10-2023

The Correlational Relationship Between Clinical Sepsis Knowledge and Evidence-Based Practice Compliance

gary martinez
gxm20a@acu.edu

This doctoral project, directed and approved by the candidate's committee, has been accepted by the College of Graduate and Professional Studies of Abilene Christian University in partial fulfillment of the requirements for the degree

Doctor of Nursing Practice

Nannette W. Glenn, Ph.D.

Dr. Nannette Glenn, Dean of the College of Graduate and Professional Studies

Date: 08/25/23

Doctoral Project Committee:

Dr. Roneisa Matero

Dr. Roneisa Matero, Chair

Dr Faisal Aboul-Enein

Dr. Faisal Aboul-Enein, Committee Member

Abilene Christian University

School of Nursing

The Correlational Relationship Between Clinical Sepsis Knowledge and Evidence-Based Practice Compliance

A doctoral project submitted in partial satisfaction

of the requirements for the degree of

Doctor of Nursing Practice

by

Gary F. Martinez

October 2023

Dedication

This scholarly DNP project is dedicated to Rodney C. Lester, PhD, CRNA. He inspired me to remain diligent and steadfast and commit to duty. I would also like to thank Valerie Baldwin, my friend who stood behind me with selflessness and unconditional support. Their spirit helped me to pen every word of this scholarly DNP project.

Acknowledgments

I thank my ACU instructors for guiding me through this educational process and appreciate their support in preparing me to meet the professional role demands of DNP practice and research. This DNP academic process has been challenging and rewarding. Thank you to my patient and supportive advisors, who made this process possible.

Abstract

Sepsis represents a growing public health concern and is considered a leading cause of death in the United States. Sepsis accounts for over 265,000 annually. The Centers for Medicare and Medicaid Services have established the SEP-1 Sepsis care bundle to reduce sepsis-related mortality. This scholarly DNP project examines the clinical problem of sepsis bundle noncompliance. The purpose of this study was to determine the relationship between baseline clinical sepsis knowledge and evidence-based practice compliance. The target population of this project includes emergency department healthcare professionals who acutely manage sepsis patients. This sample was surveyed using the KAP Sepsis Questionnaire to measure sepsis knowledge and the Evidence-Based Implementation Scale to measure compliance likelihood. The data were securely collected and stored using the Qualtrics statistical software platform. A quantitative design approach was used to analyze the surveyed data to derive a statistical correlation (*r*) value. A general overview of the research procedures, key results, and conclusions will follow according to this scholarly DNP project's progressive nature and timeline.

Keywords: Evidence-based practice, knowledge-to-action cycles, sepsis, compliance

Table of Contents

List of Tables

List of Figures

Chapter 1: Introduction

Sepsis is a growing public health concern and a leading cause of death in the United States. Sepsis accounts for approximately 1.7 million adult cases annually, resulting in over 265,000 deaths (Rhee et al., 2017). Hospital incidence rates occur at 6%, with a mortality rate of approximately 15% (Rhee et al., 2017). This morbidity and mortality significantly impact hospitalization and healthcare demands. Emergency departments (EDs) receive 850,000 sepsis-related visits annually (Wang et al., 2017). About half of those admitted for severe sepsis receive treatment in an intensive care unit (ICU) setting (Mayr et al., 2014). ICU admissions incur a mortality rate approaching 50% due to septic shock.

Sepsis represents a significant cost burden as the most expensive health-related condition treated in U.S. hospitals for all payors (Torio & Moore, 2016). The principal diagnosis of septicemia (sepsis) results in $23 billion in annual costs (Torio & Moore, 2016). Sepsis is approximately 6% of all national health costs and is the cause of the majority of hospital stays (1,297,000) and the highest percentage (3.6%) among all disease conditions (Torio & Moore, 2016).

The minimal hospital cost of uncomplicated sepsis is approximately $16,000 and increases with disease severity (Paoli et al., 2018). Severe sepsis and septic shock result in hospital costs of $24,638 and $38,298, respectively. This cost is even higher when sepsis is not initially present at admission ($51,022).

Consequently, the Centers for Medicare and Medicaid Services (CMS) established an evidence-based practice (EBP) clinical sepsis bundle (SEP-1) to reduce hospital mortality and cost of care (CMS, n.d.). Compliance with this core measure is associated with improved clinical outcomes. Ramsdell et al. (2017) discovered that sepsis care bundle compliance led to significant

clinical improvement and improved in-hospital survival. A long-term outcomes study (7.5 years) conducted by Levy et al. (2015) concluded that sepsis bundle compliance resulted in a 25% reduction in relative sepsis mortality risk and an average decrease in hospital length of stay of 4%. Similarly, Kim and Park (2019) discovered that performance improvement programs that encourage early sepsis recognition and sepsis bundle compliance improve sepsis survival and reduce mortality.

Statement of the Problem

However, clinical sepsis bundle (SEP-1) compliance must be more consistent among reporting hospitals and clinicians. For example, according to recent CMS hospital performance data (2017), 87% of hospitals properly report SEP-1 compliance (Barbash et al., 2019). However, only 49% of hospitals comply with all SEP-1 elements. Other clinical researchers have discovered similar compliance practice irregularities. Gilhooly et al. (2019) determined that hospital bundle complexity often led to nonuniform or absent bundle compliance reporting and compliance. Truong et al. (2019) reported that such SEP-1 ambiguities resulted in less (47.3%) performance compliance and are consistently not followed in certain critical disease states and clinical settings. Liao et al. (2019) also identified an overall SEP-1 compliance performance rate of only 52.7% when describing related hospital characteristics. Finally, Wang et al. (2020) explained that such sepsis bundle compliance inconsistencies are related to practitioner concerns. These clinical issues include the need for individualized care, underlying patient comorbidities, overlapping clinical symptoms, and rejection of administrative mandates. Similar problems with sepsis bundle noncompliance are clinical concerns for improvement in this project's host organization.

Clinicians must gain the necessary knowledge and skills to implement sepsis bundle elements accurately (Gilbert et al., 2019). Healthcare providers have demonstrated a need for working knowledge during sepsis bundle performance simulations (Ottestad et al., 2007). Brown (2018) described this clinical performance phenomenon as the *knowledge-to-action cycle.* This behavior occurs when EBP knowledge lags behind clinical practice applications.

Background

Sepsis bundle noncompliance affects epidemiological, economic, and quality societal interests. The background for such sepsis issues is related to a current definition, relevant pathophysiology, established clinical guidelines, and sepsis bundle understanding. The approach of this scholarly DNP project uses concepts associated with this background to measure study participants' knowledge base and likelihood for compliance, respectively.

Definition

According to Singer et al. (2016), sepsis (Sepsis-3) is a "life-threatening organ dysfunction caused by a dysregulated host response to infection" (p. 6). This current definition explains the progressive pathological state of sepsis, severe sepsis, and septic shock (Han et al., 2015). Nevertheless, various terminologies of sepsis and septic shock exist. For example, Shankar-Hari et al. (2016) described clinical septic shock as hypotension requiring vasopressor therapy and unresponsive to fluid therapy.

Singer et al. (2016) discovered that different sepsis definitions led to misleading models, unclear terminologies, and discrepancies concerning mortality reporting. This emerging operational definition of sepsis (Sepsis-3) is essential to understanding sepsis pathophysiology and developing or adhering to clinical practice guidelines designed to reduce sepsis mortality

(Rhodes et al., 2017). This scholarly DNP project utilizes this sepsis definition (Sepsis-3) to determine the knowledge base of research participants.

Pathophysiology

Several compensatory mechanisms counter the effect of hypotension experienced in septic shock. The initial physiological stress responses include stimulating the baroreceptor reflex, activating the Renin-Angiotensin System, and releasing endogenous vasopressin and catecholamines (epinephrine, norepinephrine) from the adrenal gland (Hall, 2015). These physiological activities increase heart rate, contractility, and peripheral vasoconstriction. Clinical manifestations observed in patients are associated with increased cardiac output (CO), mean arterial pressure (MAP), and peripheral vascular resistance (Hall, 2015).

However, these compensatory mechanisms fail in advancing states of hypotensive septic shock. Coronary blood flow decreases, leading to myocardial depression and a morbid reduction in CO (Hall, 2015). Finally, ischemic tissues release potentially harmful substances such as histamine, serotonin, and bacterial endotoxins that produce further profound vasodilation, progressive cardiac function decline, and ultimately death. Understanding these pathophysiological responses is indispensable to developing and implementing sepsis-related clinical practice guidelines (Rhodes et al., 2017). This scholarly DNP project measures the likelihood of implementing EBP guidelines.

Surviving Sepsis Guideline

A team of global experts representing several international organizations convened to recommend best practices to reduce sepsis mortality, known as the Surviving Sepsis Guideline (SSG; Rhodes et al., 2017). This EBP guideline indicates that sepsis and septic shock are clinical emergencies that require immediate treatment and resuscitation. The SSG recommends

beginning fluid administration parameters, hemodynamic reassessments, fluid responsiveness, a blood pressure target, and laboratory lactate measurements (Rhodes et al., 2017).

Specifically, the SSG recommends, at minimum, an initial crystalloid IV (intravenous) infusion of 30 mL/kg to treat sepsis-related hypoperfusion within the first 3 hours of diagnosis. Hemodynamic monitoring (cardiac function) guides subsequent infusions. Dynamic assessment tests determine fluid responsiveness. A MAP patient target of 65 mm Hg determines vasopressor use. Finally, elevated serum lactate levels are normalized to reduce tissue hypoperfusion. These SSG recommendations for sepsis and septic shock initial resuscitation support organizational and professional practice policies and reduce sepsis mortality (Rhodes et al., 2017). This scholarly DNP project measures the study participants' likelihood of EBP adopting such guidelines.

SEP-1 Sepsis Care Bundle

In 2015, the CMS instituted a sepsis quality measure (SEP-1) program composed of "bundled" 3- and 6-hour treatments (CMS, n.d.). These clinical treatments include timely fluid administration, antibiotics, blood cultures, lactate laboratory measurements, bedside evaluation, and pharmacological support for blood pressure when needed. These quality measures modeled the Surviving Sepsis Campaign (SSC) guidelines (2004) that were published to increase clinical awareness and improve sepsis outcomes (Dellinger et al., 2004). The CMS adopted these clinical SSC guidelines (Rhodes et al., 2017) and received endorsement from the National Quality Forum to engage in public reporting and value-based purchasing as a core quality measure (CMS, n.d.). As such, The SEP-1 Sepsis bundle is a quality measure that protects sepsis-related societal interests.

More recently (2018), the SSC updated the standing sepsis guidelines to include a streamlined "Hour-One Bundle" in response to new sepsis evidence (Levy et al., 2018).

Additionally, hospitals must report SEP-1 quality measure compliance with the Hospital Inpatient Quality Reporting Program (CMS, 2021a). Under this reimbursement plan, hospitals receive CMS payments on an "all or none" basis according to core measure (SEP-1) compliance. However, the CMS still needs to establish specific SEP-1 reimbursement strategies. This scholarly DNP uses SEP-1 terminology and concepts to determine research participants' bundle understanding and compliance likelihood.

Purpose of the Study

This DNP scholarly project aimed to quantify the relationship between EBP baseline sepsis knowledge and sepsis bundle (SEP-1) clinical compliance likelihood. As such, I evaluated and enhanced the *knowledge-to-action cycle* (Brown, 2018) regarding current and future clinical performance, education, understanding, and application of best practice quality measures (CMS, n.d.; Rhodes et al., 2017). In turn, this will promote consistent clinical practice and compliance with SEP-1 sepsis bundle elements, improving sepsis outcomes regarding cost burden and mortality (Gilbert et al., 2019; Ottestad et al., 2007).

Significance of the Problem

This scholarly DNP project contributes to professional growth, organizational quality and cost performance, patient outcomes, and continued research. This project stimulates sepsis knowledge needed for professional growth. Organizational leaders will appreciate the potential quality improvement and cost reductions this project supports. Community and hospital sepsis patient populations will experience improved clinical outcomes due to sepsis bundle compliance inspired by this project. This project will generate further investigative sepsis-related causal research.

Professional Growth

This project will inspire professional nursing practice growth and interprofessional collaboration. ED nurses will learn the SEP-1 Sepsis care bundle's clinical utility and implement best practices (Schorr, 2016). This knowledge will equip ED nurses to be better prepared to identify sepsis quickly and effectively implement sepsis care bundle interventions (e.g., fluids, hemodynamic monitoring, antibiotics, etc.; Rhodes et al., 2017).

Such activities will allow for more effective professional communication with nurses along the care continuum and extend to interprofessional collaboration with other healthcare professionals such as physicians and nurse practitioners (Schorr, 2016). This professional communication is consistent with the guiding competency tenants initiated by the Institute of Medicine (IOM) to develop interprofessional education (IPE; Institute of Medicine, 2011). This multidisciplinary form of the IPE method will not only disseminate sepsis knowledge across a broader spectrum of healthcare participants who clinically manage acute sepsis but also encourage professional collaboration, mutual respect, cooperation, and clinical understanding (Homeyer et al., 2018). Thus, this scholarly DNP will inspire nursing knowledge and SEP-1 sepsis bundle compliance and develop interprofessional communication skills among the participating healthcare study participants.

Organizational Impact

This scholarly DNP project will also impact organizational quality performance and sepsis-related costs by bolstering SEP-1 compliance. SEP-1 compliance enhances organizational quality care coordination designs, improves patient health and satisfaction, and controls costs for hospitalized patients (Agency for Healthcare Research and Quality [AHRQ], 2018). Such quality approaches promote timely communication and information sharing and address public health

concerns, resulting in safer, more efficient, and cost-effective health care. Seoane et al. (2013) demonstrated that sepsis care coordination strategies resulted in improved order sets over time, decreased median time to antibiotics by 68 minutes ($p \leq .001$), and reduced length of stay (LOS) by one (1) day ($p = .036$). Guirgis et al. (2017) reported that a hospital-wide implementation of a sepsis Rapid Response Team (RRT) resulted in less mortality risk (OR 0.62, 95% CI 0.39–0.99; $p = .046$), a reduction of LOS in intensive care unit (ICU; 1.95 postintervention, 95%CI 1.75, 2.06; $p < .001$), mean hospital LOS (9.9 postintervention, 95% CI 9.3, 10.6 days; $p < .001$), and less odds of mechanical ventilation (OR 0.62, 95% CI 0.39, 0.99; $p = .007$).

Currently, the SEP-1 exists as an "all or none" reported CMS quality measurement for reimbursement (CMS, 2021a). However, hospital SEP-1 compliance is publicly available in Medicare Hospital Compare Reports (CMS, 2020b). This report compares individual hospital performance against top performers and the national average. Such quality comparisons have affected hospital competition pressures and related price changes (Dor et al., 2015). Thus, sepsis quality policy measures may drive hospital competition, costs, and pricing.

This DNP project will also help organizations maximize economic benefits. Sepsis bundle compliance ensures CMS quality measurement reimbursement (CMS, n.d.), achieves Hospital Value-Based Purchasing (VBP) incentives and rewards (CMS, 2021b), and minimizes Hospital Readmissions Reduction Program (HRRP) reduction penalties (CMS, 2020a). Thus, this scholarly DNP project will assist organizational leaders in improving quality sepsis measures and capitalize on SEP-1 compliance benefits.

Patient and Societal Outcomes

This scholarly DNP project will also improve patient clinical outcomes by supporting sepsis bundle compliance that decreases sepsis morbidity and mortality. Compliance with EBP

care bundles improves patient care and outcomes (Institute for Healthcare Improvement, 2021). Lavallée et al. (2017) found that adherence to SEP-1 Sepsis care bundles reduced the relative risk (*n* =119,178; RR = 0.66 [95% CL 0.59 to 0.75]) of sepsis-related adverse outcomes in sampled before-and-after controlled studies. Baghdadi et al. (2020) discovered compliance with SEP-1 bundle elements, such as timely serum lactate levels, reduced mortality in community-onset sepsis populations (absolute difference, –7.61%; 95% CI, –14.70% to –0.54%). Community-onset sepsis populations experience fewer vasopressor days with SEP-1 bundle elements of blood culture testing (absolute difference, –1.10 days; 95% CI, –1.85 to –0.34 days) and well-timed broad-spectrum intravenous antibiotic treatment (absolute difference, –0.62 days; 95% CI, –1.02 to –0.22 days; Baghdadi et al., 2020). Hospital-onset sepsis populations experience less mortality (mortality difference, –5.20%; 95% CI, –9.84% to –0.56%) when complying with SEP-1 bundle elements of broad-spectrum antibiotic treatments (Baghdadi et al., 2020). Thus, this scholarly DNP project will prompt compliance with SEP-1 measures that improve clinical outcomes in community and hospital sepsis populations.

Research

Finally, the correlational design of this DNP project will stimulate further hypothesis generation and inspire new research questions (Grove, 2017a; Sutherland, 2017a). For example, the findings of this study may guide a researcher to use a quasi-experimental approach to explain the underlying cause-and-effect relationship between variables of sepsis knowledge and sepsis practice compliance. Also, the noninterventional design used for this scholarly DNP project may extend to further experimental prediction and model-testing research (Sutherland, 2017b). Thus, this scholarly DNP project will lay the foundation for more investigative research.

Nature of the Project

Correlational research best describes the relationship between identified disparate variables and supports practice-related quantitative data collection and analysis (Grove, 2017a). Accordingly, this scholarly DNP project used a quantitative correlational approach to determine the relationship between the variables of baseline evidence-based sepsis knowledge and sepsis bundle (SEP-1) clinical compliance likelihood among the study participants obtained through electronic testing and survey questionnaires. The instrumentation for this project was the KAP Sepsis Questionnaire (see Appendix A) to test baseline sepsis knowledge and the Evidence-Based Implementation Scale (see Appendix B) to survey sepsis bundle compliance likelihood, respectively.

This study approach helped identify *knowledge-to-action cycle* (Brown, 2018) quality and practice patterns identified by previous researchers (Barbash et al., 2019; Gilhooly et al., 2019; Liao et al., 2019; Truong et al., 2019; Wang et al., 2020) among the participants in this study group. In turn, this groundwork information may isolate and target areas or groups for further education (Gilbert et al., 2019), training (Ottestad et al., 2007), or clinical practice and quality compliance modification (Wang et al., 2020). The correlational approach used in this DNP project explains the "nature of the relationships" (Grove, 2017a, p. 28) between the studied variables. It suggests primary ways to improve sepsis-related clinical education, practice, and quality.

Research Question (PICOT Format)

What is the measured correlational relationship between baseline evidence-based sepsis knowledge and evidence-based practice (EBP) compliance likelihood among healthcare

professionals who clinically manage acute adult sepsis in an emergency care setting over a 30-day study period?

Population. Bedside healthcare professionals (nurses, nurse practitioners, and physicians) who clinically manage acute adult sepsis in emergency care settings.

Intervention. Participants are survey-scored for baseline sepsis knowledge using the KAP Sepsis Questionnaire (see Appendix A) and the Evidence-Based Implementation Scale (see Appendix B) to determine sepsis bundle (SEP-1) compliance likelihood.

Comparison. No comparison.

Outcome. Statistical correlation (*r*) between sepsis knowledge and EBP compliance.

Time. Over a 30-day data collection period.

Hypothesis (Restatement of the PICOT)

Noninterventional correlational research merely describes the relationship between variables but may include an implied hypothesis (Sutherland, 2017a). Based on the PICOT research question, this scholarly DNP project's implied hypothesis is: There is a relationship between baseline sepsis knowledge and EBP compliance likelihood among healthcare professionals who clinically manage acute adult sepsis in emergency and intensive care settings.

Operational Definitions

Evidence-Based Implementation Scale (EBIS). An 18-item scale to determine the clinical likelihood for the implementation of evidence-based practices (EBPs) among healthcare professionals (Melnyk et al., 2008).

Evidence-based practice (EBP). Evidence-based practice (EBP) blends best research evidence, clinical expertise, and patient values to deliver cost-effective quality care (Grove, 2017a).

KAP Sepsis Questionnaire. This survey is an eight-question test measuring baseline sepsis knowledge for healthcare professionals (Adegbite et al., 2021).

Knowledge-to-action cycle. The time lag of available knowledge has not yet been integrated into clinical practice (Brown, 2018).

SEP-1 (Severe Sepsis and Septic Shock: Management Bundle). A Centers for Medicare and Medicaid Services (CMS) sepsis quality measure program consisting of "bundled" evidence-based practice (EBP) treatments (Centers for Medicare and Medicaid Services [CMS], n.d.).

Sepsis. Sepsis is a "life-threatening organ dysfunction caused by a dysregulated host response to infection" (Singer et al., 2016, p. 6). This current definition explains the progressive pathological state of sepsis, severe sepsis, and septic shock (Han et al., 2015). However, a clinical description of septic shock is hypotension requiring vasopressor therapy and unresponsive to fluid therapy (Shankar-Hari et al., 2016).

Scope and Limitations

The scope of this scholarly DNP project included willing study participants who were current healthcare professionals (nurses and physicians) who manage acute adult sepsis in an emergency care setting in the approved regional community in southeast Texas. However, this project had design, instrumentation, and sample elements limitations. Correlation studies are limited to determining the strength of the relationship between variables and do not indicate causation (Grove, 2017a). Although survey questionnaires are convenient and cost-effective, such instrumentation provided less clarity and depth, required computer access, required ensuring variable anonymity protection, and proved difficult to obtain informed consent (Sullivan-Bolyai & Bova, 2018). Finally, the convenience sampling of this study introduced

inherent researcher and systemic bias and sampling error that limits population representativeness and study generalizability (Grove, 2017c).

Summary

The clinical problem of interest for this scholarly DNP project centered on hospital and clinician compliance with the CMS Core Measure for sepsis (SEP-1; CMS, n.d.). I measured the relationship between baseline sepsis knowledge and sepsis bundle compliance likelihood. I used correlational methods to compare sepsis baseline knowledge and bundle compliance likelihood variables using the KAP Sepsis Questionnaire (see Appendix A) and the Evidence-Based Implementation Scale (see Appendix B) instruments, respectively. The project findings will empower *knowledge-to-action cycles* (Brown, 2018) to produce greater clinical understanding, performance, and educational expectations for the future and encourage more consistent adoption of best practice quality measures that improve sepsis outcomes.

