take a pretest and posttest which will be used to predict acquired knowledge during the educational program. A second link will be emailed to you to allow you to take the pretest and posttest which will be on the REDCapTM site. Your test results will be kept confidential.






Please RSVP now if you would like to participate in the educational project. I do hope to see you there. Thank you for your time.

Sincerely,

Regina Heidner MSN, APRNc, FNPc

Appendix E

**Hello and thank you for taking part in the Sepsis Prevention Education project.
As a participant in this educational project, please answer the questions below.
Thank you!**

<p>Hello and thank you for taking part in the Sepsis Prevention Education project. As a participant in this educational project, please answer the questions below. Thank you! Regina Heidner, MSN, APRN Doctor of Nursing Practice Candidate University of Kansas School of Nursing</p>	
<p>First and Last Name <i>* must provide value</i></p>	<p> <input type="text"/></p>
<p>Please provide a work email <i>* must provide value</i></p>	<p> <input type="text"/></p>
<p>Where do you work? <i>* must provide value</i></p>	<p><input type="text"/></p> <p>Arma</p> <p> Fort Scott Family Practice</p> <p>Fort Scott Urgent Care</p> <p>Pleasanton</p>
<p>Provider Type <i>* must provide value</i></p>	<p><input type="text"/></p> <p> Physician</p> <p>Physician Assistant</p> <p>Nurse Practitioner</p>
<p>Form Status</p>	
<p>Complete?</p>	<p> <input type="text" value="Complete"/></p>

Appendix F

Sepsis Education Pretest

(Learners should complete this assessment prior to viewing the sepsis presentation.)

Directions: Select the correct answer for each question.

1. Two early signs and/or symptoms of sepsis are:
 - a. Confusion and headache
 - b. Fever and nausea
 - c. Shortness of breath
 - d. Extreme pain and general discomfort
2. Sepsis causes tissues to die because of a lack of:
 - a. Oxygen
 - b. Red blood cells
 - c. Carbon dioxide
 - d. Hemoglobin
3. If not treated quickly, sepsis can result in:
 - a. Pneumonia
 - b. Death
 - c. Urinary tract infection
 - d. Confusion
4. Which of the following individuals are at higher risk of developing sepsis:
 - a. Person recovering from a heart attack
 - b. Person with Alzheimer's
 - c. Resident recently in hospital for pneumonia
 - d. Resident with heart failure
5. SIRS stands for:
 - a. Systemic Infection Response Syndrome
 - b. Systemic inflammatory Response Syndrome
 - c. Systemic inflammatory Residual Syndrome
 - d. Systemic inflamed Respiratory Syndrome
6. Which of the following correctly depicts two of the four SIRS criteria:
 - a. Nausea and vomiting
 - b. Fever reducer and antibiotic
 - c. Antibiotic and fluids
 - d. Pain medicine and fever reducer
7. Which two forms of treatment for sepsis should be given immediately:
 - a. Pain medicine and fluids
 - b. Fever reducer and antibiotic
 - c. Antibiotic and fluids

- d. Pain medicine and fever reducer
8. For individuals age 65-80, the likelihood of developing sepsis:
- a. Doubles
 - b. Triples
 - c. Quadruples
 - d. Quintuples
9. The most common infections leading to sepsis include all the following except:
- a. Pneumonia
 - b. Cellulitis
 - c. H1N1
 - d. Urinary tract
10. Infections can progress to severe sepsis as quickly as ____ hours:
- a. Two
 - b. Four
 - c. Six
 - d. Eight

This was adopted from the TMF (2018) Sepsis Education Pre-Assessment (TMF, 2018)

Appendix G

Sepsis Education Posttest

(Learners should complete this assessment after to viewing the sepsis presentation.)

Directions: Select the correct answer for each question.

