DNP RESEARCH REPORT/PROJECT
IMPLEMENTING SEPSIS RECOGNITION EDUCATION FOR UNDERGRADUATE NURSING STUDENTS

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Acknowledgement and Dedication

This DNP project is dedicated to my dad, the late Wing Fun Chow, who always encouraged me to follow my dreams and do my absolute best.

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Implementing Sepsis Recognition Education for Undergraduate Nursing Students

Abstract

Sepsis has been a significant cause of morbidity and mortality for millennia. There is a vital need for skilled assessment and rapid intervention for septic patients. Substantial evidence shows that sepsis knowledge is lacking for nursing students and practicing nurses. This DNP project will examine the effectiveness of undergraduate sepsis nursing education. The project will develop, implement, and evaluate an educational module for undergraduate nursing students to improve their knowledge of sepsis and confidence in identifying patients at risk of sepsis with a focus on older adults. Six participants began the module by completing the demographics and the pre-quiz sections. Four participants completed the entire module. Barriers to implementation included low recruitment and participation. Project implementation resulted in six participants, with four students completing the module. Half of the participants had prior experience with sepsis, and all were in their fourth year of post-high-school education. Half the participants answered the same pre-quiz question incorrectly: “Less than 17% of nurses have current sepsis knowledge.” Half of the participants responded incorrectly to the same post-quiz question, “Sepsis recognition tools include,” with the response of “SIRS” instead of the correct response, “All of the above.” The satisfaction survey results indicated that all participants felt the module improved their sepsis knowledge. Sepsis education is vital for students and practicing nurses. Future recruitment to participate in the sepsis education module of undergraduate students at different stages in their education would allow

comparison of knowledge and could assist in curriculum development. Practicing nurses in many clinical areas may benefit from sepsis education.

Keywords: Sepsis, undergraduate nursing education

Background and Significance

Global Significance of Sepsis

Around the globe, sepsis is a significant cause of human mortality and morbidity. Several organizations, including the Global Sepsis Alliance (GSA), the Society of Critical Care Medicine (SCCM), and the World Health Organization (WHO) have consistently dedicated substantial resources to addressing sepsis. The World Health Organization (2020), reports that in 2017, sepsis accounted for nearly 20% (48.9 million cases) of all deaths. The WHO reports that globally, 2.9 million deaths annually are directly attributable to sepsis (World Health Organization, 2020). Many initiatives have been implemented worldwide to address sepsis, reduce the number of deaths, and improve outcomes.

National Significance of Sepsis

Jones et al. (2016) found that in 2010, sepsis was the 10th leading cause of death in the United States (U.S.) in those aged 65 and up. According to the U.S. National Institute of Health (NIH) statistics, over 1.7 million people develop sepsis annually, resulting in almost 270,000 deaths (NIH National Institute of General Medical Sciences, 2020). The Sepsis Alliance, a leading patient advocacy group in the United States (U.S.), reports that from 2012 to 2018, average annual sepsis costs for acute care were nearly $62 billion (Sepsis Alliance, 2020).

For 2021, reported sepsis deaths in the U.S. were 330.9 per 100,000 for all people aged 65 and over but increased to 858.3 per 100,000 in those aged 85 and over (Gorina & Kramarow, 2023). According to the Centers for Medicare and Medicaid Services (CMS), sepsis is an increasing cause of morbidity and mortality for Medicare recipients

(Buchman et al., 2020). Buchman et al. (2020) noted that from 2012 to 2018, annual hospital admissions of Medicare A and B beneficiaries related to sepsis rose from over 800,000 to over 1,100,000. Due to the increase in sepsis admissions during that time, the annual cost of inpatient sepsis care rose from over $17.75 billion to nearly $ 22.5 billion (Buchman et al., 2020).