Chapter 2: Literature Review

This chapter reviews the literature on the PICOT question: What is the relationship between baseline sepsis knowledge and evidence-based practice (EBP) compliance likelihood among healthcare professionals who clinically manage acute adult sepsis in an emergency care setting? A literature search based on this PICOT question used key terms in emergency care settings: *surviving sepsis guidelines*, *sepsis bundle*, *fluids*, *education*, *compliance*, and *goal-directed therapy*. Electronic databases used for this search include Cumulative Index to Nursing and Allied Health (CINAHL) Complete, MEDLINE/PubMed, TRIP, and the Cochrane Library. Collectively, this produced over 252 results. A secondary search filtered publication dates (2014-2021), full text, peer-reviewed, English language, and U.S. geography. This refined search identified 12 evidence sources, of which only eight were specific to the PICO question and were associated with higher levels of evidence hierarchy (Grove, 2017a). The selected eight articles will be discussed and critiqued based on emerging topics of current clinical guidelines, bundle compliance factors, hospital characteristics, clinical outcomes, quality initiatives, theoretical framework, project application, and summary.

Current Clinical Guidelines

Rhodes et al. (2017) published the current iteration of the Surviving Sepsis Campaign (SSC) clinical guidelines, which consists of 93 evidence-based recommendations regarding early sepsis management and treatment. A committee of international experts developed these clinical guidelines according to their respective specialties (i.e., hemodynamics, infection, adjunctive therapies, metabolic, and ventilation). These recommendations include 18 best practice statements evaluated by the Grading of Recommendations Assessment, Development, and Evaluation (GRADE) system for evidence quality (Granholm et al., 2019). The SSC guidelines

also propose clinical recommendations with “less strength” of evidence. These clinical suggestions include 32 strong and 39 weak recommendations with four unanswered clinical questions. The GRADE system determined strong and weak evidence according to bias, inconsistency, indirectness, imprecision, and publication bias and was subject to panel voting of 80% agreement. Rhodes et al. (2017) explained that submitting recommendations with weaker evidence support reduces mortality in septic critical care patients. For example, the Centers for Medicare and Medicaid Services (CMS) adopted the SSC's strong recommendation to deliver 30 mL/kg of IV crystalloid fluid within 3 hours when resuscitating sepsis-related hypoperfusion despite the low quality of supporting evidence (CMS, n.d.; Rhodes et al., 2017).

Bundle Compliance Factors

Bundle compliance is not always a straightforward process for hospitals and clinical professionals. Gilhooly et al. (2019) conducted a thorough scoping review of acute hospital care bundle implementation, evaluation, and development. The authors discovered bundle compliance often uses a nonuniform or absent approach to bundle design, performance, and reporting strategy. For example, a majority (57/90) of the studies included in this review developed newly created de novo care bundle designs (34/99) or adapted them independently from existing guidelines (23/90). At the same time, only a minority (42/99) of the sampled evidence supports the adoption of recognized bundle standards.

This arbitrary approach resulted in inconsistent bundle compliance rates, for which only approximately half (53/99) of the sample studied in this review reported complete care bundle compliance (Gilhooly et al., 2019). Strengths of this review included using a recognized framework (i.e., Arksey and O'Malley) to select appropriate literature (Munn et al., 2018), a quality checklist (i.e., Downs and Black) to exclude studies, and an implementation strategy

classification (Expert Recommendations for Implementing Change [ERIC]) to ensure evidence quality. Weaknesses of this review included using only one (1) independent screener, limiting inclusions related to acute care settings, irregular bundle compliance reporting, a scarcity of high levels of evidence, and a limited number (2) of randomized studies.

Truong et al. (2019) also discovered a lack of uniformity regarding bundle compliance with fluid resuscitation in patients with septic shock. Only 47.3% (486/1027) of the identified septic shock patients in this retrospective observational study received the recommended fluid administration (30 mL/kg) within the Centers for Medicare and Medicaid Services (CMS) recommended 6-hour bundle period. Bundle noncompliance often occurred when treating patients experiencing congestive heart disease (CHF; 40.9%), chronic kidney disease (CKD; 42.3%), and chronic liver disease (38.5%), although clinical settings such as the emergency department reported higher compliance rates (51.7%) than inpatient settings (35.4%). The strengths of this study included a large sample size of selected patients (n = 1027). However, the data collected from the smaller (235-bed) community hospital included in this study may introduce bias and limit generalizability (Grove, 2017b). Also, the inherent nature of observational research precludes the discovery of other confounding variables that prevent sepsis bundle compliance, such as Sequential Organ Failure Assessments SOFA scores (Jones et al., 2009). Other unexplored limitations include illness severity, reasons for clinical decision-making, and underestimating comorbidities that influence sepsis bundle compliance (Truong et al., 2019).

Similarly, Pepper et al. (2019) conducted an exhaustive systematic review to assess the clinical relevance of SEP-1 bundle components concerning antibiotic times, fluid resuscitation, and serial lactate measurements. This review concluded that bundle complexity, provider

compliance, and low-quality supporting evidence require more rigorous clinical scrutiny of individual SEP-1 components. For example, there is clear evidence to support that elements of sepsis bundle compliance improve survival (Seymour et al., 2017), the timeliness of antibiotic therapy and fluid volume required for resuscitation is quite varied and has yet to be adequately determined (Pepper et al., 2019). Strengths of this systematic review included using Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) to critique evidence inclusions (McInnes et al., 2018) and the use of a wide variety of data search sources that included Embase, Scopus, Web of Science, and Clinicaltrials.gov. Weaknesses of this review are related to International Classification of Disease (ICD) sepsis coding variances that limited actual sepsis survival estimates and a wide disparity of clinical bundle compliance reporting. For example, only seven studies reported fluid bundle compliance at the prescribed 30mL/kg requirement.

Hospital Characteristics

Barbash et al. (2019) conducted a cross-sectional observational study to characterize national SEP-1 bundle compliance performance according to hospital characteristics. Of the data collected for 3,283 U.S. hospitals, 86.8% (2,851) reported SEP-1 performance data to the CMS (2021b). This study (Barbash et al., 2019) revealed that SEP-1 reporting most often occurred in hospitals with a large bed count (> 250 beds; 99.4%), small teaching availability (< 0.2 residents to bed ratio; 97.4%), categorized as a nonprofit (94.3%) institution, and have more than 30 ICU (Intensive Care Unit) beds (99%). Hospital SEP-1 sepsis bundle reporting is also associated with other bundle performance compliance measures such as CT head interpretation (stroke; $p <$ .001), aspirin administration (heart attack; $p < .001$), and EKG time (chest pain; $p < .001$). Despite these significant findings, Barbash et al. (2019) discovered that overall SEP-1 reporting

performance varied widely among reporting CMS hospitals (mean of 48.9%, [±19]; ranging from 0-100%). Reasons for this inconsistency include individual hospital sepsis caseload volume and current undefined CMS SEP-1 performance standards and penalties (Barbash et al., 2019). Strengths of this observational study included a large sample size of SEP-1 reporting hospitals (*n* = 3,283) across a broad general mix of acute care settings. Recognized limitations of this study included the inability to perform external audits for self-reporting hospitals, the concept of "time zero" interpretation, and the need to compare similar performance measures more robustly (Barbash et al., 2019, p. 7).

Similarly, Liao et al. (2019) performed a retrospective observational cohort study to determine the relationship between hospital characteristics and SEP-1 performance. For this sample of 48 hospitals, the SEP-1 compliance average was 52.7%. The results indicated that nonteaching, for-profit, low bed count (< 100), and intermediate case mix index (CMI) hospitals with more total discharges experienced the highest SEP-1 performance scores. Conversely, variables of increased staffed beds and discharge numbers are negatively associated with sepsis performance. Interestingly, the relationship between teaching intensity and SEP-1 compliance was not statistically significant. Strengths of this observational study included using Hospital Compare (CMS, 2020b), a national hospital quality reporting system, to collect a broad range of data for defining hospital characteristics. Weaknesses of the study by Liao et al. (2019) included using a select sample of 48 small regional acute care hospitals in a dense teaching population in Massachusetts, which may introduce biases and limit the generalizability of findings (Grove, 2017b). Also, reported ICD coding inaccuracies and questionable CMI reporting (Liao et al., 2019) may skew SEP-1 bundle compliance reporting and threaten internal validity (LoBiondo-Wood, 2018).

Clinical Outcomes

Healthcare bundles based on evidence-based practices (EBPs) improve patient care and outcomes (Institute for Healthcare Improvement, 2021). Lavallée et al. (2017) conducted a systematic review of 37 studies to determine the clinical outcomes associated with healthcare practice bundles and associated healthcare worker compliance behavior. The findings yielded variable results. The six pooled randomized controlled studies in this review indicate a relatively neutral risk ratio (RR) related to care bundle implementation (n = 2049; RR = 0.97 [CI 0.71 to 1.34]). Whereas, in the less controlled sample (before-and-after) studies, a reduced relative risk (RR) is attributable to care bundle implementation and practice (n = 119,178; RR = 0.66 [95% CL 0.59 to 0.75]). Also, the studied evidence needed to uniformly describe characteristics of worker bundle compliance due to limited content, lack of theoretical basis, and inconsistent feedback and monitoring techniques (Lavallée et al., 2017). Accordingly, the authors concluded that more rigorous high-level randomized trials and further research are needed to support this study's low-quality evidence findings. Strengths of this study included using PRISMA to determine acceptable evidence minimums, excellent search databases such as the Cochrane Central Register for Controlled Trials, and independent screening for duplications and data extraction. The weakness of this research is related to downgraded GRADE evaluations due to indirectness, inconsistency, bias risk, and findings of "very low" research quality (Granholm et al., 2019; McInnes et al., 2018).

Baghdadi et al. (2020) used a retrospective cohort approach to study the effect of particular SEP-1 bundle elements on mortality and morbidity among hospital-onset and community-onset sepsis patients. In community-onset sepsis patients, timely serum lactate level testing reduced mortality. Bundle elements such as blood cultures and broad-spectrum antibiotic

coverage only reduced vasopressor days. Interestingly, complete SEP-1 adherence in this group significantly increased vasopressor days and did not reduce mortality. Also, the hospital-onset group experienced a significant reduction (absolute difference, -5.20%; 95% CI, -9.84% to -0.56%) in mortality due to the single SEP-1 bundle element of timely antibiotic coverage. Thus, Baghdadi et al. (2020) discovered that while clinical adherence to the SEP-1 care bundle is not directly associated with sepsis mortality improvement, select bundle elements did improve mortality outcomes, suggesting the need for quality metric revision. Strengths of this study included the large sample size of sepsis patient onset experiences (n = 6404) among a broad range of community (64.1%) and hospital (35.9%) settings. Weaknesses in this study included inherent sepsis onset "time zero" (time 0) approximations that may not reflect authentic sepsis clinical experiences. Baghdadi et al. (2020) also reported limitations regarding postdischarge follow-up, medical record review, ICD coding biases, and using qualitative data for statistical corrections that may affect study outcomes and conclusions. Finally, the authors (Baghdadi et al., 2020) used vasopressor days as an outcome variable to explain organ dysfunction when other proven options, such as SOFA scores (Jones et al., 2009), may have been more clinically useful.

Quality Initiatives

Quality studies demonstrate that knowledge of sepsis awareness impacts sepsis bundle compliance. Leon et al. (2018) conducted a before-and-after quality study to improve sepsis bundle compliance using identifiable sepsis educational reminders in a large level II Emergency Department (ED) trauma center. The quality initiative resulted in a statistically significant increase in sepsis bundle compliance (p = .0399). Warstadt et al. (2022) performed a multipronged quality improvement project in a large metropolis emergency department (ED) that included multidisciplinary communication, electronic health record (EHR) prompts, and

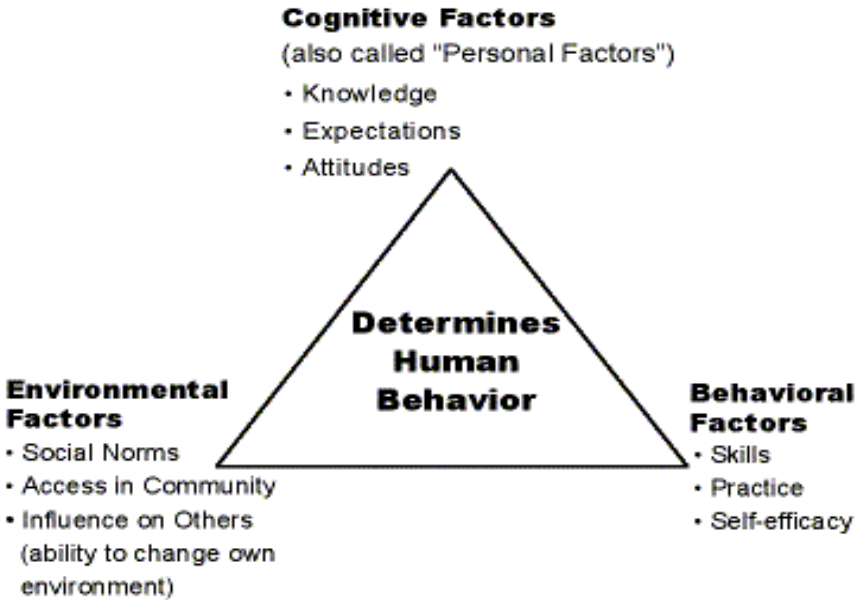
collaborative feedback to improve sepsis bundle compliance. These quality measures resulted in a statistically significant increase in sepsis bundle compliance ($p < .001$) as well as bundle elements of initial lactate ($p = .009$), repeat lactate ($p = .001$), timely antibiotics ($p = .031$), blood culture timing ($p = .001$), initial bolus ($p < .001$), and hemodynamic reassessments ($p < .001$). Finally, Gatewood et al. (2015) directed a quality project using a nurse screening tool, protocol, and electronic health record (EHR) reminders in a larger quaternary hospital with emergency services to initiate early sepsis treatment and bundle compliance. The results of this approach include a statistically significant increase in overall bundle compliance ($p < .001$)., antibiotic timeliness ($p < .001$), and fluid bolus requirements ($p < .001$).

Theoretical Framework

SLT described by Bandura (1977) supports the clinical problem of interest regarding sepsis bundle (SEP-1) compliance. Bandura describes learning as a cognitive process that occurs within a social context. Critical tenets of SLT include vicarious reinforcement, modeling, and reciprocal determinism (Grusec, 1992). Vicarious reinforcement occurs by observing the consequences of others. Modeling refers to behavior imitation. Reciprocal determinism is the interdependent relationship between cognition, environment, and behavior (see Figure 1). In this sense, sepsis bundle compliance is a product of cognitive (knowledge), environmental (social norm), and behavioral (practice) influences. Gilbert et al. (2019) identified knowledge deficits contributing to nonuniform sepsis bundle performances. Liao et al. (2019) concluded that environmental hospital characteristics determined inconsistent sepsis bundle compliance. Finally, Wang et al. (2020) linked behavioral practice concerns with sepsis bundle noncompliance.

Figure 1

Social Learning Theory Human Behavior Determinates



Note. The image illustrates the cognitive, environmental, and behavioral factors that determine reciprocal determinism behavior, according to Bandura (1977). From *Theories & approaches: Social Learning Theory,* by ReCAPP (n.d.), http://recapp.etr.org/recapp/index.cfm?fuseaction=pages.TheoriesDetail&PageID=380. Copyright by Recpp.etr.org.

Additionally, Bandura (1982) explained that a chief behavioral factor of SLT is self-efficacy or the individual's belief concerning his control of life events. SLT is primarily a cognitive learning theory (Wills & McEwen, 2018). However, as a constructivist learning tool (Candela, 2016), it can influence and change behavior using concepts of self-efficacy and new modeling patterns that build upon existing knowledge, personal experience, and past understanding. Accordingly, SLT may lay a theoretical foundation for teaching and adopting sepsis bundle (SEP-1) compliance among healthcare professionals.

DNP Project Application

This literature review supports the DNP scholarly project's problem of interest concerning sepsis bundle compliance and explains the relationship between sepsis knowledge and clinical compliance. Gilhooly et al. (2019) discovered that sepsis bundle compliance directly relates to care bundle complexity and the number of required elements. Suggestions to improve care bundle compliance included simplification, standardized reporting, and further training and education (Gilhooly et al., 2019). Similarly, Truong et al. (2019) reported that SEP-1 clinical noncompliance regarding fluid administration might stem from a lack of clinical knowledge and clinical hesitancy regarding approved fluid administration protocols. Pepper et al. (2019) suggested that sepsis bundle compliance irregularities are related to SEP-1 time contingencies requiring further high-quality evidence dissemination for clinical adoption. Liao et al. (2019) presented data suggesting that hospitals in traditionally high-acuity teaching facilities require training and educational support to meet SEP-1 bundle compliance. Barbash et al. (2019) explained that higher SEP-1 bundle compliance among nonteaching organizations is due to less complex case mixes that increase available time for sepsis bundle understanding and compliance. Lavallée et al. (2017) recognized a clear need to provide continuing quality research and education to demonstrate the clinical value of care bundles. Baghdadi et al. (2020) showed that knowledge of specific SEP-1 bundle elements would improve sepsis bundle compliance and reduce patient mortality. Together, these sources indicate research opportunities to link and quantify the relationship between sepsis knowledge and sepsis bundle (SEP-1) compliance that is consistent and supports this DNP scholarly project clinical problem of interest and PICO question.

Chapter Summary

This literature review supports the project clinical problem of sepsis bundle compliance inconsistency and the PICO question regarding the relationship between healthcare professional sepsis knowledge and sepsis bundle (SEP-1) compliance. The basis of this knowledge rests on the Surviving Sepsis Campaign (SSC) evidence-based recommendations for clinical practice to improve sepsis outcomes (Rhodes et al., 2017). The CMS implemented these clinical guidelines into the SEP-1 sepsis care bundle, for which hospitals must report and comply (CMS, 2021b).

Accordingly, knowledge and sepsis bundle compliance determinants reviewed high-level evidence concerning bundle compliance factors, hospital characteristics, clinical outcomes, theoretical framework, and DNP project application. Sepsis Bundle (SEP-1) compliance among hospitals and providers remains inconsistent, nonuniform, and clinically dismissed (Gilhooly et al., 2019; Pepper et al., 2019; Truong et al., 2019). Barbash et al. (2019) and Liao et al. (2019) independently discovered that common hospital characteristics for SEP-1 performance success include smaller, nonteaching, for-profit hospitals. Further, these authors concluded that sepsis bundle compliance occurred in this group because of a more favorable case-mix index, less severe patients, and more available time to treat patients than their larger, nonprofit counterparts (Barbash et al., 2019; Liao et al., 2019). Clinical outcomes associated with care bundle compliance include less relative risk (RR) exposure for patients (Lavallée et al., 2017) and reduced sepsis mortality when specific elements of SEP-1 are clinically adhered to (Baghdadi et al., 2020). Quality research (Gatewood et al., 2022; Leon et al., 2018; Warstadt et al., 2022) reveals the impact of sepsis knowledge on sepsis bundle compliance.

The theoretical framework of this DNP scholarly project is Bandura's social learning theory (SLT; Bandura, 1977). Specifically, the SLT connects cognitive learning processes with

sepsis bundle knowledge, environmental factors experienced by hospital characteristics, and behavior that determines sepsis bundle compliance. Finally, the reviewed literature provides consistent examples of the interconnected relationship between sepsis knowledge and sepsis bundle compliance. This DNP scholarly project quantifies that relationship according to the clinical problem of interest and PICO question.

Chapter 3: Research Method

The Severe Sepsis and Septic Shock Management Bundle (SEP-1) Sepsis care bundle established by the Centers for Medicare and Medicaid (CMS) decreases sepsis-related morbidity, mortality, and cost of care (CMS, n.d.). This health policy initiative incorporates evidence-based practice (EBP) recommendations from the Surviving Sepsis Campaign (SSC) that center on early identification and rapid, effective clinical treatments (Rhodes et al., 2017). Current evidence supports the clinical utility of SEP-1 Sepsis bundle compliance. Levy et al. (2015) reported that full compliance with such bundle performance guidelines was associated with a 25% reduction in the relative risk for sepsis-related mortality.

However, SEP-1 bundle compliance among hospitals and providers needs to be more consistent, nonuniform, and complete (Gilhooly et al., 2019; Pepper et al., 2019; Truong et al., 2019). The organization I am affiliated with reported similar experiences and has identified a need for sepsis bundle compliance improvement. Ferrer et al. (2008) suggested that continued performance investigation is critical to improve and maintain clinical sepsis bundle compliance. This DNP scholarly project further described the clinical problem of sepsis bundle noncompliance by quantifying the relationship between EBP baseline sepsis knowledge and SEP-1 Sepsis bundle implementation likelihood. An explanation of the methodology of this project included defining the project design, instrumentation, data collection and analysis, methodology, feasibility, Institutional Review Board (IRB) process, interprofessional collaboration, practice setting, target population, risks and benefits, timeline, and summary.

Project Design

This scholarly DNP project used a nonexperimental descriptive correlation research design to determine the relationship between EBP knowledge and sepsis bundle compliance

likelihood. A simple correlational research design is the best approach to describe the nature and strength of the relationship between two disparate variables of interest (Sutherland, 2017a). This method quantitatively measures relationships between variables according to the effect size of the Pearson product-moment correlation coefficient (*r*), for which a perfect positive correlation is +1, a perfect negative correlation is -1, and a 0 (zero) is no relationship (Cipher, 2017). The Pearson product-moment correlation coefficient is the appropriate correlational analysis for data collected using interval and ratio levels of measurement (Cipher, 2017).

These correlational research design characteristics fit the outcome requirements of this scholarly DNP project to determine the relationship between variables of clinical knowledge and practice compliance. Quantitative statistical analysis determined the strength and direction of that relationship. The study instruments tested knowledge at the ratio level of measurement and scale compliance at the interval level (Grove, 2017b). Hence, a simple correlational design appropriately determined the relationship between study variables, the directional strength of that relationship, and the statistical analysis requirements of this scholarly DNP project.

This correlational research design approach also fits the scholarly DNP project's stated clinical problem of sepsis bundle noncompliance and the purpose of determining the relationship between evidence-based knowledge and clinical practice. Descriptive correlational research designs use professional behaviors like sepsis bundle noncompliance data to improve clinical practice (Moran et al., 2019). This design approach is consistent with The Iowa Model of Evidence-Based Practice to Promote Quality Care to integrate evidence into practice (Titler et al., 2001). Research triggers for this model include associated practice-knowledge gaps in standardized clinical guidelines such as the SSC recommendations for sepsis management. Brown (2018) described similar *knowledge-to-action cycle* deficits that are consistent with the

purpose of this scholarly DNP project. Accordingly, a correlational research design will appropriately meet the outcome requirements for this scholarly DNP project and is compatible with the stated purpose and problem of interest.