1. Infections can progress to severe sepsis as quickly as ____ hours:
 - a. Two
 - b. Four
 - c. Six
 - d. Eight
2. Which two forms of treatment for sepsis should be given immediately:
 - a. Pain medicine and fluids
 - b. Fever reducer and antibiotic
 - c. Antibiotic and fluids
 - d. Pain medicine and fever reducer
3. Which of the following correctly depicts two of the four SIRS criteria:
 - a. Nausea and vomiting
 - b. Fever reducer and antibiotic
 - c. Antibiotic and fluids
 - d. Pain medicine and fever reducer
4. The most common infections leading to sepsis include all the following except:
 - a. Pneumonia
 - b. Cellulitis
 - c. H1N1
 - d. Urinary tract
5. Sepsis causes tissues to die because of a lack of:
 - a. Oxygen
 - b. Red blood cells
 - c. Carbon dioxide
 - d. Hemoglobin
6. For individuals age 65-80, the likelihood of developing sepsis:
 - a. Doubles
 - b. Triples
 - c. Quadruples
 - d. Quintuples
7. Two early signs and/or symptoms of sepsis are:
 - a. Confusion and headache
 - b. Fever and nausea
 - c. Shortness of breath
 - d. Extreme pain and general discomfort
8. If not treated quickly, sepsis can result in:

- a. Pneumonia
 - b. Death
 - c. Urinary tract infection
 - d. Confusion
9. SIRS stands for:
- a. Systemic Infection Response Syndrome
 - b. Systemic inflammatory Response Syndrome
 - c. Systemic inflammatory Residual Syndrome
 - d. Systemic inflamed Respiratory Syndrome
10. Which of the following individuals are at higher risk of developing sepsis:
- a. Person recovering from a heart attack
 - b. Person with Alzheimer's
 - c. Resident recently in hospital for pneumonia
 - d. Resident with heart failure

Adopted from the TMF (2018) Sepsis Education Pre-Assessment (TMF, 2018)

Appendix H

<https://tmf.org/Portals/0/Documents/CMP/PostAcuteCareTrainingPPTandVideo.zip>

Outline of PowerPoint™ Presentation

Early Identification
and Treatment of Sepsis

Nursing Home/Long-Term Care

Objective

Gain the knowledge to:

Recognize early signs and symptoms of sepsis

Recognize evidence-based treatment for optimal
resident outcomes

Sepsis Education

Pre-Assessment

Why is this important?

“Sepsis: Emergency” video available on Sepsis Alliance website,
www.sepsis.org, under Resources → Video Library

What is sepsis?

Sepsis is the body’s overwhelming and life-threatening response to INFECTION

NOT ENOUGH OXYGEN is reaching the tissues

If not recognized and treated PROMPTLY, sepsis can result in:

Organ failure

Tissue damage

Death

Sepsis is a health care challenge.

1+ million sepsis cases in the U.S. each year

A leading cause of hospital readmissions

The nation’s third-leading killer

Severe sepsis has a 20-50 percent mortality rate

Definitions

Let’s look at some important definitions to help recognize the progression of sepsis.

Sepsis Progression – SIRS

Sepsis Progression – Sepsis

Sepsis Progression – Severe Sepsis

Acute Organ Dysfunction as a Marker of Severe Sepsis

Sepsis Progression – Septic Shock

Relationship of Infection, SIRS, Sepsis, Severe Sepsis and Septic Shock

Early recognition is key.

Sepsis-induced organ damage may not be apparent

You cannot detect organ damage until it is too late

Survival depends on timely assessment and treatment when changes first happen in the resident's condition

Knowing which residents are more susceptible to sepsis and are at higher risk will help with early recognition

Why identify and treat early?

To decrease morbidity and mortality related to sepsis

Avoid long-term, health-related complications for survivors

Residents at Risk for Sepsis Progression

Infection (pneumonia, urinary tract)

Elderly (ages 65 and older accounts for 60-85 percent of all episodes of sepsis)

Recent hospitalization

Chronic illnesses such as diabetes, AIDS, cancer and kidney or liver disease

Wounds

Invasive lines, drains, catheters

Signs and Symptoms Often Dismissed

Change in mental status

Confused thinking

Weakness

Loss of appetite for food

General discomfort

Falls

Urinary incontinence

Extreme pain

Know the Signs and Symptoms of Sepsis

Sepsis is a medical emergency.