For the same period (2012 to 2018), if the price of skilled nursing care is factored into Medicare expenditures, the estimated annual cost of sepsis care increased from $27.7 to $41.5 billion (Buchman et al., 2020). The incidence of sepsis and the associated cost in dollars, lives, and morbidity continue to rise. According to the CMS, between January and August 2017, 69,401 sepsis admissions out of 613,895 total non-sepsis Medicare admissions were people with no prior sepsis history. Sepsis admissions for that period had a 32.6% death rate, and an additional 1.8% were discharged to hospice (Buchman et al., 2020). Reviewing the financial burden of sepsis, Jones et al. (2016) reported that from 2008 through 2011, Medicare reimbursements for the diagnosis-related group for sepsis were almost $18 billion. The after-effects of sepsis often result in physical and mental deficits requiring post-discharge care and reduced independence for those who survive, which increases the overall expense of sepsis (Jones et al., 2016). Frank et al. (2021) report that from 2012 to 2019, Medicare Part A/B and Medicare Advantage sepsis admissions increased from 981,027 to 1,700,433. While six-month mortality was declining, the rate for septic shock was 59.9%, 35.5% for severe sepsis, 30.8% for organism-specific sepsis, and 26.5% for sepsis not otherwise specified. During that period (2012-2019), hospital costs increased by $5.19 billion, with estimates of hospital care for all U.S. sepsis patients for 2019 at $57.47 billion. (Frank et al., 2021).

Evidence-based practice (EBP) is based on implementing quality care processes and tools using current knowledge and research instead of personal beliefs, peer recommendations, and traditional techniques. EBP has improved patient care quality and outcomes, reducing healthcare costs and disinhibiting clinicians from accepting positive changes (Melnyk & Fineout-Overholt, 2019). Sepsis bundles include specific time frames for implementing evidence-based (clinically proven) interventions, including fluid resuscitation, vasopressor administration, blood culture collection, and treatment initiation with broad-spectrum antibiotics. The Surviving Sepsis Campaign (SSC) and the Institute for Health Care Improvement (IHCI) developed evidence-based sepsis bundles, which they define as a "bundle of interventions that, when implemented together, will result in better outcomes." Separate sepsis bundles were introduced as the resuscitation bundle to be implemented in the first six hours and the management bundle with interventions to be implemented in the first 24-hour period (Hurtado et al., 2009).

Since 2015, CMS has mandated sepsis bundle compliance for hospitals voluntarily participating in the Pay for Performance (P4P) program. CMS's P4P was implemented as a set of voluntary "value-based programs" that include resources and initiatives that strengthen teamwork among providers and stakeholders to increase the quality of care Medicare beneficiaries receive. One segment of the P4P program includes the Hospital-Acquired Condition (HAC) Reduction Program, which subjects applicable facilities to a 9% reduction in payment based on claims for ten diagnoses, including tracking post-operative sepsis rates. Hospitals scoring in the top 10% for compliance with these quality measures receive a 9% bonus above the standard payment (Center for Medicare and Medicaid Services, 2005). While compliance with CMS guidelines is

essential for full P4P Medicare and Medicaid reimbursement, participating facilities' sepsis bundle compliance rate has consistently been under 30%. Despite the presence of the CMS P4P mandate, in several randomized controlled trials, it was concluded that sepsis bundle compliance had not affected patient survival rates (Raschke et al., 2017). This project intends to explore the need for educational interventions in providing sepsis care and to evaluate one educational intervention designed for undergraduate nursing students to address the high incidence of sepsis.

Literature Review

While sepsis is on the national radar, the question becomes why and what can nurses do about it? One thought is to investigate how undergraduate nurses are educated on sepsis recognition. An extensive literature review was conducted to understand the current nursing educational practices for sepsis and to answer the question, "Does undergraduate nursing sepsis education improve sepsis knowledge and confidence in sepsis recognition?"

This question was entered in CINAHL, which provided six results. Five results were not appropriate to this project due to the patient population and lack of an intervention (2), not related to sepsis (2), not specific to sepsis (1), the remaining result from this search is Harley et al. (2021), this study assessed the sepsis knowledge of final-year Australian nursing students but provided no education. The term “Undergraduate nursing sepsis education,” limited to five years, was entered in MEDLINE with four results. One result had inappropriate subjects (interprofessional), one result had an inappropriate patient group (pediatrics) as well as simulated patients, one study compared different years of undergraduate nursing students in Croatia, and one result (Harley et al.,

2021) was a duplicate from the CINAHL search. A PubMed search using "Undergraduate nursing sepsis education" limited to five years produced seven results. One result was inappropriate due to patient population (oncologic emergencies) and use of simulation, one result involved discharge planning, one result (a duplicate) studied simulated pediatric patients, one study involved pediatric patients with gastroenteritis in Brazil, one study (a duplicate) had interprofessional subjects using simulation, one study (a duplicate) was various years of undergraduate nursing students in Croatia, one study (Harley et al., 2021) was duplicated from prior searches and has been used to provide evidence for this project. The literature review resulted in the development of the Literature Review Matrix (Appendix A). Articles discussed in the literature review include studies evaluating the status of sepsis knowledge involving practicing nurses or nursing students, with several studies providing and evaluating an educational intervention.