Instrument/Measurement Tool

This scholarly DNP project used two established instruments to answer the clinical research question. The KAP (Knowledge, Attitudes, and Practice) Sepsis Questionnaire tests baseline sepsis knowledge (Adegbite et al., 2021; see Appendix A), and the Evidence-Based Implementation Scale (Melnyk et al., 2008; see Appendix B) measures sepsis bundle compliance likelihood. The KAP Sepsis Questionnaire tested the knowledge of 115 active healthcare professionals, including physicians and nurses (Adegbite et al., 2021). This instrument was created in response to a newly emerged definition of sepsis (Sepsis-3; Singer et al., 2016) that included features of septic shock and clinical signs of organ dysfunction based on qSOFA (quick Sequential Organ Failure Assessment) scores.

The KAP Sepsis Questionnaire consists of a demographic information section and an 8-question test with a possible score of 21. The KAP Sepsis Questionnaire was developed according to guidelines and recommendations from the World Health Organization, Surviving Sepsis Campaign International, and leading local and published medical sepsis healthcare practitioners. This instrument demonstrated a high level (0.8) of internal consistency reliability according to the tested Cronbach's alpha coefficient (Grove, 2017b). The established clinical range, current information (Sepsis-3 definition), content validity (Grove, 2017b), and reliability of the KAP Questionnaire make this an appropriate tool to assess the sepsis knowledge of the described population of healthcare professionals (nurses and physicians) who clinically manage

acute adult sepsis in emergency care settings in this scholarly DNP project. This tool is granted permission through Creative Commons (see Appendix C).

Melnyk et al. (2008) developed the Evidence-Based Implementation Scale (EBIS) to determine the clinical likelihood of the implementation of EBP. Behavioral models such as the ARCC (Advancing Research and Clinical practice through Close Collaboration)**,** which explain belief and appreciation motivators for implementation change**,** helped guide the EBIS (Melnyk et al., 2008) and acted as a basis to measure sepsis bundle (SEP-1) compliance in this project. Similarly, Melnyk et al. (2008) used EBIS to determine the extent of evidence-based implementation by studying the surveyed responses of 394 nurses who attended continuing education workshops.

The EBIS consists of 18 action statement items scored (on a 5-point Likert scale) according to the number of EBP activities respondents in this study reported having performed over eight weeks. These action items included implementing and sharing evidence-based outcome data, guidelines, research, and practice changes. The EBIS has recorded a very high level (0.96) of internal consistency reliability according to the tested Cronbach's alpha coefficient and the Spearman-Brown *r* coefficient (0.95) for psychometric reliability (Grove, 2017b; Melnyk et al., 2008). The principal component analysis has confirmed instrument construct validity. A criterion validity study indicated that prior formal EBP training exposure, advanced education, and nursing role responsibility increase EBP implementation (Melnyk et al., 2008). The behavioral model framework, EBP implementation scoring, very high reliability, and criteria and construct validity indicators made the EBIS instrument an appropriate tool to measure sepsis bundle (SEP-1) compliance in the described population of this scholarly DNP project. The EBIS author permitted the use of this tool in this DNP project (see Appendix D).

Data Collection and Management (Methodology)

This scholarly DNP project required progressive methodological steps to collect and manage survey data securely. This process included working collaboratively with approval agencies and primary stakeholders to ensure research participants' security, privacy, and confidentiality. These steps began with project approval and ended with data retirement.

Foremost in this process is permission for organizational support for research activity. As the principal investigator, I obtained a letter of support to permit project research activity in the host facility's emergency department (ED; see Appendix E). I also received respective organizational and academic IRB approval to ensure and protect the rights of participating research subjects (Gray, 2017; see Table 1). I then submitted the IRB application to the respective IRB committee with an Abilene Christian University (ACU) informed consent document (see Appendix F) explaining the research project and participant expectations. This respective approval process took approximately 6 weeks respectively (see Table 1).

Upon organizational IRB approval, I worked directly with the primary nursing stakeholder (Nurse Manager) and medical stakeholder (Medical Director) to obtain a qualified email listing of eligible project candidates. This qualified list included currently employed practicing healthcare professionals (nurses, nurse practitioners, and physicians) who acutely manage and provide acute care for sepsis patients in the ED crossmatched with a valid working intranet address.

Next, I sent an introductory recruitment email to all qualified, eligible nursing and medical project candidates via the organization's intranet, requesting their voluntary participation in this scholarly DNP project (see Appendix I). This introductory email included a detailed description of the survey and participant expectations, specific information concerning the

expected length of time for survey completion, digital survey access requirements (QR code and weblink), starting and ending dates, my contact information, and the assurance of participant confidentiality and anonymity.

This email provided a digital weblink and QR code to access the Qualtrics Survey (see Appendix J), which included modified versions of the KAP Sepsis Questionnaire (Adegbite et al., 2021; see Appendix A) and the Evidence-Based Implementation Scale (Melnyk et al., 2008; see Appendix B). The Qualtrics Survey included one consent question, five demographic questions, eight knowledge testing questions, and 18 EBP survey questions adapted from primary sources.

Once received, participants completed the electronic surveys at their convenience during this project's 1-month duration (see Appendix J). During this time, I sent weekly email reminders to eligible project candidates until the survey completion date. Qualtrics statistical software platform technology recorded the surveyed response data anonymously to ensure privacy and confidentiality. The data were securely transmitted and stored using proprietary encryption, firewall protection, scanning, penetration, and password-protected methods (Qualtrics, 2021). Qualtrics restricts data access and monitors compliance. Qualtrics data storage occurs through third-party data centers that ensure industry-standard SSAE1-16 SOC II certification (Qualtrics, 2021). According to ACU institutional policy, ownership, lengths of data storage, and data retirement depend upon the current Qualtrics account license.

Analysis Plan

Collected surveyed data from the KAP Sepsis Questionnaire (Adegbite et al., 2021) and the Evidence-Based Implementation Scale (Melnyk et al., 2008) were analyzed using the Intellectus Statistics software package. Descriptive statistics examined the individual

characteristics and distribution (Heavey, 2019) of the selected respective knowledge and EBP compliance data sets. This data included nominal variables such as age, employment status, and occupation (see Table 2). Descriptive statistics also analyzed the ordinal data variable of education and the ratio data variable of years of experience contained in these data sets (see Table 3).

The study instruments test knowledge at the ratio level of measurement and scale compliance at the interval level. This requisite allows the collected data to be analyzed using inferential statistics (Grove, 2017b). Accordingly, a scatter plot diagram illustrates the general relationship between the described project variables of knowledge and implementation according to linearity, strength, and direction (Cipher, 2017; see Figure 3). A Pearson product-moment correlation coefficient (r) statistically represents the magnitude of the linear relationship between the ratio variable obtained from the knowledge test scores and the interval variable obtained from the implementation scale (see Table 9). Thus, descriptive and inferential statistics effectively analyzed the collected respective knowledge (see Appendix M) and EBP implementation (see Appendix N) scored data sets.

Methodology Appropriateness

This methodology approach was appropriate for this scholarly DNP project. Quantitative research uses objective numerical data to describe the relationship between variables (Grove, 2017a). Correlational research is a quantitative method investigating the relationship between practice-based variables (Grove, 2017a). The design and instruments of this project support and are consistent with correlational research methodology. Specifically, the project design determines the correlational relationship between EBP knowledge variables and sepsis bundle compliance likelihood. The KAP Sepsis Questionnaire (Adegbite et al., 2021) and the Evidence-

Based Implementation Scale (Melnyk et al., 2008) express numerical ratio and interval levels of measurement amenable to inferential correlation analysis (Grove, 2017b).

The described survey method also supports this scholarly DNP project. Surveys collect large amounts of data quickly at little expense and work well with nonexperimental designs to compare variables' differences (LoBiondo-Wood, 2018). Accordingly, this survey method will adequately meet the methodological needs of this project concerning sample size needs, time constraints, and measurable variables. Thus, overall, the methodological approach for this scholarly DNP project is appropriate regarding academic and organizational approval, organizational duties, design, instrumentation, and use of survey tools.

Feasibility and Appropriateness

This scholarly DNP project is feasible and practical at the organizational level. Respective nursing and medical leadership members have identified sepsis bundle compliance as an organizational need that will benefit from further study. The host facility is a regional community ED part of a larger healthcare organization that fosters professional growth, sponsors nursing research, and is familiar with the research and IRB process. Accordingly, this organization granted respective facility permission (see Appendix E) and institutional IRB approval (see Appendix G) to conduct this scholarly DNP research project on sepsis.

This scholarly DNP project is also feasible and practical at the local level. Individual nursing and medical team stakeholders have offered their support concerning organizational duties related to emailing, messaging, data collection, and Qualtrics analytic software. This facility routinely uses Qualtrics software applications to sponsor similar training and education and offers preferred statistician support. Access to the Qualtrics software platform remains free for organizational participants and the principal investigator. The anticipated expenditures for

this DNP depend on time, labor, and stakeholder support with little, if any, expected financial cost.

IRB Approval and Process

This scholarly DNP project received IRB academic approval from Abilene Christian University (ACU; see Appendix H) and organizational IRB approval from the participating host hospital facility (see Appendix G). As part of this academic process, a co-principal investigator and I completed prerequisite training that included CITI Social-Behavioral-Educational (SBE) Basic and the CITI Responsible Conduct of Research (RCR) Basic coursework and certification. I also completed additional CITI training concerning good clinical practice, human subject research, investigational drugs, and medical devices.

Traditionally, survey procedures and educational tests are exempted from IRB review due to a lack of risk for the research subject (Gray, 2017) and implied consent (Couper & Singer, 2009). Accordingly, the ACU IRB approved this project based on an exemption from review status (see Appendix H). The organizational IRB approved this project on an expedited IRB review basis (see Appendix G). Nevertheless, this DNP research project was strictly conducted according to the respective IRB-outlined processes to ethically protect and secure all of the research participants' rights, privacy, and welfare (Gray, 2017). As such, this protection included an ACU-sponsored template to secure informed consent (see Appendix F) incorporated into the digital Qualtrics Survey (see Appendix J) to secure and protect the participants' rights and protection from harm (Gray, 2017) and alluded to in the introductory email sent to candidates (see Appendix I). This consent information includes the purpose of this project, foreseeable risks, potential benefits, the extent of confidentiality, alternatives, compensation, contacts, and permits

withdrawal at no penalty. According to the described methodology, this project's data collection and survey information maintained all participants' confidentiality, privacy, and security.

Interprofessional Collaboration

This scholarly DNP project required the support and collaboration of interprofessional stakeholders at all levels of the stated methodology steps (i.e., permission, notification, implementation, data collection, and data analysis) for successful completion. Initially, the success of this DNP project depended on the interprofessional collaborative support of the respective academic and organizational IRB committees and nursing and medical administrators. Once approved, interprofessional collaboration with the primary stakeholders of respective nursing and medical teams' managers, educators, and clinical staff of the ED was indispensable. This DNP project's primary nursing clinical stakeholders included the ED assistant director, clinical leader, nurse educator, and nursing staff study participants. The primary medical clinical stakeholders included the ED faculty medical director and physician staff study participants.

I also consulted the respective management teams about developing the most suitable and accurate list of eligible study candidates and introductory email method and content. Also, I sought the advice of the respective education leaders to assist with the Qualtrics software survey delivery, analysis, and dissemination. Finally, I interacted with individual ED staff to provide instructions and garner feedback. Through these steps, this scholarly DNP project encouraged a multidisciplinary approach that may inspire greater clinical knowledge and improve collaboration and understanding among healthcare professionals in the ED who clinically treat and manage sepsis patients (Homeyer et al., 2018).

Practice Setting

The setting for this scholarly DNP project was a high-intensity, well-equipped emergency care area that includes 38 ED rooms consisting of available "shock" rooms where highly trained nursing and medical staff resuscitate critical acute sepsis patients. This ED is located in a medium-sized 242-bed regional community hospital that serves a wide range of population age groups and service lines that range from a birthing center to cardiovascular surgery. It is a satellite of a prominent national system organization affiliated with several large local metropolitan hospitals in Texas. This ED receives approximately 130 ED visits daily, of which many are diagnosed with sepsis or sepsis-like symptoms. The ED acutely manages and actively treats sepsis patients using a staff that comprises approximately 36 full-time nurses and nurse practitioners and 24 medical personnel, including attending physicians, residents, and physician assistants. This clinical setting provided appropriate personnel, patient population, and academic resourcefulness to conduct a DNP project determining the relationship between evidence-based sepsis bundle knowledge and sepsis bundle (SEP-1) compliance among acute healthcare professionals.

Target Population

The sampling criteria of the study determined the target population (Grove, 2017c). The sampling criteria for this scholarly DNP project included healthcare professionals (e.g., nurses, nurse practitioners, or physicians) who currently treat and manage acute sepsis patients and actively practice in an emergency care setting. Primary exclusions included ED managers, educators, and administrators who do not clinically practice at the bedside and those healthcare professionals who have not clinically practiced in the last 2 years.

Using cluster sampling, I collected groups according to similar sepsis practice patterns, behaviors, and education (Grove, 2017c). This project used a clustering method to prepare a sample from a list of eligible ED candidates. The available candidates for this study were approximately 78 respective nursing and physician candidates. Based on expected survey response rates, this project's reasonable target sample size estimate is 39, or 50% of 78 (Grove, 2017c). A power analysis determined the minimum number of participants needed for this project study (Grove, 2017c). An a priori G*Power analysis (Faul et al., 2007) revealed that a total sample size of 67 is necessary to determine statistical significance in this correlational research project study when using an exact test set at an effect size of 0.3, an alpha of 0.05, and power of 0.80 (Cipher, 2017). Also, the Intellectus Statistics software analyzed the sample demographic characteristics according to age, employment status, occupation, education level, and clinical years of experience (see Tables 2 and 3).

Risks and Bias

The primary risk exposure concerning this scholarly DNP project centered around potential data security breaches during data collection and management of survey information that threatens the protection of participants' anonymity, confidentiality, and privacy. To counter that risk potential, the Qualtrics statistical software platform used in this project includes security measures that include encrypted data transmission, high-end firewall protection, regular scanning, third-party penetration tests, and password-protected surveys (Qualtrics, 2021). Also, the Qualtrics Survey requires informed consent on the participant's part before access is permitted (see Appendix F).

This project may be affected by biases that can threaten the validity of any quantitative research design (Sutherland, 2017a). Systematic bias occurs when a studied sample shares

characteristics that are too similar and become less representative of the target population (Grove, 2017c). This bias will skew the data and lead to false conclusions. Scrutiny of inclusion criteria and less stringent exclusions reduce systematic bias threats (Grove, 2017c). The principal investigator mitigated data security risks by ensuring Qualtrics security measures and carefully evaluating the sampling criteria to preserve research validity. These measures included ensuring all candidates had an equal chance of study participation and screening Qualtrics data for potential duplication or missing response errors. Further protection was provided by the sponsored informed consent document to secure and protect the participants' rights and protection from harm (see Appendix H).

Benefits

Potential participant benefits of this scholarly DNP project include professional collaboration, practice change readiness, and clinical knowledge. The multidisciplinary approach used in this project will stimulate participants to share similar learning and evaluation experiences to promote mutual respect, cooperation, and clinical understanding (Homeyer et al., 2018). Project study participants will assess practice change readiness using the EBIS research tool to promote the transition from evidence to practice (Melnyk et al., 2008). Participants will also benefit from sepsis knowledge testing (KAP Sepsis Questionnaire) by becoming more aware of their sepsis educational needs (Adegbite et al., 2021). Finally, project participation benefits include stimulating new thought, exploring self, knowledge application, and adopting EBP practice skills (Kirkpatrick & Kirkpatrick, 2006).

Timeline

The timeline for the planned DNP project will begin at the time of the planned DNP project's inception and end upon completion. A table will be updated accordingly (see Table 1).

Table 1

DNP Project Timeline

Date	Task
January 2021	Problem of Interest (POI; PICOT)
April 2021	Chair assignment
October 2021	Mini proposal
November 2021	Committee Membership
February 2022	KAP Sepsis Questionnaire permission
February 2022	Permission to use EBIS survey tool received
February 2022	Project design with DNP chair
February 2022	Project Chapters 1-3 completed
February 2022	Proposal Defense/Approval
May 2023	Letter of Support
June 2023	Organizational IRB approval
July 2023	ACU IRB approval
July 2023	Recruitment of participants and data collection started
August 2023	Recruitment of participants and data collection ceased
August 2023	Data analysis completed
August 2023	Chapters 4-5 completed
September 2023	Data Collection Inactivation
September 2023	Raw Data Storage
September 2023	Final Defense
September 2023	Paper submitted for publication

Summary

The Sep-1 Sepsis bundle is associated with less sepsis-related morbidity, mortality, and cost (CMS, n.d.). Hospitals and providers are not routinely compliant with SEP-1 Sepsis bundle guidelines (Gilhooly et al., 2019; Pepper et al., 2019; Truong et al., 2019). This scholarly DNP project examines this clinical problem by quantifying the relationship between sepsis knowledge and sepsis bundle compliance likelihood. This project uses a nonexperimental descriptive correlational research design to answer the research question. The project instruments measure baseline sepsis knowledge and sepsis bundle compliance likelihood. Data collection and management use the Qualtrics statistical software platform to maintain participant anonymity, privacy, and confidentiality securely. The analysis plan uses descriptive and inferential statistics provided by Intellectus Statistics to analyze and compare surveyed data sets.

The detailed methodology of this project appropriately includes academic and organizational approval, organizational duties, correlational design method, instrumentation, and use of survey tools. This project is feasible at the organizational and local levels. The required academic and organizational IRB processes ensured participant protection. This project is dependent upon interprofessional collaboration. The practice setting for this project is a high-intensity emergency department staffed by a team of healthcare professionals who treat cancer-related emergencies, including sepsis. The target population for this study includes healthcare professionals who currently treat sepsis patients and actively practice in an emergency care setting. The risks of this project study are related to data security and systemic bias. The benefits of this project include professional collaboration, practice change readiness, and clinical knowledge. This project contains a running timeline of key DNP-related events. Accordingly, the

methodology of this scholarly DNP project answers the clinical question of quantifying the relationship between sepsis knowledge and SEP-1 (sepsis bundle) clinical compliance likelihood.

Chapter 4: Findings

This DNP scholarly research project aimed to quantify the correlational relationship between clinical sepsis knowledge and compliance likelihood of evidence-based practice (EBP) implementation in practice. The target population for this project encompassed emergency department (ED) professionals who actively manage sepsis patients, with sampling criteria to include nurses, nurse practitioners, physician assistants, and physicians. This sample population responded to a 32-question Qualtrics Survey providing descriptive and scored questions data analysis.

Data Collection

This project addressed considerations regarding aspects of data collection including instrumentation, population, and privacy. The instrument consisted of item questions adapted to the Qualtrics online survey software (see Appendix J). The sampled population included 48 (n = 48) ED healthcare professionals who completed the demographic portion of this survey and 33 (n = 33) who completed the test question portion. Privacy considerations included organization and academic Institutional Review Board (IRB) processes.

Instrumentation

The instrument used to collect data for this project was a digital survey delivered by Qualtrics online software platform (Appendix J). It consisted of 32 prompts focused on consent and subject demographics and incorporated direct testing questions from the KAP Sepsis Questionnaire (Appendix A) and the EBIS (Appendix B). The first Qualtrics survey question (Question 1) was a digital copy of the Abilene Christian University (ACU) Informed Consent form (see Appendix J). It required an affirmative response from the participant before survey entry was allowed. Next, the Qualtrics survey called for five demographic responses concerning

age, employment, occupation, education, and experience, respectively (see Appendix J). The remaining 26 survey questions were about eliciting subject knowledge and evidence-based practice (EBP) implementation, respectively (see Appendix J). Questions 7 through 14 were taken directly from Section B of the KAP Sepsis Questionnaire (see Appendix A) and scored on a scale from 0–21 to determine sepsis knowledge and perception, While Questions 15 through 32 were a direct digital expression of the EBIS (see Appendix J) and were scored on a scale of 0–72 to evaluate EBP implementation likelihood. The collected survey data were descriptively and inferentially analyzed using Intellectus Statistics software.

Population

The sampling criteria used to determine the target population for this project comprised healthcare professionals who actively managed sepsis patients in an emergency department (ED) setting for at least 1 year and excluded non-clinical managers, educators, and administrators. The cluster sample method in this survey collected groups according to concordant SEP-1 Sepsis care bundle guidelines outlined by the Centers for Medicare and Medicaid Services (CMS) for emergency room practice expectations and behaviors (CMS, n.d.). This sampling method also used a multidisciplinary approach to identify 62 potential survey-inclusive healthcare professional candidates that included 26 full-time nurses, 14 attending physicians, 10 supplemental nurses, five nurse practitioners, five physician assistants, and two physician residents. Although the total respondent rate of 53 (n = 53) exceeded the expected target sample size of 50% (Grove, 2017c), only 48 (n = 48) participants completed all five demographic questions, and only 33 (n = 33) participants completed the entire survey questionnaire.

This sampled survey group (n = 48) revealed descriptive demographic data expressed as nominal (i.e., Employment Status, Occupation, and Education Level) and ratio variables (Age

and Experience; see Table 2). The nominal variables were expressed according to frequency and percentage. The most frequently observed Employment Status was full-time am shift (*n* = 30, 62.50%). Nurse (*n* = 35, 72.92%) was the most frequently observed Occupation. The most commonly observed category of Education Level was bachelor's degree in college (4-year; *n* = 23, 47.92%).

Table 2

Frequency Table for Nominal Variables of the Qualtrics Survey

Variable	*n*	%
Employment Status		
Working full-time am shift	30	62.50
Working full-time pm shift	9	18.75
Working full-time split shift	7	14.58
Working part-time/PRN	2	4.17
Occupation		
Nurse	35	72.92
Physician	8	16.67
Nurse Practitioner/ Physician Assistant	3	6.25
Physician Resident	2	4.17
Education Level		
Bachelor's degree in college (4-year)	23	47.92
Associate degree in college (2-year)	10	20.83
Master's degree	8	16.67
Professional degree (MD)	5	10.42
Doctoral Degree	2	4.17

Age and Experience ratio variables were reported according to mean (M; average), standard deviation (*SD*; dispersion from the mean), standard error of the mean (SE_M; relation to population), skewness (distribution symmetry), and kurtosis (distribution normality). The survey respondents' (*n* = 42) average Age was 41.21 (*SD* = 11.39, SE_M = 1.76, Min = 25.00, Max = 69.00, Skewness = 0.42, Kurtosis = -0.69; see Table 2). The survey respondents (*n* = 40) average years of clinical sepsis Experience was 9.07 years (*SD* = 6.65, SE_M = 1.05, Min = 1.00, Max = 32.00, Skewness = 1.31, Kurtosis = 2.05; see Table 3).