Just like a heart attack, stroke or trauma, the speed and appropriateness of treatment administered in the initial hours are more likely to make a difference in patient outcomes

For every hour that appropriate treatment is delayed, the risk of death increases by 7.6 percent

Your prompt actions could save a life!

Initial Treatment – Evidence-Based

Surviving Sepsis Campaign

Recommended within the first hour of recognition

1. Measure blood lactate level
2. Obtain blood cultures (prior to giving antibiotics)
3. Administer broad-spectrum IV antibiotics
4. Administer 30 ml/kg crystalloid for hypotension or lactate ≥ 4 mmol/L

Questions to Ask Yourself

Does this facility have sepsis reduction efforts in place?

A process to screen residents for sepsis?

A process for sepsis treatment? Standing order/protocol?

Do you know which residents have the potential for sepsis in your facility?

Are you more closely monitoring residents who were discharged from a hospital with an infection or sepsis?

Save Lives – Think Sepsis!

Early identification

Early antibiotics

Early (aggressive) fluid resuscitation

Post-Acute Care Sepsis Early Identification and Treatment Pathway

Case Study, 1 of 6

A 74-year-old female, who is a longtime nursing home resident, has a medical history of CAD, osteoarthritis and stroke with left-leg weakness.

She normally eats in the dining room, but wanted to stay in her room today. She asked for a blanket because she feels chilled and is not acting like her usual self. Her color is pale and she stated it burned when she went to the bathroom. You also notice she is coughing more than normal.

Case Study, 2 of 6

Her vital signs are: T 100.3, HR 117, RR 22, BP 105/43, O2 SAT 90% on room air

Does she have two or more SIRS criteria?

Does she have a possible or active infection?

Does she have additional organ dysfunction?

Does she screen positive for severe sepsis?

Case Study, 3 of 6

Case Study, 4 of 6

Case Study, 5 of 6

Her vital signs are: T 100.3, HR 117, RR 22, BP 105/43, O2 SAT 90% on room air

Does she have two or more SIRS criteria? HR, RR

Does she have a possible or active infection? UTI?

Does she have additional organ dysfunction? Respiratory?

Does she screen positive for severe sepsis?

Case Study, 6 of 6

What should you expect to do next?

Notify the physician of your assessment findings and any laboratory results (SBAR for Sepsis)

Plan for close monitoring

Increase vital signs

Additional labs

Initiation of the Surviving Sepsis Campaign 3-hour sepsis bundle

Consider transfer to an acute care facility

SBAR for Sepsis

How can you help?

Familiarize yourself with the early signs of sepsis

Know who is at risk for sepsis

Educate friends, family and patients about the early signs and symptoms of sepsis

Ask yourself: Could this resident be septic?

Think sepsis!

Preventive Measures

Get vaccinated against the flu, pneumonia and any other infections that could lead to sepsis

Prevent infections that can lead to sepsis by:

Cleaning scrapes and wounds

Practicing good hygiene (wash hands and bathe regularly)

Think Sepsis

Residents Being Discharged

Teach them to monitor their signs/symptoms at home with a Sepsis Stoplight Zone Tool:

Sepsis Stoplight Zone Tool

Sepsis Stoplight Zone Tool

Summary

Sepsis is the body's overwhelming and life-threatening response to an infection from anywhere (skin, urine, lungs, abdomen)

Anyone with an infection may be at risk

Early signs and symptoms include fever/feeling cold, sleepy/confused, shortness of breath, rapid heart rate, dark smelly urine, something does not feel right

Tell the residents it is important to let you know if they experience any sepsis symptoms

Sepsis is a medical emergency

Resources

CDC Vital Signs Report <https://www.cdc.gov/vitalsigns/sepsis/>

Surviving Sepsis Campaign <http://www.survivingsepsis.org/Guidelines/Pages/default.aspx>

Sepsis Alliance

<http://www.sepsis.org/>

The Centers for Disease Control
<http://www.cdc.gov/sepsis/index.html>

The Rory Staunton Foundation <https://rorystauntonfoundationforsepsis.org/>

Questions?

Sepsis Education Post-Assessment

For more information,
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(TMF, 2018)