Table 3

Summary Statistics Table for Interval and Ratio Variables of the Qualtrics Survey

Variable	*M*	*SD*	*n*	SE_M	Min	Max	Skewness	Kurtosis
Age	41.21	11.39	42	1.76	25.00	69.00	0.42	-0.69
Experience	9.07	6.65	40	1.05	1.00	32.00	1.31	2.05

Note. Skewness greater than 2 indicates asymmetrical distribution. Kurtosis greater than 3 indicates a different than normal distribution.

Privacy

The collected data from this project protected participant privacy using de-identification, confidential protection of data, and compliance with organizational and academic IRB guidelines. The Abilene Christian University (ACU) sponsored Qualtrics Survey delivery tool used in this project coded subject participation data to ensure anonymity and confidentiality. The Qualtrics software platform stored collected survey data according to industry-standard encryption and password protections (Qualtrics, 2021) and was retired according to ACU institutional policy and current license. The respective organizational and academic IRB processes reinforced and outlined the protection of participant privacy and ethical protection of

participant rights and welfare. Specifically, the academic ACU IRB required current and conditional Collaborative Institutional Training Initiative (CITI) training for me and carefully reviewed this project's study design, informed consent forms (see Appendix F), recruitment document (see Appendix I), and participate-facing materials (see Appendix J) to ensure the ethical protection of participant rights and welfare. Additionally, the organizational IRB approval (see Appendix G) required additional mentorship, supplementary CITI training, and exact wording of Abilene Christian University (ACU) Informed Consent (see Appendix H) to serve as the first electronically accessed question (Question 1) of the Qualtrics survey (see Appendix J).

Data Analysis

The Intellectus Statistics statistical software package analyzed the data collected from the Qualtrics Survey instrument (see Appendix J). This analysis provided descriptive and inferential statistics to quantify the correlational relationship between clinical sepsis knowledge and EBP implementation. The most frequent descriptive raw score nominal variable for the KAP Sepsis Questionnaire in the sampled survey group (n = 33) was 15 (n = 10, 18.52%; see Table 4). A plotted histogram provides a visual illustration of the distribution of this numerical data (see Figure 2).

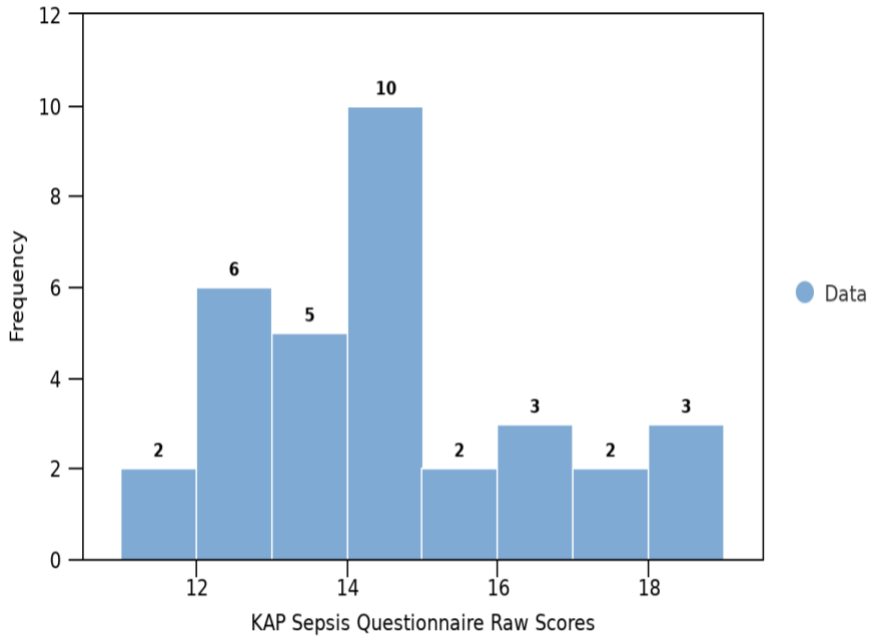
Table 4

Frequency Table for the KAP Sepsis Questionnaire Responses on the Qualtrics Survey

Variable	*n*	*%*
KAP Sepsis Questionnaire Raw Scores		
11	1	2.00
12	1	2.00
13	6	12.00
14	5	10.00
15	10	20.00
16	2	4.00
17	3	6.00
18	2	4.00
19	3	6.00
Missing	17	34.00

Figure 2

Histogram of KAP Sepsis Questionnaire Scores Raw Scores on the Qualtrics Survey



Note. This figure represents the numerical distribution of raw survey scores from the KAP Questionnaire.

The most frequent descriptive raw score nominal variable for the EBIS in the sampled survey group (n = 33) were 9 and 16, with an observed frequency of 4 (n = 4, 8.00%; see Table 5). A plotted histogram provides a visual illustration of the distribution of this numerical data (see Figure 3).

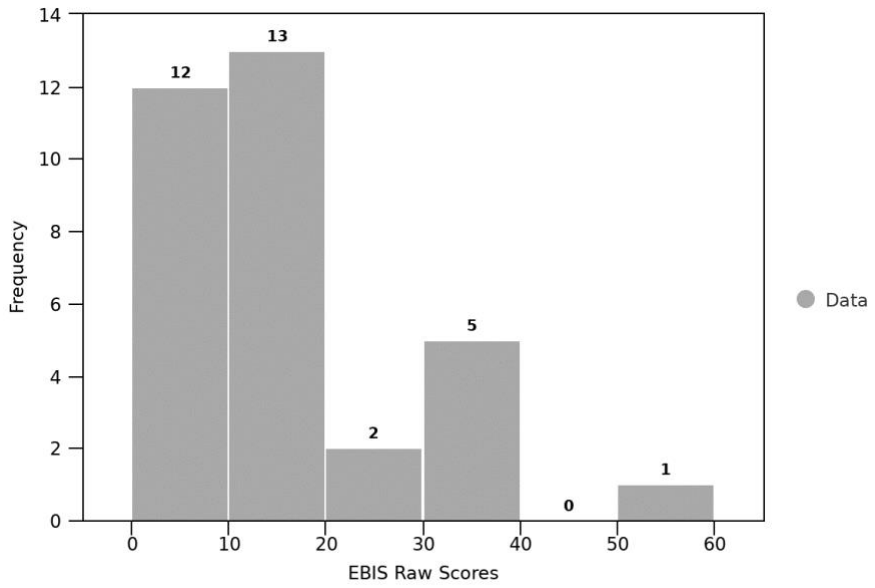
Table 5

Frequency Table for Nominal Variables of the Evidence-based Implementation Scale (EBIS) on the Qualtrics Survey

Variable	*n*	*%*
EBIS Raw Scores		
0	2	4.00
3	1	2.00
5	2	4.00
6	3	6.00
9	4	8.00
12	3	6.00
13	1	2.00
15	1	2.00
16	4	8.00
18	3	6.00
19	1	2.00
24	1	2.00
29	1	2.00
33	1	2.00
34	1	2.00
35	1	2.00
36	1	2.00
38	1	2.00
53	1	2.00
Missing	17	34.00

Figure 3

Histogram of Qualtrics-Derived Evidence-Based Implementation Scale Raw Scores on the Qualtrics Survey



Note. This figure represents the numerical distribution of raw survey scores from the KAP Questionnaire.

The KAP Sepsis Questionnaire and the EBIS scores were ratio variables that are presented according to mean (M), standard deviation (SD), standard error of the mean (SE_M), skewness, and kurtosis. The survey respondents' (n = 33) average KAP score was 15.06 (SD = 2.05, SE_M = 0.36, Min = 11.00, Max = 19.00, Skewness = 0.38, Kurtosis = -0.44; see Table 6). The survey respondents' (n = 33) average EBIS score was 16.67 (SD = 12.43, SE_M = 2.16, Min = 0.00, Max = 53.00, Skewness = 1.03, Kurtosis = 0.61; see Table 7).

Table 6

Summary Statistics Table for Interval and Ratio Variables of KAP Sepsis Questionnaire on the Qualtrics Survey

Variable	*M*	*SD*	*n*	SE_M	Min	Max	Skewness	Kurtosis
KAP Scores	15.06	2.05	33	0.36	11.00	19.00	0.38	-0.44

Table 7

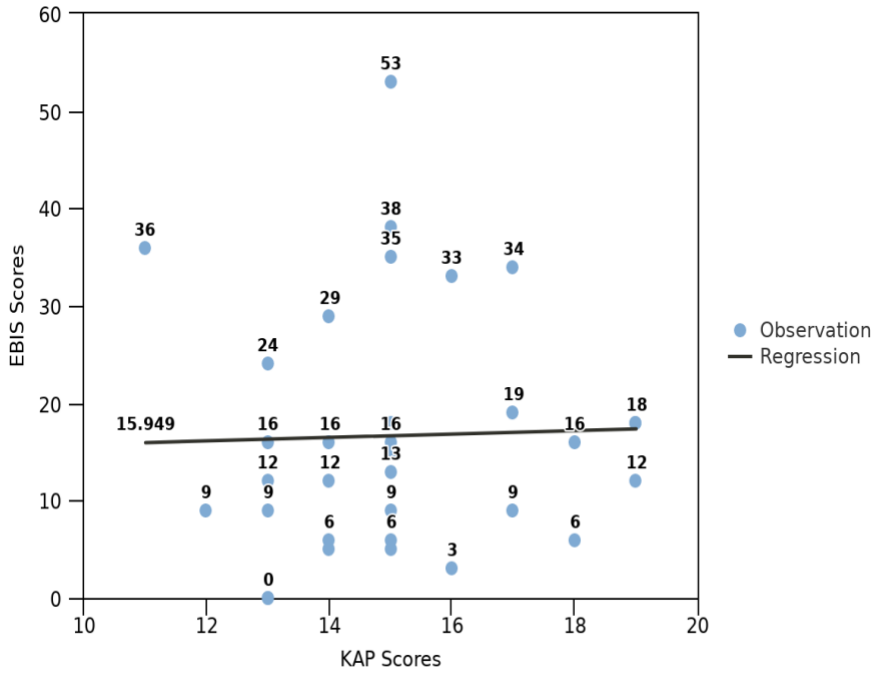
Summary Statistics Table for Interval and Ratio Variables of Evidence-Based Implementation Scale (EBIS) on the Qualtrics Survey

Variable	*M*	*SD*	*n*	SE_M	Min	Max	Skewness	Kurtosis
EBIS Scores	16.67	12.43	33	2.16	0.00	53.00	1.03	0.61

The KAP Sepsis Questionnaire and the EBIS scores were ratio variables demonstrating correlational inferential statistics. This correlational analysis included a scatterplot to illustrate the general relationship (see Figure 4), a correlation matrix to quantify the correlation (see Table 8), and a Pearson's correlation coefficient (*r*) to determine linear strength and magnitude (Heavey, 2019; Intellectus Statistics, 2023; see Table 9).

Figure 4

Scatterplot of KAP Sepsis Questionnaire and Evidence-Based Implementation (EBIS) Scores on the Qualtrics Survey



Note. KAP Scores = KAP Sepsis Questionnaire scores; EBIS Scores = Evidence-Based Implementation Scale scores. A regression line illustrates linearity.

Table 8

Pearson Correlation Matrix Between KAP Questionnaire and Evidence-Based Implementation Scale (EBIS) Scores on the Qualtrics Survey

Variable	1	2
1. KAP Scores	-	
2. EBIS Scores	.03	-

Table 9

Pearson Correlation Results Between KAP Questionnaire and Evidence-Based Implementation Scale (EBIS) Scores on the Qualtrics Survey

Combination	*r*	95.00% CI	*n*	*p*
KAP Scores-EBIS Scores	.03	[-.32, .37]	33	.872

Note. KAP Scores = KAP Sepsis Questionnaire scores; EBIS Scores = Evidence-Based Implementation Scale scores. r = Pearson's correlation coefficient where the perfect positive correlation is +1, a perfect negative correlation is -1, and a 0 (zero) for no relationship.

This correlational data analysis quantified the relationship between clinical sepsis knowledge and EBP implementation in practice and answered the project's research question. The scatterplot results (see Figure 3) illustrated a weak positive linear trend whereby higher KAP Sepsis Questionnaire scores correspond with higher EBIS scores (Cipher, 2017). The matrix cell results (see Table 7) identified no significant correlations between any pairs of variables based on an alpha value of 0.5 (Intellectus Statistics, 2023). The Pearson product-moment correlation coefficient (*r*) analysis revealed that a weak positive relationship exists between the variables of KAP Questionnaire scores and EBIS scores (Cipher, 2017; Cohen, 1988; Intellectus Statistics, 2023).

Limitations

This research project experiences certain limitations related to design, data analysis, and target population representativeness. Correlation studies are not designed to indicate causation but are limited to determining strengths and relationships between variables (Grove, 2017c). Thus, no cause-and-effect relationship between sepsis knowledge and EBP implementation can be implied from this research project. The Pearson product-moment correlation coefficient (*r*)

used to analyze the collected data in this project includes assumptions of linearity and normal distribution (Intellectus Statistics, 2023). Although the comparison data presented in this project meet the general assumption of linearity (see Figure 3) and normal distributions for both the KAP Sepsis Questionnaire scores (Table 3) and the EBIS scores (Table 4), respective independent Shapiro-Wilk Tests did not support normality for either variable (Intellectus Statistics, 2023). Interestingly, the alternative correlation analysis for nonparametric data, the Spearman rank correlation test, revealed similar correlational findings between the KAP Questionnaire scores and EBIS scores variables (r = 0.16; see Appendix L).

A power analysis determines sample sizes to detect population differences and quell sampling error occurrences (Grove, 2017c). A priori G*Power analysis (Faul et al., 2007) suggested the ideal adequate minimum sample size of 67 (n = 67) for this correlation study when using an exact test set at an effect size of 0.3, an alpha of 0.05, and a power of 0.80 (Cipher, 2017). Accordingly, due to the available number (n = 62) of potential healthcare candidates for this study, the G*Power analysis (Faul et al., 2007) was amended to include a two-tailed correlation model using an increased effect size of 0.5 while retaining an alpha of 0.05, and a power of 0.80. This revised analysis reduced the adequate minimum sample size to an accommodated sample size of 29 (n = 29) required to determine the statistical significance of this research project. Interestingly, research educators agreed that a correlation study with a sample size of at least 30 (n = 30) participants would provide meaningful results (Fraenkel & Wallen, 2009).

The sample size of the completed surveys includes 28 nurses and five physicians (n = 33). These statistics represent a survey completion rate of 85.5% for nurses and only 19.2% (5/26) for all other practitioners (e.g., physicians, physician assistants, nurse practitioners, and

residents). This calculation and an overall completion rate of 68.75% (33/48) may affect the target population's representativeness and generalizability (Grove, 2017c).

Summary

The Qualtrics online software platform used a 32-question survey requiring subject consent to collect data for this project. It included responses concerning demographics, sepsis knowledge testing, and scored evidence-based implementation experiences. The target population for this study was healthcare professionals who actively manage sepsis patients in an ED. A multidisciplinary approach resulted in a sample (n = 48) consisting of 35 nurses, eight physicians, three nurse practitioner/physician assistants, and two residents who completed all demographic questions concerning employment status, occupation, education, age, and experience. The most observed demographic frequencies included 30 full-time a.m. shift employees, 35 nurses, and 23 with a bachelor's degree (see Table 1), with an average age of respondents of 41.2 years and 9.07 (see Table 2) years of experience, respectively. This project incorporated steps to ensure participant privacy using de-identification and data confidentiality methods under academic ACU and organizational IRB guidelines.

The Intellectus Statistics statistical software package delivered descriptive and inferential analysis from a final sample of 33 (n = 33) collected KAP Sepsis Questionnaire and EBIS scores. The most frequent KAP Sepsis Questionnaire score was 15, and the most frequent EBIS score was 16 and 9, with four each (see Table 3). The average scores of the KAP Sepsis Questionnaire and the EBIS scores were 15.06 (*M*; see Table 5) and 16.67 (*M*; see Table 6), respectively. The distribution of these scored ratio variables was within respective skewness and kurtosis limitations (see Tables 5 and 6; Intellectus Statistics, 2023). The correlational analysis to explain the relationship between the KAP Sepsis Questionnaire and EBIS score variables included a

scatterplot (see Figure 3) that illustrates weak positive linearity, matrix values (see Table 7) that measured no significant strength or direction, and a Pearson product-moment correlation coefficient (*r*) of 0.03 that indicated weak positive correlation (see Table 8).

Limitations of this research project are associated with design, data analysis, and sampling methodology. This correlation study determined the strength of a directional relationship between sepsis knowledge and EBP implementation variables and does not imply causation (Grove, 2017c). The Pearson product-moment correlation coefficient (*r*) assumptions of linearity and distribution normalcy were not supported by independent Shapiro-Wilk testing (Intellectus Statistics, 2023). However, alternate nonparametric Spearman rank testing ($r = 0.16$; see Appendix L) of the scored ratio variables of the Qualtrics-derived KAP Sepsis Questionnaire and EBIS scores (see Appendix J) confirmed the primary finding of weak positive correlation. The sampling method may limit population representativeness and generalizability based on sample size, survey convenience, and community setting.

Chapter 5: Discussion

This DNP scholarly research project analyzes the relationship between clinical sepsis knowledge and evidence-based practice (EBP) implementation and includes a relative problem statement, purpose, method, limitations, and findings. The problem is inconsistent clinical sepsis bundle (SEP-1) compliance (Barbash et al., 2019; Gilhooly et al., 2019; Liao et al., 2019; Truong et al., 2019). This study project aims to quantify the relationship between evidence-based practice (EBP) baseline sepsis knowledge and sepsis bundle (SEP-1) clinical compliance likelihood. A nonexperimental correlative research design answers the research question. Sepsis knowledge and EBP implementation survey instrument data are collected by Qualitrics software and analyzed by Intellectus Statistics. The project findings include demographic frequencies of 30 full-time a.m. shift employees, 35 nurses, and 23 with a bachelor's degree (see Table 1) and an average age of respondents of 41.2 years and 9.07 years of experience (see Table 2), respectively. The average scores of the KAP Sepsis Questionnaire and the EBIS scores are 15.06 (M; see Table 5) and 16.67 (M; see Table 6), respectively. The correlational analysis includes a scatterplot (see Figure 3) that illustrates weak positive linearity, matrix values (see Table 7) without significant strength or direction, and a Pearson product-moment correlation coefficient (r) of 0.03 that indicates a weak positive correlation (see Table 8).

Discussion of Findings

The primary finding of this scholarly DNP project to quantify the relationship between clinical sepsis knowledge and (EBP) implementation results in the statistical analyses that indicate a weak positive correlation. A primary logical conclusion from this correlational analysis suggests that clinical sepsis education may have an inconclusive effect on EBP implementation. Specifically, the results of this research project indicate that education alone

may not be a significant factor in improving SEP-1 compliance among emergency department (ED) healthcare professionals who manage sepsis patients. Accordingly, ED nurse managers who may not consistently meet the quality metric demand for SEP-1 sepsis bundle compliance (Centers for Medicare and Medicaid Services [CMS], n.d.). Moreover, nurse educators may not benefit from the staff's cognitive, environmental, and behavioral influences that improve sepsis knowledge (Bandura, 1977). Future research may explore ways to provide more engaging clinical sepsis education tools that encourage SEP-1 sepsis bundle compliance and consider other variables that may affect professional EBP adoption.

Other findings in this project include an analysis of age, employment status, occupation, education, and experience descriptive demographic variables. Each variable is independently analyzed for statistical difference using data from the respective KAP Sepsis Questionnaire (see Appendix M), and EBIS (see Appendix N) scored responses from the Qualtrics Survey results (see Appendix J). The scored KAP Sepsis Questionnaire average is compared to the respective occupation levels of Nurse (M = 14.75, SD = 1.99) and Physician (M = 16.80, SD = 1.48; see Table 10). Independent one-way analysis of variance (ANOVA) determined a statistically significant (F [1, 31] = 4.76, p = .037; see Table 11) difference between KAP Sepsis Questionnaire mean (M) scores. This finding is the only significant (p = < .05) discovery between project descriptive demographic variables and Qualtrics Survey results (see Appendix J).

Table 10

Mean, Standard Deviation, and Sample Size for KAP Sepsis Questionnaire by Occupation Level on the Qualtrics Survey

Combination	*M*	*SD*	*n*
Nurse	14.75	1.99	28
Physician	16.80	1.48	5

Table 11

One-Way Analysis of Variance (ANOVA) Comparison Difference Between Means of KAP Sepsis Questionnaire Scores and Occupation Levels on the Qualtrics Survey

Term	*SS*	*df*	*F*	*p*	η_p^2
Occupation	17.83	1	4.76	.037	0.13
Residuals	116.05	31			

Note. One-way analysis of variance (ANOVA) of KAP Sepsis Questionnaire Scores and Occupation level indicate significance ($p = < .5$).

This additional comparative analysis implies that physicians demonstrate greater sepsis knowledge, and a significant knowledge gap may exist for the target population of ED nurses. Accordingly, ED nurse educators may need to assess staff baseline sepsis knowledge and gaps while considering modeling and behavioral skill factors to reinforce unit learning (Bandura, 1977). Future research may evaluate teaching strategies that improve general sepsis knowledge among ED nurses and explain existing gaps between professions.

A further examination of the specific KAP Sepsis Questionnaire (see Appendix A) inquiries compared to the analogous Qualtrics Survey responses (see Appendix M) reveals

additional analyses. Question 1 of the KAP Sepsis Questionnaire (see Appendix A) confirms awareness of the current respective definitions of sepsis and qSOFA (Quick Score for Sepsis), an instrument to assess organ dysfunction in septic shock (Singer et al., 2016). The analogous Question 7 of the Qualtrics Survey responses (see Appendix M) indicates that a significant (p = .008) number of nurses (n =14, 40%) were not aware of current respective sepsis and qSOFA definitions compared to physicians (n = 6, 75.00%; see Table 12).

Table 12

Frequency and Percentage Comparison of Nurse and Physician Response to KAP Sepsis Questionnaire: Question 1 Sepsis Awareness on the Qualtrics Survey

	Occupation		
Sepsis Awareness	Nurse	Physician	Significance
Yes	14 (40.00%)	6 (75.00%)	*p = .008
No	21 (60.00%)	2 (25.00%)	
Total	35(100.00%)	8(100.00%)	

Note. Significant (*p = < .05) comparison of Nurse and Physician KAP Sepsis Questionnaire sepsis awareness responses.

Similarly, Question 4 of the KAP Sepsis Questionnaire (see Appendix A) is associated with correctly identifying qSOFA elements. A significant (p < .001) number of nurses (n = 8, 22.86%) incorrectly identified "tachycardia" as a qSOFA element response compared to physician (n = 5, 62.5%; see Table 13) entries on the analogous Question 10 of the Qualtrics Survey responses (see Appendix M).

Table 13

Frequency and Percentage Comparison of Nurse and Physician Response to KAP Sepsis Questionnaire: Question 4 qSOFA Elements on the Qualtrics Survey

	Occupation		
qSOFA Elements	Nurse	Physician	Significance
Systolic blood pressure ≤100 mmHg	4 (11.43%)	1 (12.50%)	
Glasgow score	20 (57.14%)	1 (12.50%)	
Tachycardia> 90 beats / min	8 (22.86%)	5 (62.50%)	*p = <.001
Respiratory rate ≥ 22 c / min	3 (8.57%)	1 (12.50%)	
Missing	0 (0.00%)	0 (0.00%)	
Total	35 (100.00%)	8 (100.00%)	

Note. Significant (p = < .05) comparison of Nurse and Physician KAP Sepsis Questionnaire qSOFA elements responses.

Question 6 of the KAP Sepsis Questionnaire (see Appendix A) quizzes for sepsis monitoring conditions. Most nurses (n = 23, 65.71%) incorrectly identified that "all" patients should be monitored compared to the physician response (n = 4, 50%; see Table 14) on the analogous Question 12 of the Qualtrics Survey responses (see Appendix M).

Table 14

Frequency and Percentage Comparison of Nurse and Physician Responses to KAP Sepsis Questionnaire: Question 6 Sepsis Monitoring on the Qualtrics Survey

	Occupation	
Sepsis Monitoring	Nurse	Physician
All patients	23(65.71%)	4 (50.00%)
Patients admitted to the emergency room for severe infection	1 (2.86%)	2 (25.00%)
Patients suffering from tuberculosis, Patients admitted to the emergency room for severe infection, Patients infected with HIV, All patients	4 (11.43%)	0 (0.00%)
Patients suffering from tuberculosis, Patients infected with HIV, All patients	1 (2.86%)	0 (0.00%)
Patients suffering from tuberculosis, Patients admitted to the emergency room for severe infection, Patients infected with HIV	2 (5.71%)	2 (25.00%)
Patients admitted to the emergency room for severe infection, Patients infected with HIV	3 (8.57%)	0 (0.00%)
Patients admitted to the emergency room for severe infection, Patients infected with HIV, I don't know	1 (2.86%)	0 (0.00%)
Total	35 (100.00%)	8 (100.00%)

Note. Percentage comparison of Nurse and Physician KAP Sepsis Questionnaire qSOFA sepsis monitoring response.

Adegbite et al. (2021) discovered similar disparities between nursing and physician knowledge scores when developing the KAP Sepsis questionnaire. According to this seminal research (Adegbite et al., 2021), physicians' global KAP Sepsis Questionnaire scores [14 (IQR, 11-15)] were higher than nurses [12 (IQR, 10-14.5)] with comparatively noted similar scores respecting qSOFA awareness (Question 1; nurse = 8, 27.6%; physician = 4, 21.1%), and higher scores concerning qSOFA elements (Question 4; nurse = 0, 0%; physician = 4, 21.1%) and sepsis monitoring (Question 6; nurse = 5, 17.2%; physician =6, 31.6). Accordingly, ED nurse educators may design interprofessional sepsis education programs that reflect contemporary SEP-1 sepsis bundle knowledge and guidelines to reinforce cognitive learning (Bandura, 1977). Future research may investigate methods that disseminate the most current SEP-1 sepsis bundle sepsis education among all ED healthcare professions.

Other important comparative research literature related to this project includes the Evidence-Based Implementation Scale (EBIS; Melnyk et al., 2008) tool developed to guide EBP implementation strategies for practice and education. Although Melnyk et al. (2008) based this EBIS tool on a convenience sample of nurses (n = 394) attending a continuing education workshop, several noteworthy comparisons are pertinent to the discussion of this project in addressing the research question of evidence-based practice (EBP) clinical implementation compliance likelihood.

Specifically, this relevance concerns analogous Qualtrics Survey participant responses (see Appendix N) for EBIS Question 1 (see Appendix B) regarding practice changes, EBIS Question 8 (see Appendix B) addressing professional sharing, EBIS Question 13 (see Appendix B) following accessing clinical guidelines, and EBIS Question 18 (see Appendix B) promoting EBP use among colleagues. These foundational questions will support the likelihood of

implementing EBP guidelines such as the SEP-1 sepsis bundle guidelines (CMS, n.d.) among the studied target population of emergency department (ED) healthcare professionals who acutely manage sepsis patients.

The analogous Qualtrics response score (see Appendix N) for EBIS Question 1 (see Appendix B) indicates that 35.19% of project participants used evidence to change practice more than five times within the last 8 weeks compared to 24% in the sample studied by Melnyk et al. (2008; see Appendix B). This comparison implies that the cohort of project-sampled (ED) healthcare professionals will likely use SEP-1 sepsis bundle guidelines in practice.

The analogous Qualtrics response score (see Appendix N) for EBIS Question 8 (see Appendix B) indicates that 3.70% of project participants shared evidence-based guidelines with a colleague more than five times within the last 8 weeks compared to 16% in the sample studied by Melnyk et al. (2008). This comparison implies that the cohort of project-sampled (ED) healthcare professionals is less likely to share SEP-1 sepsis bundle guidelines with fellow nurses, physicians, nurse practitioners, or physician assistants.

The analogous Qualtrics response score (see Appendix N) for EBIS Question 13 (see Appendix B) indicates that 9.26% of project participants accessed evidence-based guidelines more than five times within the last 8 weeks compared to 12% in the sample studied by Melnyk et al. (2008). This comparison implies that the cohort of project-sampled (ED) healthcare professionals will generally likely access SEP-1 sepsis bundle guidelines in practice.

The analogous Qualtrics response score (see Appendix N) for EBIS Question 18 (see Appendix B) indicates that 5.56% of project participants promoted EBP with colleagues more than five times within the last 8 weeks compared to 23% in the sample studied by Melnyk et al. (2008). This comparison implies that the cohort of project-sampled (ED) healthcare professionals

are less likely to promote SEP-1 sepsis bundle guidelines with fellow nurses, physicians, nurse practitioners, or physician assistants. Accordingly, ED nurses who may incorporate SEP-1 sepsis guidelines in personal practice may be less inclined to share this evidence-based practice with other professional colleagues and fail to create a cultural environment of compliance and adoption (Bandura, 1977). Future EBP research may study effective methods of encouraging greater SEP-1 sepsis bundle adoption and compliance among cohorts of ED healthcare professionals.

Recommendations for Future

The statistical findings of this correlational research project indicate a weak positive relationship ($r = .03$) between the variables of clinical sepsis knowledge and EBP implementation, which determined strength and direction but cannot describe or explain causation (Grove, 2017c). Hence, increased sepsis knowledge among ED healthcare professionals is not directly proportional to or a clear indicator of EBP implementation or SEP-1 sepsis bundle compliance. Accordingly, an additional experimental research design approach is necessary to adequately examine any causal relationships concerning sepsis knowledge and EBP implementation variables (Grove, 2017a). Such research may study newly defined independent factors influencing sepsis knowledge improvement and EBP implementation from a working hypothesis or novel intervention not described in this correlation project. For example, ED sepsis knowledge improvement among ED healthcare professionals may be dependent upon the educational approach. Tedesco et al. (2017) discovered that interprofessional education (IPE) improved staff sepsis knowledge using a novel screening and management algorithm tool in a tertiary care ED. Vattanavanit et al. (2016) determined that high-fidelity medical simulation training significantly ($p < .001$) improved ED sepsis knowledge testing scores and confidence in

treating septic shock resuscitation. Researchers have also used experimental interventions to test evidence-based sepsis practice compliance using experimental interventions. Gripp et al. (2021) implemented a collaborative short-stay tool that improved completion times of one-hour blood cultures, initial lactate, and antibiotic administration requirements. Breuer and Hassinger (2020) used a theory based on knowledge, attitude, and behavior to significantly (p = .001) enhance sepsis treatment recognition. Accordingly, the results of this noninterventional correlational research-designed project will lay a foundation for future researchers in testing new hypotheses, models, and variables to explain causal relationships between sepsis knowledge and EBP implementation (Grove, 2017c).

Relationship to the DNP Essentials

The American Association of Colleges of Nursing (AACN) formed the *DNP Essentials* to outline academic program curricula and set core competency expectations for advanced practice DNP students (American Association of Colleges of Nursing [AACN], 2006). The *DNP Essentials* consist of eight foundational core competency expectations designed to prepare all DNP graduates for all advanced practice roles. These competencies outline practice goals for scientific underpinning (I), organizational leadership (II), clinical scholarship (III), information technology (IV), health care policy (V), interprofessional collaboration (VI), population health ((VII), and advanced nursing practice (VIII). This scholarly DNP project exemplifies DNP Essentials I, II, and VI.

DNP Essential I: Scientific Underpinnings for Practice

DNP Essential I prepares the graduate to integrate science knowledge, theory, and innovation in practice. This scholarly DNP project meets these scientific goals. The primary science of the Surviving Sepsis Guideline (Rhodes et al., 2017) was measured according to the

Grading of Recommendations Assessment, Development, and Evaluation (GRADE) scale to qualify levels of evidence and underpinned this project's variable of sepsis knowledge. SLT described by Bandura (1977) supports the clinical problem of SEP-1 compliance and discussion of professional nursing implications (see Discussion of Findings). This project represents an innovative approach to measuring the correlation between scored ratio variables of sepsis knowledge and evidence-based practice (EBP) implementation.

DNP Essential II: Organizational and Systems Leadership for Quality Improvement and Systems Thinking

DNP Essential II prepares the graduate to address the future health needs of patient populations, ensure quality accountability, and manage system healthcare dilemmas. This scholarly DNP project meets these organizational goals. Sepsis represents a growing public health concern, resulting in over 265,000 deaths annually (Rhee et al., 2017). This scholarly project's target population includes healthcare professionals who manage sepsis patients in an ED setting, which receives a national estimate of 850,000 sepsis-related visits annually (Wang et al., 2017). The CMS developed the SEP-1 quality core measure initiative to reduce hospital mortality and cost of care (CMS, n.d.). This scholarly project provides sepsis knowledge and EBP implementation metrics to help managers optimize SEP-1 compliance to improve patient health, satisfaction, and control hospitalization costs (Agency for Healthcare Research and Quality [AHRQ], 2018). The healthcare cost burden dilemma associated with sepsis accounts for over $23 billion in annual costs (Torio & Moore, 2016). This scholarly project addresses SEP-1 sepsis bundle compliance metrics that may ensure CMS reimbursement (CMS, n.d.), Hospital Value-Based Purchasing (VBP) incentives and rewards (CMS, 2021a), and reduce Hospital Readmissions Reduction Program (HRRP) reduction penalties (CMS, 2020a).

DNP Essential VI: Interprofessional Collaboration for Improving Patient and Population Health Outcomes

The DNP program prepares the graduate to implement scholarly lead interprofessional analysis collaborative reviews and employ interprofessional change. This project descriptively analyzed a sample population (n = 48) of emergency department (ED) healthcare professionals that included nurses (n = 35), physicians (n = 8), physician residents (n = 2), and nurse practitioner/ physician assistants (n = 3) and inferential correlational analysis between variables of sepsis knowledge and EBP implementation (r = .03; see Data Collection). A comparative review of this data discovered a "knowledge gap" disparity between nurses and physicians concerning general sepsis knowledge, qSOFA awareness, and qSOFA scoring (see Data Analysis). Interprofessional recommendations for change in this study included assessing baseline sepsis knowledge and multidisciplinary education programs focusing on current sepsis knowledge and guidelines (see Discussion of Findings).

Summary

The primary research finding of this scholarly DNP project indicates that a weak positive statistical correlation (r) exists between the studied variables of clinical sepsis knowledge and EBP implementation. This finding implies that clinical sepsis education alone may not have a conclusive effect on EBP implementation or SEP-1 compliance among emergency department (ED) healthcare professionals who acutely manage sepsis patients and that nurse managers and educators may need to explore other methods to improve sepsis quality performance metrics and staff education knowledge, respectively. However, this research project discovers statistical findings that have clinical implications. A comparative one-way analysis of variance (ANOVA) identifies a statistically significant difference (F (1, 31) = 4.76, p = .037) of overall knowledge

variable scores (KAP Sepsis Questionnaire) between nurse (*M* = 14.75, *SD* = 1.99) and physician (*M* = 16.80, *SD* = 1.48) levels of occupation (see Appendix K). This discovery may encourage ED nurse educators to evaluate staff baseline sepsis knowledge and address interprofessional knowledge gaps using modeling and behavioral skill factors to reinforce learning (Bandura, 1977). The statistical differences were also noticeable regarding correctly scored questions concerning qSOFA awareness (nurses = 40%; physicians = 75%), qSOFA scoring (nurse = 22.86%; physicians = 62.5%), and incorrect responses in monitoring sepsis (nurse = 65.71%; physician = 50%; see Table 3). These findings imply that ED nurse educators may design collaborative educational programs that reflect contemporary sepsis knowledge to reinforce cognitive learning (Bandura, 1977).

Data findings from the Evidence-Based Implementation Scale (EBIS) tool used in this research project also provide clinical implications. Collectively, sample population Qualtrics Survey participants (*n* = 33; 28 nurses, five physicians; see Table 1) comparatively scored higher than the seminal research conducted by Melnyk et al. (2008) regarding questions concerning using evidence to change practice (35.9%; 24%) and scored lower regarding questions regarding sharing evidence with colleagues (3.70%; 16%), accessing evidence-based guidelines (9.26%; 12%), and promoting EBP with colleagues (5.56%; 23%; see Appendix N). These findings imply that ED healthcare professionals may incorporate SEP-1 guidelines in practice but are less inclined to share EBP with other colleagues, which may limit an environmental culture of adoption (Bandura, 1977).

This scholarly project uses a correlational research design to describe the relationships between variables of sepsis knowledge and EBP implementation that will not explain causation (Grove, 2017c). However, additional experimentally research-designed studies may define new

independent factors influencing knowledge improvement and EBP implementation using novel hypotheses and interventions (Grove, 2017c). For example, IPE and a novel sepsis screening and management intervention improved ED sepsis knowledge test results Tedesco et al. (2017). A high-fidelity medical stimulation intervention significantly ($p < .001$) improved ED sepsis knowledge and confidence in treating septic shock (Vattanavanit et al., 2016). A collaborative short-stay tool intervention improved EBP implementation regarding sepsis bundle compliance times (Gripp et al., 2021). A multidisciplinary approach that used knowledge, attitude, and behavior theory significantly improved sepsis knowledge ($p = .015$) and EBP implementation ($p = .001$), respectively (Breuer & Hassinger, 2020).

This scholarly DNP research project is consistent with DNP Essentials I, II, and VI (American Association of Colleges of Nursing [AACN], 2006). This scholarly DNP project manifests the scientific goals of DNP Essential I by utilizing the primary science of the Surviving Sepsis Guideline (Rhodes et al., 2017) to define the variable of sepsis knowledge, employing SLT (Bandura, 1977) to support the clinical problem and describe nursing implications, and using an innovational research approach to answer the research question. This scholarly DNP project manifests the organizational goals of DNP Essential II by studying the growing public health concern of sepsis in an ED setting, providing sepsis knowledge and EBP implementation metrics to improve SEP-1 quality compliance and healthcare cost burden. Finally, this scholarly DNP project manifests the interprofessional collaborative goals of DNP Essential VI by comparatively analyzing a multidisciplinary sample population consisting of ED healthcare professionals, including a sample population of nurses, physicians, residents, nurse practitioners, and physician assistants.

References

Adegbite, B. R., Edoa, J. R., Rylance, J., Jacob, S. T., Kawale, P., Adegnika, A. A., & Grobusch, M. P. (2021). Knowledge of health workers relating to sepsis awareness and management in Lambaréné, Gabon. *Acta Tropica*, *219*, 105914–105914. https://doi.org/10.1016/j.actatropica.2021.105914

Agency for Healthcare Research and Quality. (2018, August). *Care coordination.* Ahrq.gov. https://www.ahrq.gov/ncepcr/care/coordination.html

American Association of Colleges of Nursing. (2006). *The essentials of doctoral education for advanced nursing practice*. https://www.aacnnursing.org/Portals/42/Publications/DNPEssentials.pdf

Baghdadi, J. D., Brook, R. H., Uslan, D. Z., Needleman, J., Bell, D. S., Cunningham, W. E., & Wong, M. D. (2020). Association of a care bundle for early sepsis management with mortality among patients with hospital-onset or community-onset sepsis. *JAMA Internal Medicine*, *180*(5), 707–716. https://doi.org/10.1001/jamainternmed.2020.0183

Bandura, A. (1977). *Social learning theory*. Prentice Hall.

Bandura, A. (1982). Self-efficacy mechanism in human agency. *The American Psychologist*, *37*(2), 122–147. https://doi.org/10.1037/0003-066X.37.2.122

Barbash, I. J., Davis, B., & Kahn, J. M. (2019). National performance on the Medicare SEP-1 sepsis quality measure. *Critical Care Medicine*, *47*(8), 1026–1032. https://doi.org/10.1097/CCM.0000000000003613

Breuer, R. K., & Hassinger, A. B. (2020). Impact of a multidisciplinary sepsis initiative on knowledge and behavior in a pediatric center. *Pediatric Quality & Safety*, *5*(2), e267. https://doi.org/10.1097/pq9.0000000000000267

Brown, S. J. (2018). *Evidence-based nursing: The research-practice connection*. (4th ed.). Jones & Bartlett Learning.

Candela, L. (2016). Theoretical foundations of teaching and learning. In D. Billings & J. Halstead (Eds.). *Teaching in nursing: A guide for faculty* (5th ed., pp. 211–229). Elsevier.

Centers for Medicare and Medicaid Services. (n.d.). *Severe sepsis and septic shock: Management bundle (composite measure)*. CMS Measures Inventory Tool. https://cmit.cms.gov/CMIT_public/ViewMeasure?MeasureId=1017#tab1

Centers for Medicare and Medicaid Services. (2021a, February 18). *Hospital Inpatient Quality Reporting Program*. https://www.cms.gov/Medicare/Quality-Initiatives-Patient-Assessment-Instruments/HospitalQualityInits/HospitalRHQDAPU

Centers for Medicare and Medicaid Services. (2021b, February 18). *The Hospital Value-Based Purchasing (VBP) Program.* CMS.gov. https://www.cms.gov/Medicare/Quality-Initiatives-Patient-Assessment-Instruments/Value-Based-Programs/HVBP/Hospital-Value-Based-Purchasing

Cipher, D. (2017). Introduction to statistical analysis. In J. Gray, S. Grove, & S. Sutherland. (Eds.). *Burns and Grove's the practice of nursing research: Appraisal, synthesis, and generation of evidence* (8th ed., pp. 519–534). Elsevier.

Cohen, J. (1988). *Statistical power analysis for the behavior sciences* (2nd ed.). West Publishing Company.

Couper, M. P., & Singer, E. (2009). The role of numeracy in informed consent for surveys. *Journal of Empirical Research on Human Research Ethics: JERHRE*, *4*(4), 17–26. https://doi.org/10.1525/jer.2009.4.4.17

Dellinger, R. P., Carlet, J. M., Masur, H., Gerlach, H., Calandra, T., Cohen, J., Gea-Banacloche, J., Keh, D., Marshall, J. C., Parker, M. M., Ramsay, G., Zimmerman, J. L., Vincent, J. L., & Levy, M. M. (2004). Surviving Sepsis Campaign guidelines for management of severe sepsis and septic shock. *Critical Care Medicine*, *32*(3), 858–873. https://doi.org/10.1097/01.ccm.0000117317.18092.e4

Dor, A., Encinosa, W. E., & Carey, K. (2015). Medicare's Hospital Compare quality reports appear to have slowed price increases for two major procedures. *Health Affairs* (Project Hope), *34*(1), 71–77. https://doi.org/10.1377/hlthaff.2014.0263

Faul, F., Erdfelder, E., Lang, A. G., & Buchner, A. (2007). G*Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behavior Research Methods*, *39*(2), 175–191. https://doi.org/10.3758/bf03193146

Ferrer, R., Artigas, A., Levy, M. M., Blanco, J., González-Díaz, G., Garnacho-Montero, J., Ibáñez, J., Palencia, E., Quintana, M., de la Torre-Prados, M. V., & Edusepsis Study Group (2008). Improvement in process of care and outcome after a multicenter severe sepsis educational program in Spain. *JAMA*, *299*(19), 2294–2303. https://doi.org/10.1001/jama.299.19.2294

Fraenkel, J. R., & Wallen, N. E. (2009). *How to design and evaluate research in education*. McGraw-Hill Companies.

Gatewood, M. O., Wemple, M., Greco, S., Kritek, P. A., & Durvasula, R. (2015). A quality improvement project to improve early sepsis care in the emergency department. *BMJ Quality & Safety*, *24*(12), 787–795. https://doi.org/10.1136/bmjqs-2014-003552

Gilbert, B. W., Reichert, M., & Fletcher, S. (2019). Strategies for the management of sepsis. *AACN Advanced Critical Care*, *30*(1), 5–11. https://doi.org/10.4037/aacnacc2019526

Gilhooly, D., Green, S. A., McCann, C., Black, N., & Moonesinghe, S. R. (2019). Barriers and facilitators to the successful development, implementation, and evaluation of care bundles in acute care in hospital: A scoping review. *Implementation Science, 14*(1), 1–12. https://doi.org/10.1186/s13012-019-0894-2

Granholm, A., Alhazzani, W., & Møller, M. H. (2019). Use of the GRADE approach in systematic reviews and guidelines. *British Journal of Anaesthesia*, *123*(5), 554–559. https://doi.org/10.1016/j.bja.2019.08.015

Gray, J. (2017). Ethics in research. In J. Gray, S. Grove, & S. Sutherland (Eds.), *Burns and Grove's the practice of nursing research: Appraisal, synthesis, and generation of evidence* (8th ed., pp. 157–191). Elsevier.

Gripp, L., Raffoul, M., & Milner, K. A. (2021). Implementation of the Surviving Sepsis Campaign one-hour bundle in a short stay unit: A quality improvement project. *Intensive & Critical Care Nursing, 63*, 103004. https://doi.org/10.1016/j.iccn.2020.103004

Grove, K. (2017a). Evolution of research in building evidence-based nursing practice. In J. Gray, S. Grove, & S. Sutherland (Eds.), *Burns and Grove's the practice of nursing research: Appraisal, synthesis, and generation of evidence* (8th ed., pp. 193–6). Elsevier.

Grove, K. (2017b). Measurement concepts. In J. Gray, S. Grove, & S. Sutherland (Eds.), *Burns and Grove's the practice of nursing research: Appraisal, synthesis, and generation of evidence* (8th ed., pp. 363–393). Elsevier.

Grove, K. (2017c). Sampling. In J. Gray, S. Grove, & S. Sutherland (Eds.), *Burns and Grove's the practice of nursing research: Appraisal, synthesis, and generation of evidence* (8th ed., pp. 329–362). Elsevier.

Grusec, J. E. (1992). Social learning theory and developmental psychology: The legacies of Robert Sears and Albert Bandura. *Developmental Psychology, 28*(5), 776–786. https://doi.org/10.1037/0012-1649.28.5.776

Guirgis, F. W., Jones, L., Esma, R., Weiss, A., McCurdy, K., Ferreira, J., Cannon, C., McLauchlin, L., Smotherman, C., Kraemer, D. F., Gerdik, C., Webb, K., Ra, J., Moore, F. A., & Gray-Eurom, K. (2017). Managing sepsis: Electronic recognition, rapid response teams, and standardized care save lives. *Journal of Critical Care, 40,* 296–302. https://doi.org/10.1016/j.jcrc.2017.04.005

Hall, J. E. (2015). *Guyton and Hall physiology review*. Saunders.

Han, J., Cribbs, S. K., & Martin, G. S. (2015). Sepsis, severe sepsis, and septic shock. In J. B. Hall, G. A. Schmidt, & J. P. Kress (Eds.), *Access medicine*. McGraw-Hill Education. https://accessmedicine.mhmedical.com/content.aspx?bookid=1340&sectionid=80033910

Heavey, E. (2019). *Statistics for nursing: A practical approach* (3rd ed.). Jones & Bartlett Learning.

Homeyer, S., Hoffmann, W., Hingst, P., Oppermann, R. F., & Dreier-Wolfgramm, A. (2018). Effects of interprofessional education for medical and nursing students: Enablers, barriers and expectations for optimizing future interprofessional collaboration - A qualitative study. *BMC Nursing, 17,* 13. https://doi.org/10.1186/s12912-018-0279-x

Institute for Healthcare Improvement. (2021). *Evidence-Based care bundles.* http://www.ihi.org/Topics/Bundles/Pages/default.aspx

Institute of Medicine. (2011). *The future of nursing*. National Academies Press. https://doi.org/10.17226/12956

Intellectus Statistics [Online computer software]. (2023). Intellectus Statistics. https://analyze.intellectusstatistics.com/

Jones, A. E., Trzeciak, S., & Kline, J. A. (2009). The Sequential Organ Failure Assessment score for predicting outcome in patients with severe sepsis and evidence of hypoperfusion at the time of emergency department presentation. *Critical Care Medicine*, *37*(5), 1649–1654. https://doi.org/10.1097/CCM.0b013e31819def97

Kim, H. I., & Park, S. (2019). Sepsis: Early recognition and optimized treatment. *Tuberculosis And Respiratory Diseases*, *82*(1), 6–14. https://doi.org/10.4046/trd.2018.0041

Kirkpatrick, D., & Kirkpatrick, J. (2006). Evaluating training programs: The four levels. In *Google Books*. Berrett-Koehler Publishers. https://books.google.com/books?hl=en&lr=&id=BJ4QCmvP5rcC&oi=fnd&pg=PR9&ots=Mo0196q25_&sig=9ExXMJ-_MKSsgDs4qoCKV6HgeJs#v=onepage&q&f=false

Lavallée, J. F., Gray, T. A., Dumville, J., Russell, W., & Cullum, N. (2017). The effects of care bundles on patient outcomes: A systematic review and meta-analysis. *Implementation Science: IS*, *12*(1), 142–142. https://doi.org/10.1186/s13012-017-0670-0

Leon, L., Kramer, N., Ganti, L., Amico, K., Dub, L., Lebowitz, D., Rosario, J., & Ballinger, B. (2018). Sepsis cards and facts: A simple way to increase sepsis bundle compliance. *Cureus*, *10*(9), e3245. https://doi.org/10.7759/cureus.3245

Levy, M. M., Evans, L. E., & Rhodes, A. (2018). The surviving sepsis campaign bundle. *Critical Care Medicine*, *46*(6), 997–1000. https://doi.org/10.1097/ccm.0000000000003119

Levy, M. M., Rhodes, A., Phillips, G. S., Townsend, S. R., Schorr, C. A., Beale, R., Osborn, T., Lemeshow, S., Chiche, J. D., Artigas, A., & Dellinger, R. P. (2015). Surviving sepsis

campaign: Association between performance metrics and outcomes in a 7.5-year study. *Critical Care Medicine*, *43*(1), 3–12. https://doi.org/10.1097/CCM.0000000000000723

Liao, J., Aaronson, E., Kim, J., Liu, X., Snydeman, C., Goldfarb, I., Black, L., Filbin, M., Phillips, M. T., Mort, E., & Lee, J. (2019). Association of hospital characteristics with early SEP-1 performance. *American Journal of Medical Quality*, *35*(2), 110–116. https://doi.org/10.1177/1062860619857028

LoBiondo-Wood, G. (2018). Introduction to quantitative research. In G. LoBiondo-Wood & J. Haber (Eds.), *Nursing research: Methods and critical appraisal for evidence-based practice* (9th ed., 149–164). Elsevier.

Mayr, F. B., Yende, S., & Angus, D. C. (2014). Epidemiology of severe sepsis. *Virulence*, *5*(1), 4–11. https://doi.org/10.4161/viru.27372

McInnes, M. D. F., Moher, D., Thombs, B. D., McGrath, T. A., Bossuyt, P. M., Clifford, T., Cohen, J. F., Deeks, J. J., Gatsonis, C., Hooft, L., Hunt, H. A., Hyde, C. J., Korevaar, D. A., Leeflang, M. M. G., Macaskill, P., Reitsma, J. B., Rodin, R., Rutjes, A. W. S., Salameh, J., . . . and the PRISMA-DTA Group. (2018). Preferred reporting items for a systematic review and meta-analysis of diagnostic test accuracy studies: The PRISMA-DTA statement. *Journal of the American Medical Association*, *319*(4), 388–396. https://doi.org/10.1001/jama.2017.19163

Melnyk, B. M., Fineout-Overholt, E., & Mays, M. Z. (2008). The evidence-based practice beliefs and implementation scales: Psychometric properties of two new instruments. *Worldviews on Evidence-Based Nursing*, *5*(4), 208–216. https://doi.org/10.1111/j.1741-6787.2008.00126.x

Moran, K. J., Burson, R., & Conrad, D. (2019). *The Doctor of Nursing Practice project* (3rd ed.). Jones & Bartlett Learning.

Munn, Z., Peters, M. D. J., Stern, C., Tufanaru, C., McArthur, A., & Aromataris, E. (2018). Systematic review or scoping review? Guidance for authors when choosing between a systematic or scoping review approach. *BMC Medical Research Methodology*, *18*(1), 1–7. https://doi.org/10.1186/s12874-018-0611-x

Ottestad, E., Boulet, J. R., & Lighthall, G. K. (2007). Evaluating the management of septic shock using patient simulation. *Critical Care Medicine*, *35*(3), 769–775. https://doi.org/10.1097/01.CCM.0000256849.75799.20

Paoli, C. J., Reynolds, M. A., 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*(12), 1889–1897. https://doi.org/10.1097/CCM.0000000000003342

Pepper, D. J., Sun, J., Cui, X., Welsh, J., Natanson, C., & Eichacker, P. Q. (2019). Antibiotic- and fluid-focused bundles potentially improve sepsis management, but high-quality evidence is lacking for the specificity required in the centers for Medicare and Medicaid service's sepsis bundle (SEP-1). *Critical Care Medicine*, *47*(10), 1290–1300. https://doi.org/10.1097/CCM.0000000000003892

Qualtrics. (2021, September 1). *Privacy statement*. Qualtrics.com. https://www.qualtrics.com/privacy-statement/

Ramsdell, T. H., Smith, A. N., & Kerkhove, E. (2017). Compliance with updated sepsis bundles to meet new sepsis core measure in a tertiary care hospital. *Hospital Pharmacy*, *52*(3), 177–186. https://doi.org/10.1310/hpj5203-177

ReCAPP. (n.d.). *Theories & approaches: Social learning theory*. Recapp.etr.org. http://recapp.etr.org/recapp/index.cfm?fuseaction=pages.TheoriesDetail&PageID=380

Rhee, C., Dantes, R., Epstein, L., Murphy, D. J., Seymour, C. W., Iwashyna, T. J., Kadri, S. S., Angus, D. C., Danner, R. L., Fiore, A. E., Jernigan, J. A., Martin, G. S., Septimus, E., Warren, D. K., Karcz, A., Chan, C., Menchaca, J. T., Wang, R., Gruber, S., & Klompas, M. (2017). Incidence and trends of sepsis in US hospitals using clinical vs claims data, 2009–2014. *JAMA*, *318*(13), 1241. https://doi.org/10.1001/jama.2017.13836

Rhodes, A., Evans, L. E., Alhazzani, W., Levy, M. M., Antonelli, M., Ferrer, R., Kumar, A., Sevransky, J. E., Sprung, C. L., Nunnally, M. E., Rochwerg, B., Rubenfeld, G. D., Angus, D. C., Annane, D., Beale, R. J., Bellinghan, G. J., Bernard, G. R., Chiche, J., Coopersmith, C., . . . Dellinger, R. P. (2017). Surviving sepsis campaign: International guidelines for management of sepsis and septic shock: 2016. *Intensive Care Medicine*, *43*(3), 304–377. https://doi.org/10.1007/s00134-017-4683-6

Schorr, C. (2016, March 15). Nurses can help improve outcomes in severe sepsis. *American Nurse*, *11*(3), 20–25. https://www.myamericannurse.com/nurses-can-help-improve-outcomes-severe-sepsis/

Seoane, L., Winterbottom, F., Nash, T., Behrhorst, J., Chacko, E., Shum, L., Pavlov, A., Briski, D., Thibeau, S., Bergeron, D., Rafael, T., & Sundell, E. (2013). Using quality improvement principles to improve the care of patients with severe sepsis and septic shock. *Ochsner Journal*, *13*(3), 359–366. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3776511/

Seymour, C. W., Gesten, F., Prescott, H. C., Friedrich, M. E., Iwashyna, T. J., Phillips, G. S., Lemeshow, S., Osborn, T., Terry, K. M., & Levy, M. M. (2017). Time to treatment and

mortality during mandated emergency care for sepsis. *New England Journal of Medicine*, *376*(23), 2235–2244. https://doi.org/10.1056/NEJMoa1703058

Shankar-Hari, M., Phillips, G. S., Levy, M. L., Seymour, C. W., Liu, V. X., Deutschman, C. S., Angus, D. C., Rubenfeld, F. D., & Singer, M. (2016). Developing a new definition and assessing new clinical criteria for septic shock: For the third international consensus definitions for sepsis and septic shock. *JAMA*, *315*(8), 775–787. https://doi.org/10.1001/jama.2016.0289

Singer, M., Deutschman, C. S., Seymour, C. W., Shankar-Hari, M., Annane, D., Bauer, M., Bellomo, R., Bernard, G. R., Chiche, J. D., Coopersmith, C. M., Hotchkiss, R. S., Levy, M. M., Marshall, J. C., Martin, G. S., Opal, S. M., Rubenfeld, G. D., van der Poll, T., Vincent, J. L., & Angus, D. C. (2016). The third international consensus definitions for sepsis and septic shock (Sepsis-3). *JAMA*, *315*(8), 801–810. https://doi.org/10.1001/jama.2016.0287

Sullivan-Bolyai, S., & Bova, C. (2018). Data collection methods. In G. Lobiondo-Wood & J. Haber (Eds.). *Nursing research: Methods and critical appraisal for evidence-based practice* (9th ed., pp. 247–259). Elsevier.

Sutherland, S. (2017a). Introduction to quantitative research. In J. Gray, S. Grove, & S. Sutherland (Eds.), *Burns and Grove's the practice of nursing research: Appraisal, synthesis, and generation of evidence* (8th ed., pp. 37–61). Elsevier.

Sutherland, S. (2017b). Quantitative methodology: Noninterventional designs and methods. In J. Gray, S. Grove, & S. Sutherland (Eds.), *Burns and Grove's the practice of nursing research: Appraisal, synthesis, and generation of evidence* (8th ed., pp. 192–216). Elsevier.

Tedesco, E. R., Whiteman, K., Heuston, M., Swanson-Biearman, B., & Stephens, K. (2017). Interprofessional collaboration to improve sepsis care and survival within a tertiary care emergency department. *Journal of Emergency Nursing*, *43*(6), 532–538. https://doi.org/10.1016/j.jen.2017.04.014

Titler, M. G., Kleiber, C., Steelman, V. J., Rakel, B. A., Budreau, G., Everett, L. Q., Buckwalter, K. C., Tripp-Reimer, T., & Goode, C. J. (2001). The Iowa Model of evidence-based practice to promote quality care. *Critical Care Nursing Clinics of North America*, *13*(4), 497–509. https://doi.org/10.1016/S0899-5885(18)30017-0

Torio, V. M., & Moore, B. J. (2016). *National inpatient hospital costs: The most expensive conditions by payer. Statistical brief #204.* Healthcare Cost and Utilization Project (HCUP). Agency for Healthcare Research and Quality [AHRQ]. https://hcup-us.ahrq.gov/reports/statbriefs/sb204-Most-Expensive-Hospital-Conditions.jsp

Truong, T.-T. N., Dunn, A. S., McCardle, K., Glasser, A., Huprikar, S., Poor, H., Raucher, B., & Poeran, J. (2019). Adherence to fluid resuscitation guidelines and outcomes in patients with septic shock: Reassessing the “one-size-fits-all” approach. *Journal of Critical Care*, *51*, 94–98. https://doi.org/10.1016/j.jcrc.2019.02.006

Vattanavanit, V., Kawla-Ied, J., & Bhurayanontachai, R. (2016). High-fidelity medical simulation training improves medical students' knowledge and confidence levels in septic shock resuscitation. *Open Access Emergency Medicine: OAEM*, *9*, 1–7. https://doi.org/10.2147/OAEM.S122525

Wang, H. E., Jones, A. R., & Donnelly, J. P. (2017). Revised national estimates of emergency department visits for sepsis in the United States. *Critical Care Medicine*, *45*(9), 1443–1449. https://doi.org/10.1097/CCM.0000000000002538

Wang, J., Strich, J. R., Applefeld, W. N., Sun, J., Cui, X., Natanson, C., & Eichacker, P. Q. (2020). Driving blind: Instituting SEP-1 without high quality outcomes data. *Journal of Thoracic Disease*, *12*(Suppl 1), S22–S36. https://doi.org/10.21037/jtd.2019.12.100

Warstadt, N. M., Caldwell, J. R., Tang, N., Mandola, S., Jamin, C., & Dahn, C. (2022). Quality initiative to improve emergency department sepsis bundle compliance through utilisation of an electronic health record tool. *BMJ Open Quality*, *11*(1), e001624. https://doi.org/10.1136/bmjoq-2021-001624

Wills, E. M., & McEwen, M. (2018). Learning theories. In M. McEwen & E.M. Wills (Eds.). *Theoretical basis for nursing* (5th ed., pp. 409–431). Wolters Kluwer.

Appendix A: KAP Sepsis Questionnaire

KAP SEPSIS QUESTIONNAIRE

SECTION A: Basic information

1. ID .....

2. Gender: M [] F []

3. Health facility ————————————-

4. Hospital service: ———————————————— ——————

5. Type of health facility

□ Referral hospital

□Secondary hospital (health center)

□ First level hospital (dispensary)

□Research center

□Other .....

6. Education level: O primary O secondary O university

7. Profession: Doctor O assistant nurse O nurse O Others O

8. Duration of medical career ....

SECTION B-KAP

Knowledge and perception of sepsis

1.Have you ever heard of the Third International Consensus on Definitions of Sepsis and Septic Shock (Sepsis-3) and qSOFA

□Yes □ No

2. What do you think is the most appropriate definition of sepsis?

a)

Blood contamination by a microbe

b)

life-threatening organ dysfunction caused by a dysregulated host response to infection.

c)

Systemic inflammatory response caused by infection

d)

Allergic reaction against germs

3. Do you think the following symptoms and signs are associated with sepsis? a) Fever □ Yes □ No or not sure b) Hypothermia □ Yes □ No or not sure c) Tachycardia □ Yes □ No or not sure d) Tachypnea □ Yes □ No or not sure e) Hypotension □ Yes □ No or not sure f) Altered state of consciousness □ Yes □ No or not sure

4. Which of the following is NOT a component of the qSOFA score?

a)

Glasgow score <15

b)

Respiratory rate ≥ 22 c / min

c)

Tachycardia> 90 beats / min

d)

Systolic blood pressure ≤100 mmHg

5. **The blood culture must be requested in the event of any suspicion of sepsis**

True □False □

6. Which patients do you think should be monitored for the onset of sepsis. a) Patients suffering from tuberculosis b) Patients admitted to the emergency room for severe infection c) Patients infected with HIV d) All patients e) I don't know

7. Which of the following are urgently appropriate for the management of sepsis? a. Secure large-bore IV access b. If hypotension, initially resuscitate with crystalloid c. Collect blood for blood culture and start broad-spectrum antibiotic therapy d. Maintain good oxygen saturation

8. Do you think the following practice could be useful for the management of sepsis? a) using of antibiotics □ Yes □ No or not sure b) using of crystalloids □Yes □ No or not sure c) using of vasopressors □Yes □ No or not sure d) Earlier identification of the source of infection □Yes □ No or not sure

For section, where appropriate, single to multiple answers were correct:

2-b;3- a-b-c-d-e-f; 4-c; 5-True; 6-a-b-c; 7-a-b-c-d; 8-a-b-c-d

Appendix B: Evidence-Based Implementation Scale (EBIS)

EBP Implementation Scale

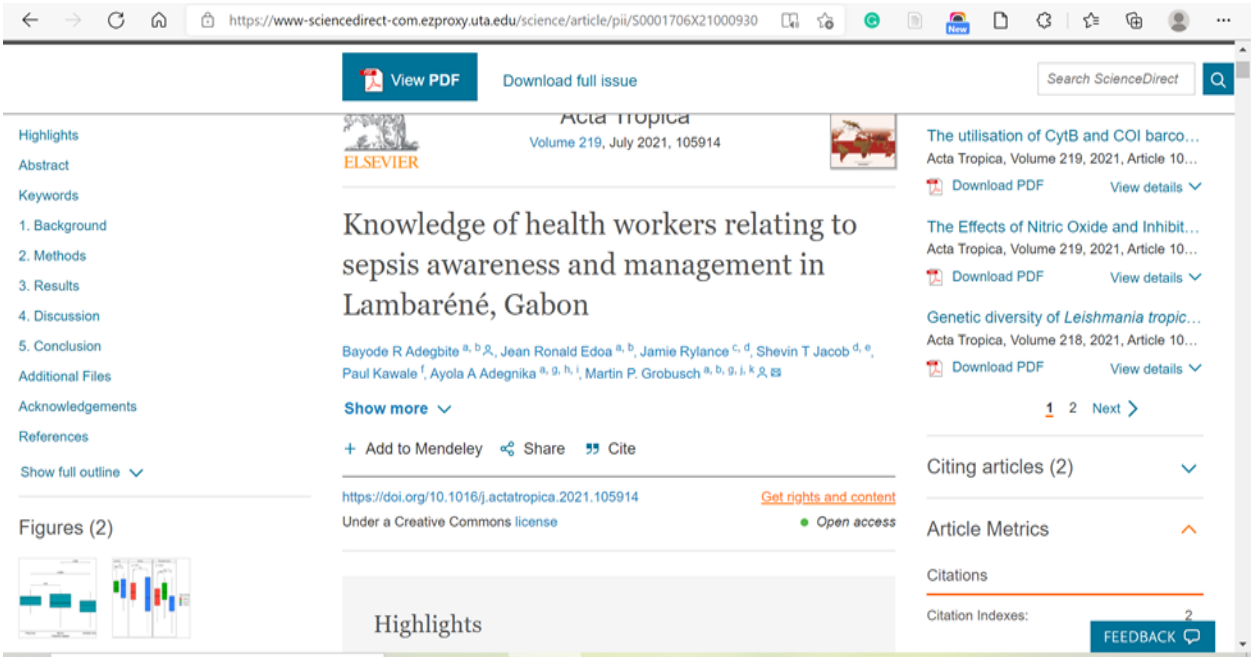
Below are 18 questions about evidence-based practice (EBP). Some healthcare providers do some of these things more often than other healthcare providers. There is no certain frequency in which you should be performing these tasks. Please answer each question by circling the number that best describes **how often each item has applied to you in the past 8 weeks**.

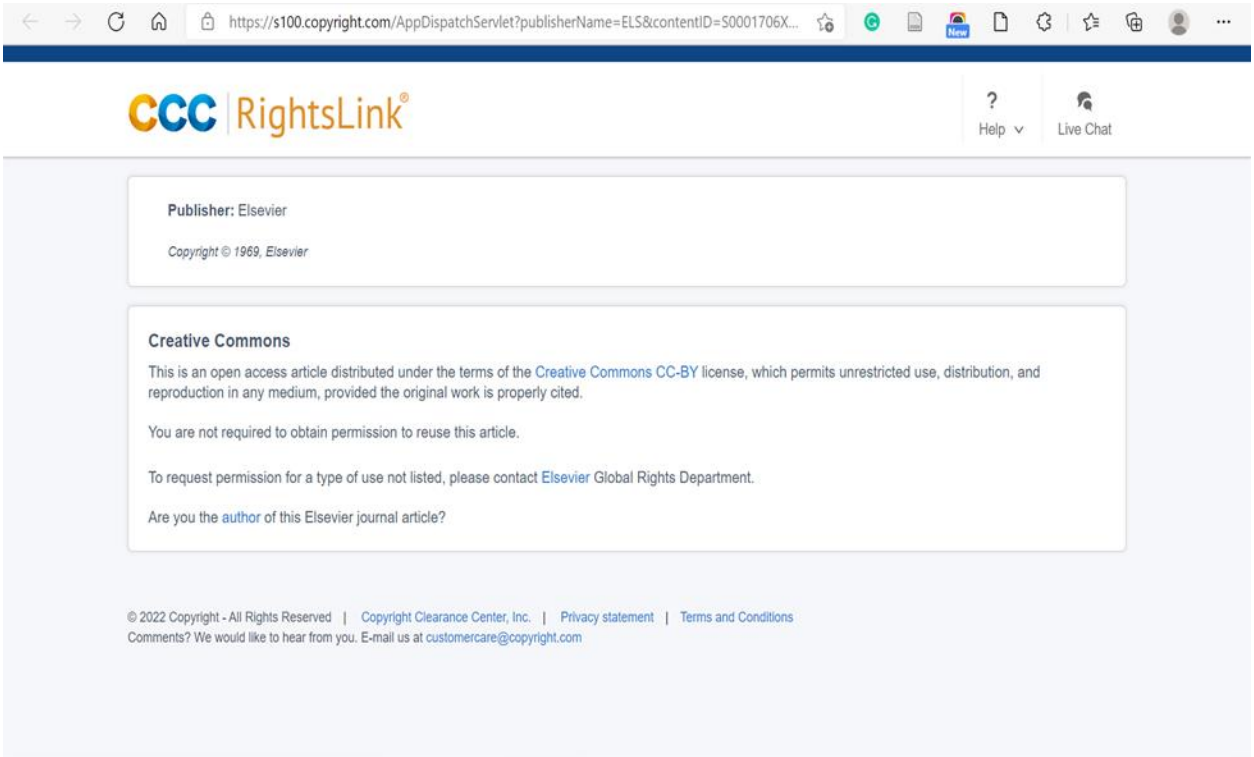
In the **past 8 weeks**, I have:

	0 times	1-3 times	4-5 times	6-8 times	>8 times
1. Used evidence to change my practice.	0	1	2	3	4
2. Critically appraised evidence from a research study.	0	1	2	3	4
3. Generated a PICO question about my practice.	0	1	2	3	4
4. Informally discussed evidence from a research study with a colleague.	0	1	2	3	4
5. Collected data on a clinical issue.	0	1	2	3	4
6. Shared evidence from a study or studies in the form of a report or presentation to more than 2 colleagues.	0	1	2	3	4
7. Evaluated the outcomes of practice change...	0	1	2	3	4
8. Shared an evidence-based guideline with a colleague.	0	1	2	3	4
9. Shared evidence from a research study with a patient/family member.	0	1	2	3	4
10. Shared evidence from a research study with a multi-disciplinary team member.	0	1	2	3	4
11. Read and critically appraised a clinical research study.	0	1	2	3	4
12. Accessed the Cochrane database of systematic reviews.	0	1	2	3	4
13. Accessed an evidence-based guideline.	0	1	2	3	4
14. Used an evidence-based guideline or systematic review to change clinical practice where I work.	0	1	2	3	4
15. Evaluated a care initiative by collecting patient outcome data.	0	1	2	3	4
16 Shared the outcome data collected with colleagues.	0	1	2	3	4
17. Changed practice based on patient outcome data.	0	1	2	3	4
18. Promoted the use of EBP to my colleagues.	0	1	2	3	4

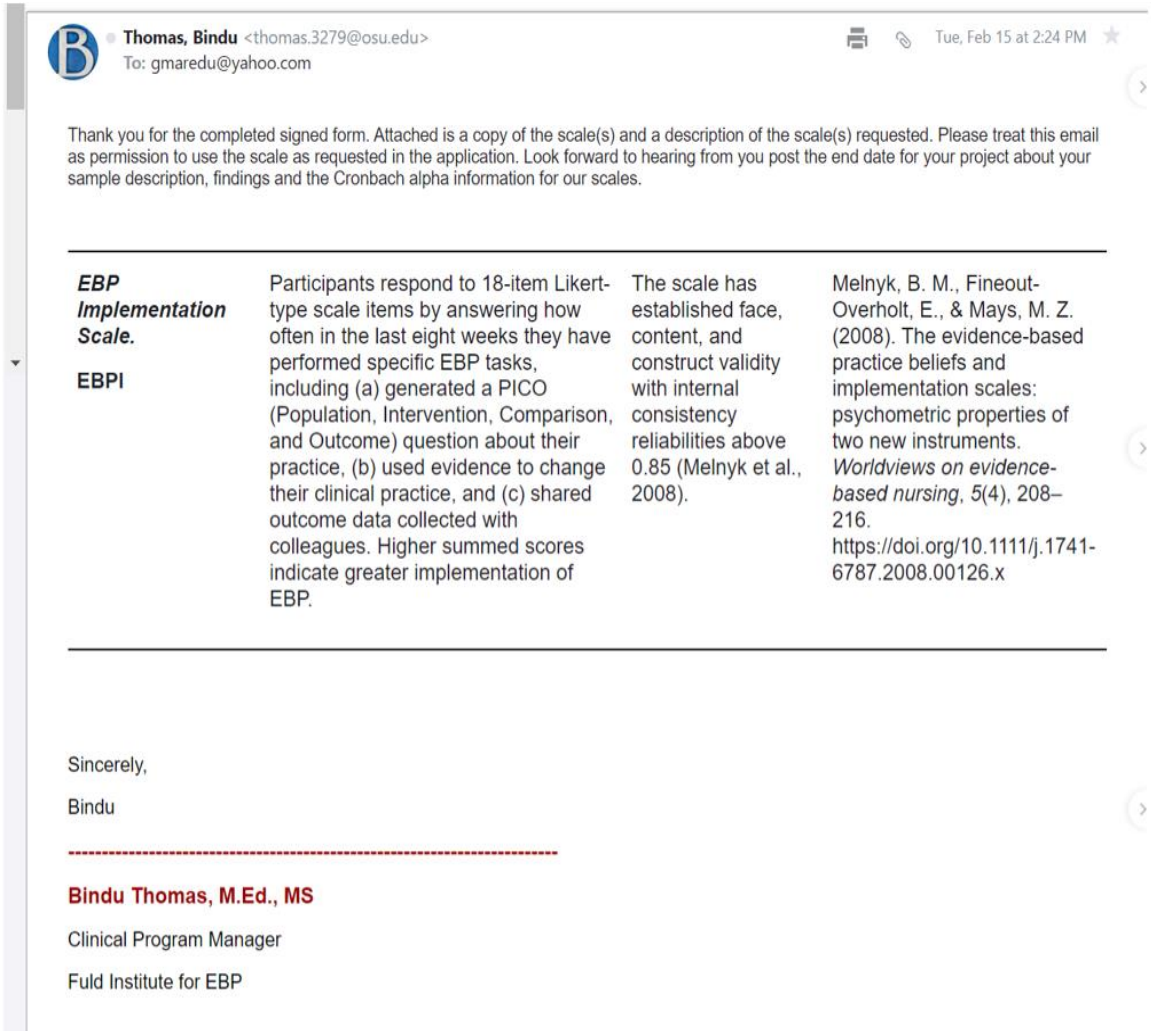
 Validity of this scale has been established and Cronbach's alphas have been $\geq$.85 across various samples.

Appendix C: Permission to Use the KAP Sepsis Questionnaire





Appendix D: Permission to Use EBP Implementation Scale (EBIS)



Thomas, Bindu <thomas.3279@osu.edu>
To: gmaredu@yahoo.com

Tue, Feb 15 at 2:24 PM

Thank you for the completed signed form. Attached is a copy of the scale(s) and a description of the scale(s) requested. Please treat this email as permission to use the scale as requested in the application. Look forward to hearing from you post the end date for your project about your sample description, findings and the Cronbach alpha information for our scales.

EBP Implementation Scale. **EBPI**	Participants respond to 18-item Likert-type scale items by answering how often in the last eight weeks they have performed specific EBP tasks, including (a) generated a PICO (Population, Intervention, Comparison, and Outcome) question about their practice, (b) used evidence to change their clinical practice, and (c) shared outcome data collected with colleagues. Higher summed scores indicate greater implementation of EBP.	The scale has established face, content, and construct validity with internal consistency reliabilities above 0.85 (Melnyk et al., 2008).	Melnyk, B. M., Fineout-Overholt, E., & Mays, M. Z. (2008). The evidence-based practice beliefs and implementation scales: psychometric properties of two new instruments. *Worldviews on evidence-based nursing*, *5*(4), 208–216. https://doi.org/10.1111/j.1741-6787.2008.00126.x

Sincerely,

Bindu

Bindu Thomas, M.Ed., MS

Clinical Program Manager

Fuld Institute for EBP

Appendix E: Letter of Support

CommonSpirit **Gary Martinez TX-The Woodlands**

Gary DNP Project

Melanie Graves TX-The Woodlands <xxxxxx@stlukeshealth.org> Mon, May 1, 2023 at 8:26 AM
To: Gary Martinez TX-The Woodlands <xxxxxxxx@commonspirit.org>
Cc: Ellen Pitcher TX-The Woodlands <xxxxxxx@commonspirit.org>, Laura Connelly TX-The Woodlands <xxxxx@commonspirit.org>

Gary received a consensus from the PPC committee to proceed with his project. The ED staff was especially excited to participate. We look forward to hearing the results of the surveys.

Thank you,
Melanie Graves BSN, RN, CMSRN
Director, Nursing Operations
xxxxxxxxxxxx
P. xxx-xxx-xxxx

Appendix F: Abilene Christian University Informed Consent

Abilene Christian University (ACU) Informed Consent

Introduction: The Correlational Relationship Between Clinical Sepsis Knowledge and Evidence-based Practice Compliance

You may be able to take part in a research study. This form provides important information about that study, including the risks and benefits to you as a potential participant. Please read this form carefully and ask the researcher any questions that you may have about the study. You can ask about research activities and any risks or benefits you may experience. You may also wish to discuss your participation with other people, such as your family doctor or a family member. Your participation in this research is entirely voluntary. You may refuse to participate or stop your participation at any time and for any reason without any penalty or loss of benefits to which you are otherwise entitled. Your participation in this study is completely voluntary and optional. Your decision to participate or not participate will not affect your employment or your relationship with your supervisor(s), CHI leadership, or CHI St. Luke's The Woodlands.
PURPOSE AND DESCRIPTION: The purpose of this study is to determine the clinical relationship between sepsis knowledge and practice compliance. This study will include an electronic survey of five demographic questions (year of birth, employment status, occupation title, education level, and sepsis-related years of experience), eight knowledge test questions, and 18 practice questions. This is a one-time electronic survey requiring internet access that is expected to take 20 minutes to complete. You may take this at your convenience using a personal computer or smartphone anytime during the scheduled 30-day timeframe of this study. All electronic survey responses are unidentifiable and anonymous.
RISKS & BENEFITS: There are risks to taking part in this research study. Below is a list of the foreseeable risks, including the seriousness of those risks and how likely they are to occur: The primary risk with this survey study is a breach of confidentiality, without the likely addition of any other foreseeable serious risk. There are potential benefits to participating in this study. Such benefits may include professional collaboration, practice change readiness, and clinical knowledge. The researchers cannot guarantee that you will experience any personal benefits from participating in this study. ALTERNATIVE
PROCEDURES: There may be other options available to you, which include: a paper version of the survey materials.
PRIVACY & CONFIDENTIALITY: Any information you provide will be confidential to the extent allowable by law. Some identifiable data may have to be shared with individuals outside of the study team, such as members of the ACU Institutional Review Board or individuals affiliated with the granting agency at CHI St. Luke's Health-The Woodlands Hospital. Otherwise, your confidentiality will be protected by Qualtrics Experience Management Platform. The primary risk with this study is breach of confidentiality. However, we have taken steps to minimize this risk that includes encrypted data transmission, high-end firewall protection, regular scanning, third-party penetration tests, and password-protected surveys. We will not be collecting any personal identification data during the survey. However, Qualtrics may collect information from

your computer. You may read their privacy statements here:
https://www.qualtrics.com/privacy-statement/

CONTACTS: If you have questions about the research study, the lead researcher is Gary Martinez and may be contacted at xxx xxx-xxxx, xxxx@acu.edu, and/or xxxx xxxxx xxxxx, xxxx, xxxxx xxxxx. If you are unable to reach the lead researcher or wish to speak to someone other than the lead researcher, you may contact my faculty advisor, Katrina Kelly at xxxxxxx@acu.edu. If you have concerns about this study, believe you may have been injured because of this study, or have general questions about your rights as a research participant, you may contact ACU's Chair of the Institutional Review Board and Executive Director of Research, Qi Hang, at xxxxxx@acu.edu, (xxx)xxx-xxxx, 320 Hardin Administration Bldg, ACU Box 29145 Abilene, TX 79699, OR, you may contact the CommonSpirit Health Research Institute IRB by email at CSHRI-IRB@commonspirit.org or by phone at 1-844-626-2299.

ADDITIONAL INFORMATION

The expected number of participants in this study includes a combined total of 85 emergency room personnel. There is no participant cost or pay compensation in this study. Individual electronic post-test survey scores will be immediately available for participant review on Qualtrics software. Overall research findings will be made available to all interested subject participants upon the publication stage of this project. All electronic survey response data will be stored and analyzed using Qualtrics. Participants will receive an anonymous Qualtrics weblink inviting voluntary consent in this study.

CONSENT SIGNATURE SECTION

Please click the link below if you voluntarily agree to participate in this study. Click only after you have read all the information provided and your questions have been answered to your satisfaction. If you wish to have a copy of this consent form, you may print it now. You do not waive any legal rights by consenting to this study.

https://abilenechristian.qualtrics.com/homepage/ui/index

Appendix G: Organizational Institutional Review Board Approval Letter

FWA Number: FWA 00019514
OHRP IRB Number: IRB00009715

DATE: June 16, 2023

TO: gary martinez

PROJECT TITLE: [2064110-1] The Correlational Relationship Between Clinical Sepsis Knowledge and Evidence-based Practice Compliance

SUBMISSION TYPE: New Project

STATUS: ACTIVE

ACTION: APPROVED
APPROVAL DATE: June 16, 2023
REPORT DUE DATE: June 15, 2024

REVIEW TYPE: Expedited Review
REVIEW CATEGORY: Expedited review category # *7*

Thank you for your submission to the Common Spirit Health Research Institute Institutional Review Board (CSHRI IRB). The CSHRI IRB has APPROVED your submission. All research must be conducted in accordance with this approved submission.

This study meets the criteria for a waiver of documentation of consent for the entire study according to federal regulations pertaining to human subject research.

Informed consent is a process that must continue throughout the duration of the study via a dialogue between the researcher and the research participant. Federal regulations require that informed consent be documented by the use of a written consent form approved by the IRB and signed by the research participant or the participant's legally authorized representative. Federal regulations also require that each participant receive a copy of the consent form.

Please note that it is your responsibility to obtain any additional local institutional or departmental required approvals prior to initiating your study.

Any revision to previously approved materials must be reviewed and approved by the CSHRI IRB prior to implementation, except when necessary to eliminate apparent immediate hazards to the subject. If, during the course of the research, it becomes necessary to modify the study to eliminate apparent immediate hazards to research participants, you are required to notify the IRB by submitting a study modification. Please submit modifications through IRBNet and use the appropriate revision forms for this procedure.

The CSHRI IRB requires prompt reporting (within 10 business days of discovery) of events that are Unanticipated Problems regardless of whether the event occurred at the local study site (internal UAP) or at another participating study site (external UAP). Unanticipated Problems are 1) unanticipated AND 2) serious or life-threatening or potential for increased risk AND 3) possibly or definitely related to the protocol, as determined by the investigator. Unanticipated deaths that meet these 3 criteria must be reported to the CSHRI IRB within 24 hours of discovery. Events that are not Unanticipated Problems may be reported to the CSHRI IRB in summary form at the time of continuing review. All FDA and sponsor reporting requirements should also be followed.

All major protocol departures regarding this study must also be reported within 10 business days to this office. Major protocol departures are events that impact the risk and benefit of the research; may impact subject safety, affect the integrity of research data and/or affect a subject's willingness to participate in the research. All minor protocol departures can be reported at the time of continuing review.

Periodic Review and Study Closure: Your CSHRI IRB CHECK-IN REPORT is due on June 15, 2024 and should be submitted in IRBNet 30 days prior to this 'next report due date.' The CSHRI IRB staff will send reminder emails for completing this CSHRI IRB CHECK-IN REPORT, but the investigator is required to submit the CSHRI IRB CHECK-IN REPORT on time. The CSHRI IRB CHECK-IN REPORT is also required to be submitted when the research has been completed. Please note that all research records must be retained for a minimum of three years after the completion of the project. Consent forms, including those for optional procedures, or other study documents pertaining to HIPAA, must be maintained for at least 6 years after the end of the study.
The following documents have been approved or noted as part of this approval:

- Consent Form - IRBNet Qualtrics Consent.docx (UPDATED: 06/12/2023)
- Consent Form - Appendix F - IRB Doc #4.docx (UPDATED: 06/5/2023)
- CSHRI - IRB Application - CSHRI - IRB Application (UPDATED: 06/7/2023)
- Letter - Appendix E - CommonSpirit Health Mail - Gary DNP Project Approval.pdf (UPDATED: 05/31/2023)
- Protocol - IRB Doc #1.docx (UPDATED: 06/12/2023)
- Questionnaire/Survey - Appendix B - IRB Doc #3.docx (UPDATED: 05/30/2023)
- Questionnaire/Survey - Appendix A - IRB Doc #2.docx (UPDATED: 06/12/2023)

If you have any questions at any time, please feel free to contact the CSHRI IRB at 1-844-626-2299 or CHIRB@CatholicHealth.net. Please include your project title and reference number in all correspondence with the CSHRI IRB so that we can best assist you.
Thank you.

This letter has been electronically signed in accordance with all applicable regulations, and a copy is retained within CommonSpirit Health Research Institute IRB's records.

Appendix H: Abilene Christian University Institutional Review Board Approval Letter

Date: July 11, 2023
PI: Gary Martinez
Department: ONL-Online Student, 17250-EdD Online
Re: Initial - IRB-2022-24
The Correlational Relationship Between Clinical Sepsis Knowledge and Evidence-based Practice Compliance
The Abilene Christian University Institutional Review Board has rendered the decision below for The Correlational Relationship Between Clinical Sepsis Knowledge and Evidence-based Practice Compliance.

The administrative Decision: Exempt

Additional Approvals/Instructions:
If at any time the details of this project change, please resubmit to the IRB so the committee can determine whether or not the exempt status is still applicable. All approval letters and study documents are located within the Study Details in Cayuse IRB.
The following are all responsibilities of the Primary Investigator (PI). Violation of these responsibilities may result in suspension or termination of research by the Institutional Review Board. If the Primary Investigator is a student and fails to fulfil any of these responsibilities, the Faculty Advisor then becomes responsible for completing or upholding any and all of the following:
• When the research is completed, inform the Office of Research and Sponsored Programs. If your study is Exempt, Non-Research, or Non-Human Research, email orsp@acu.edu to indicate that the research has finished.
• According to ACU policy, research data must be stored on ACU campus (or electronically) for 3 years from inactivation of the study, in a manner that is secure but accessible should the IRB request access.
• It is the Investigator's responsibility to maintain a general environment of safety for all research participants and all members of the research team. All risks to physical, mental, and emotional well-being as well as any risks to confidentiality should be minimized.
For additional information on the policies and procedures above, please visit the IRB website http://www.acu.edu/community/offices/academic/orsp...
or email orsp@acu.edu with your questions.
Sincerely,
Abilene Christian University Institutional Review Board

Appendix I: Introductory Recruitment Email

To: Emergency Room Personnel
From: Gary Martinez, RN, Education Specialist

The Emergency Room department at CHI St. Luke's The Woodlands has agreed to participate in an evidence-based practice (EBP) research project about *The Correlation Relationship Between Clinical Sepsis Knowledge and Evidence-based Practice Compliance*. I am conducting this research as part of my DNP scholarly project. You are being asked to participate in this survey because you are a member of the medical personnel in the Emergency Room at CHI St. Luke's The Woodlands. Participating in this research is completely voluntary and optional.

If you choose to participate, you will be asked to complete a simple 32-item survey which includes one consent question, five demographic questions, eight testing questions, and 18 EBP survey questions. It should take 15-20 minutes of your time to complete the survey. The survey will be open for 30 days (7/15 - 8/15). During this month period, you will receive this email each week as a reminder about the research and voluntarily participation by completing the survey.

Purpose:	The purpose of this research project is to determine the relationship between evidence-based knowledge and sepsis bundle compliance.
Time:	Survey time: 5-10 minutes
Access:	weblink accessible by smartphone or PC.
Researcher:	Gary Martinez RN, DNP Student Abilene Christian University. xxxxxxx@acu.edu xxx xxx-xxxx
Data:	Qualtrics statistical software survey, storage, analytics, and security. The data are confidential, and your anonymity will be preserved.
Consent:	Your consent to participate in this research is implied by completing and returning the Qualtrics Survey.

Participation in this research is completely voluntary and you have the right to refuse to complete the survey, stop the survey at any time, or skip survey questions you do not wish to answer. Your decision to participate or not participate in this research will not affect your relationship with your supervisor(s), CHI leadership, or CHI St. Luke's The Woodlands. The survey data collected about you is confidential and obtained anonymously. You may not benefit directly, but by participating in this research you will be contributing to the evidence about the relationship between clinical sepsis knowledge and practice compliance.

If you wish to participate in this research, scan the QR Code or select the web link below to be directed to the Qualtrics Survey. After reading the Qualtrics information consent page, you'll be asked to consent to research participation by selecting "Yes" to complete the survey or you can opt out by selecting "No" to research participation.

[QR code]

[Web Link]

https://abilenechristian.qualtrics.com/homepage/ui/index

Thank you for your participation!

Contact: Gary Martinez, RN
DNP Candidate
Abilene Christian University
xxxxx@acu.edu
xxx xxx-xxxxx

Appendix J: Qualtrics Survey

Q1 Abilene Christian University (ACU) Informed Consent

Introduction: The Correlational Relationship Between Clinical Sepsis Knowledge and Evidence-based Practice Compliance

You may be able to take part in a research study. This form provides important information about that study, including the risks and benefits to you as a potential participant. Please read this form carefully and ask the researcher any questions that you may have about the study. You can ask about research activities and any risks or benefits you may experience. You may also wish to discuss your participation with other people, such as your family doctor or a family member. Your participation in this research is entirely voluntary. You may refuse to participate or stop your participation at any time and for any reason without any penalty or loss of benefits to which you are otherwise entitled. Your participation in this study is completely voluntary and optional. Your decision to participate or not participate will not affect your employment or your relationship with your supervisor(s), CHI leadership, or CHI St. Luke's The Woodlands. PURPOSE AND DESCRIPTION: The purpose of this study is to determine the clinical relationship between sepsis knowledge and practice compliance. This study will include an electronic survey of five demographic questions (year of birth, employment status, occupation title, education level, and sepsis-related years of experience), eight knowledge test questions, and 18 practice questions. This is a one-time electronic survey requiring internet access that is expected to take 20 minutes to complete. You may take this at your convenience using a personal computer or smartphone anytime during the scheduled 30-day timeframe of this study. All electronic survey responses are unidentifiable and anonymous. RISKS & BENEFITS: There are risks to taking part in this research study. Below is a list of the foreseeable risks, including the seriousness of those risks and how likely they are to occur: The primary risk with this survey study is a breach of confidentiality, without the likely addition of any other foreseeable serious risk. There are potential benefits to participating in this study. Such benefits may include professional collaboration, practice change readiness, and clinical knowledge. The researchers cannot guarantee that you will experience any personal benefits from participating in this study. ALTERNATIVE PROCEDURES: There may be other options available to you, which include: a paper version of the survey materials. PRIVACY & CONFIDENTIALITY: Any information you provide will be confidential to the extent allowable by law. Some identifiable data may have to be shared with individuals outside of the study team, such as members of the ACU Institutional Review Board or individuals affiliated with the granting agency at CHI St. Luke's Health-The Woodlands Hospital. Otherwise, your confidentiality will be protected by Qualtrics Experience Management Platform. The primary risk with this study is breach of confidentiality. However, we have taken steps to minimize this risk that includes encrypted data transmission, high-end firewall protection, regular scanning, third-party penetration tests, and password-protected surveys. We will not be collecting any personal identification data during the survey. However, Qualtrics may collect information from your computer. You may read their privacy statements here: https://www.qualtrics.com/privacy-statement/CONTACTS: If you have questions about the research study, the lead researcher is Gary Martinez and may be contacted at xxx xxx-xxxx, xxxxx@acu.edu, and/or xxxxxxxxxxxx. If you are unable to reach the lead researcher or wish to speak to someone other than the lead researcher, you may contact my faculty advisor, Katrina Kelly at xxxxx@acu.edu. If you have concerns about this study, believe you may have been injured because of this study, or have general questions about your rights as a research participant, you may contact ACU's Chair of the Institutional Review Board and Executive Director of Research, Qi Hang, at xxxxxx@acu.edu, (xxx)xxx-xxxx, 320 Hardin Administration Bldg, ACU Box 29145 Abilene, TX 79699, OR, you may contact the CommonSpirit Health Research Institute IRB by email at CSHRI-IRB@commonspirit.org or by phone at 1-844-626-2299.
ADDITIONAL INFORMATION
The expected number of participants in this study includes a combined total of 85 emergency room personnel. There is no participant cost or pay compensation in this study. Individual electronic post-test survey scores will be immediately available for participant review on Qualtrics software. Overall research findings will be made available to all interested subject participants upon the publication stage of this project. All electronic survey response data will be stored and analyzed using Qualtrics. Participants will receive an anonymous Qualtrics weblink inviting voluntary consent in this study.
CONSENT SIGNATURE SECTION
Please click the link below if you voluntarily agree to participate in this study. Click only after you have read all the information provided and your questions have been answered to your satisfaction. If you wish to have a copy of this consent form, you may print it now. You do not waive any legal rights by consenting to this study.

- ○ Yes, I consent to participate in the research study and understand that I will not be able to access this survey until I have officially consented to the Abilene Christian University (ACU) Consent form. (1)
- ○ No, I do not consent and I will not participate in the research study (2)

Q2 Select Year of Birth:

Year (3)	▼ 1900 (1) 2049 (150)

Q3 Which statement best describes your current employment status?

- Working full time am shift (1)
- Working full time pm shift (2)
- Working full time split shift (5)
- working part time/prn (6)

Q4 Please indicate your occupation:

- Physician (1)
- Physician Resident (2)
- Nurse (3)
- Nurse Practitioner/ Physician Assistant (4)

Q5 What is the highest level of school you have completed or the highest degree you have received?

- Associate degree in college (2-year) (1)
- Bachelor's degree in college (4-year) (2)
- Master's degree (3)
- Doctoral degree (4)
- Professional degree (MD) (5)

Q6 How many years of experience caring for sepsis patients

0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40

Click to write Choice 1 ()	

Q7 Have you ever heard of the Third International Consensus on Definitions of Sepsis and Septic Shock (Sepsis-3) and qSOFA

- Yes (1)
- No (2)

Q8 What do you think is the most appropriate definition of sepsis?

- ○ Blood contamination by a microbe (1)
- ○ life-threatening organ dysfunction caused by a dysregulated host response to infection. (2)
- ○ Systemic inflammatory response caused by infection (3)
- ○ Allergic reaction against germs (4)

Q9 Do you think the following symptoms and signs are associated with sepsis?

	Yes (1)	No (2)	Not Sure (3)
Fever (1)	○	○	○
Hypothermia (2)	○	○	○
Tachycardia (3)	○	○	○
Tachypnea (4)	○	○	○
Hypotension (5)	○	○	○
Altered State of Consciousness (6)	○	○	○

Q10 Which of the following is NOT a component of the qSOFA score?

- ○ Glasgow score (1)
- ○ Respiratory rate ≥ 22 c / min (2)
- ○ Tachycardia> 90 beats / min (3)
- ○ Systolic blood pressure ≤100 mmHg (4)

Q11 The blood culture must be requested in the event of any suspicion of sepsis

- ○ True (1)
- ○ False (2)

Q12 Which patients do you think should be monitored for the onset of sepsis.

- ☐ Patients suffering from tuberculosis (1)
- ☐ Patients admitted to the emergency room for severe infection (2)
- ☐ Patients infected with HIV (3)
- ☐ All patients (4)
- ☐ I don't know (5)

Q13 Which of the following are urgently appropriate for the management of sepsis?

- ☐ Secure large-bore IV access (1)
- ☐ If hypotension, initially resuscitate with crystalloid (2)
- ☐ Collect blood for blood culture and start broad-spectrum antibiotic therapy (3)
- ☐ Maintain good oxygen saturation (4)

Q14 Do you think the following practice could be useful for the management of sepsis?

	Yes (1)	No (2)	Not Sure (3)
Using of antibiotics (1)	○	○	○
Using of crystalloids (2)	○	○	○
Using of vasopressors (3)	○	○	○
Earlier identification of the source of infection (4)	○	○	○

Q15 Below are 18 questions about evidence-based practice (EBP). Some healthcare providers do some of these things more often than other healthcare providers. There is no certain frequency in which you should be performing these tasks. Please answer each question by clicking the number that best describes how often each item has applied to you in the past 8 weeks.In the past 8 weeks, I have:

Q15 Used evidence to change my practice.

	0 times (1)	1-3 times (2)	4-5 times (3)	6-8 times (4)	greater than 8 times (5)
Used evidence to change my practice (1)	○	○	○	○	○

Q16 Critically appraised evidence from a research study

	0 times (1)	1-3 times (2)	4-5 times (3)	6-8 times (4)	greater than 8 times (5)
Critically appraised evidence from a research study (1)	○	○	○	○	○

Q17 Generated a PICO question about my practice

	0 times (1)	1-3 times (2)	4-5 times (3)	6-8 times (4)	greater than 8 times (5)
Generated a PICO question about my practice (1)	○	○	○	○	○

Q18 Informally discussed evidence from a research study with a colleague.

	0 times (1)	1-3 times (2)	4-5 times (3)	6-8 times (4)	greater than 8 times (5)
Informally discussed evidence from a research study with a colleague (1)	○	○	○	○	○

Q19 Collected data on a clinical issue.

	0 times (1)	1-3 times (2)	4-5 times (3)	6-8 times (4)	greater than 8 times (5)
Collected data on a clinical issue (1)	○	○	○	○	○

Q20 Shared evidence from a study or studies in the form of a report or presentation to more than 2 colleagues.

	0 times (1)	1-3 times (2)	4-5 times (3)	6-8 times (4)	greater than 8 times (5)
Shared evidence from a study or studies in the form of a report or presentation to more than 2 colleagues. (1)	○	○	○	○	○

Q21 Evaluated the outcomes of practice change.

	0 times (1)	1-3 times (2)	4-5 times (3)	6-8 times (4)	greater than 8 times (5)
Evaluated the outcomes of practice change (1)	○	○	○	○	○

Q22 Shared an evidence-based guideline with a colleague.

	0 times (1)	1-3 times (2)	4-5 times (3)	6-8 times (4)	greater than 8 times (5)
Shared an evidence-based guideline with a colleague. (1)	○	○	○	○	○

Q23 Shared evidence from a research study with a patient/family member.

	0 times (1)	1-3 times (2)	4-5 times (3)	6-8 times (4)	greater than 8 times (5)
Shared evidence from a research study with a patient/family member (1)	○	○	○	○	○

Q24 Shared evidence form a research study with a multidisciplinary team member

	0 times (1)	1-3 times (2)	4-5 times (3)	6-8 times (4)	greater than 8 times (5)
Shared evidence from a research study with a multidisciplinary team member (1)	○	○	○	○	○

Q25 Read and critically appraised a clinical research study.

	0 times (1)	1-3 times (2)	4-5 times (3)	6-8 times (4)	greater than 8 times (5)
Read and critically appraised a clinical research study (1)	○	○	○	○	○

Q26 Accessed the Cochrane database of systematic reviews.

	0 times (1)	1-3 times (2)	4-5 times (3)	6-8 times (4)	greater than 8 times (5)
Accessed the Cochrane database of systematic reviews. (1)	○	○	○	○	○

Q27 Accessed an evidence-based guideline.

	0 times (1)	1-3 times (2)	4-5 times (3)	6-8 times (4)	greater than 8 times (5)
Accessed an evidence-based guideline. (1)	○	○	○	○	○

Q28 Used an evidence-based guideline or systematic review to change clinical practice where I work.

	0 times (1)	1-3 times (2)	4-5 times (3)	6-8 times (4)	greater than 8 times (5)
Used an evidence-based guideline or systematic review to change clinical practice where I work. (1)	○	○	○	○	○

Q29 Evaluated a care initiative by collecting patient outcome data.

	0 times (1)	1-3 times (2)	4-5 times (3)	6-8 times (4)	greater than 8 times (5)
Evaluated a care initiative by collecting patient outcome data. (1)	○	○	○	○	○

Q30 Shared the outcome data collected with colleagues.

	0 times (1)	1-3 times (2)	4-5 times (3)	6-8 times (4)	greater than 8 times (5)
Shared the outcome data collected with colleagues. (1)	○	○	○	○	○

Q31 Changed practice based on patient outcome data

	0 times (1)	1-3 times (2)	4-5 times (3)	6-8 times (4)	greater than 8 times (5)
Changed practice based on patient outcome data (1)	○	○	○	○	○

Q32 Promoted the use of EBP to my colleagues.

	0 times (1)	1-3 times (2)	4-5 times (3)	6-8 times (4)	greater than 8 times (5)
Promoted the use of EBP to my colleagues. (1)	○	○	○	○	○

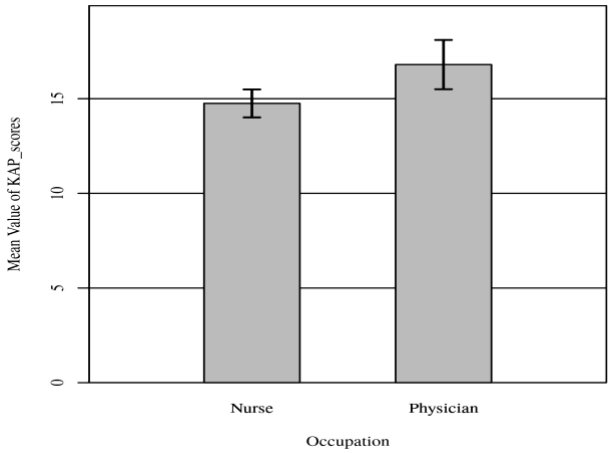
Appendix K: Analysis of Variance (ANOVA) for KAP Questionnaire Scores by Level of Occupation

ANOVA Results

Assuming assumptions of normal distribution and homoscedasticity and accounting for outliers, an analysis of variance (ANOVA) using an alpha value of .05 was conducted to determine whether there were significant differences in KAP Sepsis Questionnaire scores by Occupation. Figure K1 provides a visual expression of the means (M) for analysis, Table K1 provides the numeric values, and Table K2 indicates the significant F (1, 31) = 4.76, p = .037, differences in KAP Sepsis Questionnaire scores according to levels of Occupation.

Figure K1

Means of KAP Sepsis Questionnaire Scores by Occupation



Note. Means with 95.00% CI Error Bars. Copyright 2023 by Intellectus Statistics.

Table K1

Mean, Standard Deviation, and Sample Size for KAP Sepsis Questionnaire Scores by Occupation

Combination	*M*	*SD*	*n*
Nurse	14.75	1.99	28
Physician	16.80	1.48	5

Note. Copyright 2023 by Intellectus Statistics.

Table K2

Analysis of Variance Table for KAP Sepsis Scores by Occupation

Term	*SS*	*df*	*F*	*p*	η_p^2
Occupation	17.83	1	4.76	.037	0.13
Residuals	116.05	31			

Note. Copyright 2023 by Intellectus Statistics.

Appendix L: Spearman Correlation Analysis Spearman Correlation Analysis Results

A Spearman Correlation Analysis Results provides an alternative correlational analysis between this project's Qualtrics derived KAP Questionnaire scores and EBIS scores variables (see Appendix J). This analysis accounts for nonparametric data without assumptions of normality (Intellectus Statistics, 2023). This analysis discovered no significant correlations between the KAP Questionnaire and EBIS scores variables using an alpha of 0.5. Table L1 provides the correlational matrix values between KAP Questionnaire Scores and EBIS Scores, and Table L2 provides the statistical correlational comparison results ($r = 0.16$).

Table L1

Spearman Correlation Matrix Between KAP Questionnaire Scores and EBIS Scores

Variable	1	2
1. KAP_Raw_Scores_Nominal	-	
2. SUM_Score_Nominal_1	.16	-

Note. $^{*}p < 0.5$. Copyright 2023 by Intellectus Statistics.

Table L2

Spearman Correlation Results Between KAP Sepsis Questionnaire Scores and EBIS Scores

Combination	*r*	95.00% CI	*n*	*p*
KAP_Raw_Scores_Nominal-SUM_Score_Nominal_1	.16	[-.19, .48]	33	.369

Note. $^{*}p < 0.5$. Copyright 2023 by Intellectus Statistics.

Appendix M: Analogous Qualtrics Survey Responses to KAP Sepsis Questionnaire by Occupation

Frequency and Percentages of Imputed Questions 7-14

Variable	Occupation				
	Nurse	Physician	Physician Resident	Nurse Practitioner/ Physician Assistant	Missing
Q7_imputed					
Yes	14 (40.00%)	6 (75.00%)	1 (50.00%)	2 (66.67%)	0 (0.00%)
No	21 (60.00%)	2 (25.00%)	1 (50.00%)	1 (33.33%)	0 (0.00%)
Missing	0 (0.00%)	0 (0.00%)	0 (0.00%)	0 (0.00%)	0 (0.00%)
Total	35 (100.00%)	8 (100.00%)	2 (100.00%)	3 (100.00%)	0 (100.00%)
Q8_imputed					
life-threatening organ dysfunction caused by a dysregulated host response to infection.	29 (82.86%)	5 (62.50%)	2 (100.00%)	2 (66.67%)	0 (0.00%)
Systemic inflammatory response caused by infection	6 (17.14%)	3 (37.50%)	0 (0.00%)	1 (33.33%)	0 (0.00%)
Missing	0 (0.00%)	0 (0.00%)	0 (0.00%)	0 (0.00%)	0 (0.00%)
Total	35 (100.00%)	8 (100.00%)	2 (100.00%)	3 (100.00%)	0 (100.00%)
Q9_1_imputed					
Yes	34 (97.14%)	8 (100.00%)	1 (50.00%)	3 (100.00%)	0 (0.00%)
No	1 (2.86%)	0 (0.00%)	1 (50.00%)	0 (0.00%)	0 (0.00%)
Missing	0 (0.00%)	0 (0.00%)	0 (0.00%)	0 (0.00%)	0 (0.00%)
Total	35 (100.00%)	8 (100.00%)	2 (100.00%)	3 (100.00%)	0 (100.00%)
Q8_imputed_1					
life-threatening organ dysfunction caused by a dysregulated host response to infection.	29 (82.86%)	7 (87.50%)	2 (100.00%)	1 (33.33%)	0 (0.00%)

Systemic inflammatory response caused by infection	6 (17.14%)	1 (12.50%)	0 (0.00%)	2 (66.67%)	0 (0.00%)
Missing	0 (0.00%)	0 (0.00%)	0 (0.00%)	0 (0.00%)	0 (0.00%)
Total	35 (100.00%)	8 (100.00%)	2 (100.00%)	3 (100.00%)	0 (100.00%)
Q9_1_imputed_1					
Yes	34 (97.14%)	8 (100.00%)	2 (100.00%)	3 (100.00%)	0 (0.00%)
No	1 (2.86%)	0 (0.00%)	0 (0.00%)	0 (0.00%)	0 (0.00%)
Missing	0 (0.00%)	0 (0.00%)	0 (0.00%)	0 (0.00%)	0 (0.00%)
Total	35 (100.00%)	8 (100.00%)	2 (100.00%)	3 (100.00%)	0 (100.00%)
Q9_2_imputed					
Yes	26 (74.29%)	6 (75.00%)	0 (0.00%)	1 (33.33%)	0 (0.00%)
Not Sure	2 (5.71%)	1 (12.50%)	1 (50.00%)	0 (0.00%)	0 (0.00%)
No	7 (20.00%)	1 (12.50%)	1 (50.00%)	2 (66.67%)	0 (0.00%)
Missing	0 (0.00%)	0 (0.00%)	0 (0.00%)	0 (0.00%)	0 (0.00%)
Total	35 (100.00%)	8 (100.00%)	2 (100.00%)	3 (100.00%)	0 (100.00%)
Q9_3_imputed					
Yes	34 (97.14%)	8 (100.00%)	2 (100.00%)	3 (100.00%)	0 (0.00%)
No	1 (2.86%)	0 (0.00%)	0 (0.00%)	0 (0.00%)	0 (0.00%)
Missing	0 (0.00%)	0 (0.00%)	0 (0.00%)	0 (0.00%)	0 (0.00%)
Total	35 (100.00%)	8 (100.00%)	2 (100.00%)	3 (100.00%)	0 (100.00%)
Q9_4_imputed					
Yes	35 (100.00%)	8 (100.00%)	2 (100.00%)	3 (100.00%)	0 (0.00%)
Missing	0 (0.00%)	0 (0.00%)	0 (0.00%)	0 (0.00%)	0 (0.00%)
Total	35 (100.00%)	8 (100.00%)	2 (100.00%)	3 (100.00%)	0 (100.00%)
Q9_5_imputed					
Yes	34 (97.14%)	8 (100.00%)	2 (100.00%)	3 (100.00%)	0 (0.00%)
Not Sure	1 (2.86%)	0 (0.00%)	0 (0.00%)	0 (0.00%)	0 (0.00%)
Missing	0 (0.00%)	0 (0.00%)	0 (0.00%)	0 (0.00%)	0 (0.00%)
Total	35 (100.00%)	8 (100.00%)	2 (100.00%)	3 (100.00%)	0 (100.00%)
Q9_6_imputed					
Yes	30 (85.71%)	6 (75.00%)	2 (100.00%)	1 (33.33%)	0 (0.00%)
No	5 (14.29%)	1 (12.50%)	0 (0.00%)	2 (66.67%)	0 (0.00%)
Not Sure	0 (0.00%)	1 (12.50%)	0 (0.00%)	0 (0.00%)	0 (0.00%)
Missing	0 (0.00%)	0 (0.00%)	0 (0.00%)	0 (0.00%)	0 (0.00%)

Total	35 (100.00%)	8 (100.00%)	2 (100.00%)	3 (100.00%)	0 (100.00%)

Note. Copyright 2023 by Intellectus Statistics.

Appendix N: Analogous *Qualtrics* Survey Responses for Evidence-Based Implementation Scale (EBIS) Response Scores

Frequency and Percentages of EBIS Questions 15-32

Variable	*n*	*%*
Q15_1_imputed		
0	34	62.96
2	19	35.19
22	1	1.85
Missing	0	0.00
Q16_1_imputed		
0	46	85.19
2	6	11.11
8	2	3.70
Missing	0	0.00
Q17_1_imputed		
0	49	90.74
2	4	7.41
4	1	1.85
Missing	0	0.00
Q18_1_imputed		
0	47	87.04
2	5	9.26
10	2	3.70
Missing	0	0.00
Q19_1_imputed		
0	49	90.74
2	4	7.41
6	1	1.85
Missing	0	0.00
Q20_1_imputed		
0	50	92.59
2	2	3.70
4	2	3.70
Missing	0	0.00
Q21_1_imputed		
0	48	88.89

2	4	7.41
6	2	3.70
Missing	0	0.00
Q22_1_imputed		
0	52	96.30
2	2	3.70
Missing	0	0.00
Q23_1_imputed		
0	50	92.59
2	3	5.56
4	1	1.85
Missing	0	0.00
Q24_1_imputed		
0	48	88.89
2	5	9.26
6	1	1.85
Missing	0	0.00
Q25_1_imputed		
0	48	88.89
2	3	5.56
4	3	5.56
Missing	0	0.00
Q26_1_imputed		
0	48	88.89
2	5	9.26
4	1	1.85
Missing	0	0.00
Q27_1_imputed		
0	47	87.04
2	5	9.26
8	2	3.70
Missing	0	0.00
Q28_1_imputed		
0	49	90.74
2	4	7.41
6	1	1.85
Missing	0	0.00
Q29_1_imputed		

0	54	100.00
Missing	0	0.00
Q30_1_imputed		
0	54	100.00
Missing	0	0.00
Q31_1_imputed		
0	49	90.74
2	4	7.41
6	1	1.85
Missing	0	0.00
Q32_1_imputed		
0	50	92.59
2	3	5.56
4	1	1.85
Missing	0	0.00

Note. Copyright by Intellectus Statistics.