Lack of Sepsis Knowledge

Coiner and Wingo (2021) performed a metasynthesis that examined the sepsis knowledge of practicing nurses and found that the level of knowledge was inadequate. Coiner and Wingo were surprised by the lack of nurses' knowledge. Coiner and Wingo (2021) suggest specialized assessment of various nursing units and emphasize that current, high-quality sepsis education can result in both reduced patient mortality and morbidity as well as producing more self-assured nurses. Conclusions included the importance of not assuming nurses have any essential skills or knowledge for sepsis care and that sepsis-specific nursing education programs are needed (Coiner & Wingo, 2021).

Harley et al. (2019) found that Emergency Department nurses had knowledge deficits regarding sepsis identification and treatment and recommended a nurse-specific sepsis education program. Only one (*n*=14) nurse was able to identify the hospital's protocol, which consisted of the *Quick Sequential Organ Failure Assessment* (qSOFA) criteria (Harley et al., 2019). Storozuk et al. (2019) conducted a cross-sectional survey of 312 Canadian emergency department registered nurses and found that the nurses had a mean score of 51.8% on a test of their sepsis knowledge. Storozuk et al. (2019) included that some survey respondents had expressed a desire for sepsis education.

Harley et al. (2021) assessed the knowledge of final-year nursing students using an online survey and found that participants scored, on average, 3.7/9 (n = 237). Conclusions reached from this cross-sectional study include suggesting a standardized educational approach enumerating the specific number of hours committed to sepsis education and periodically re-evaluating the curricula (Harley et al., 2021). Moody et al. (2022) conducted a retrospective chart review analyzing sepsis screenings and clinical provider alerts. They concluded that before initiating targeted nursing sepsis tool education, sepsis screenings were conducted in 26% of patients, but following education, consistent performance of sepsis screenings increased to 42%.

The studies included in the literature review provide evidence that nursing students and practicing nurses demonstrated a lack of sepsis knowledge and that the quality of care they provide can improve following sepsis education. This DNP project will introduce a nursing education module to help undergraduate nursing student participants identify sepsis. As evidenced by the high mortality and morbidity associated

with sepsis, a need exists to educate nurses to identify individuals experiencing signs of sepsis rapidly.

Theoretical Framework

The theoretical framework used to support sepsis education for undergraduate nursing students is Benner's Novice to Expert Theory. Benner's theory outlines how nurses transition from novice students to expert practitioners. This theory supports lifelong learning for nursing professionals and states that nurses can learn skills without learning theory (Benner, 2004).

The Novice to Expert theory delineates five stages of nursing expertise. They are: 1) novice, 2) advanced beginner, 3) competent, 4) proficient, and 5) expert. The novice nurse has limited experience. Benner's theory states that when novice first-year nursing students are given strictly delineated parameters and guidelines, they can proceed to gain experience. The novice nurse is taught basic rules and follows simple instructions. Novice nurses require mentors and educators to support their learning and growth. The novice usually experiences comparatively stable patient assignments, allowing the expert nurse mentor/educator to predict and develop the novice's patient care skills. When the novice nurse has demonstrated essential skills in nursing and begins to function as a new graduate, he or she will move into the advanced beginner stage (Benner, 2004). Prelicensure nursing students as nursing novices may not have experienced caring for unstable patients experiencing sepsis. However, they will benefit from education, such as early sepsis identification, to gain experience.

The advanced beginner is very cognizant of assessments regarding their achievements as well as the nursing practices of their co-workers. The advanced

beginner will pay special attention to patient status issues when pointed out by colleagues and subsequently develop improved independent assessment skills. The advanced beginner will initially view all tasks as having equal importance and cannot prioritize tasks. When new tasks are necessary, the advanced beginner will generally experience anxiety. Self-directed skill study and mentoring from a knowledgeable co-worker are beneficial approaches for managing anxiety. An advanced beginner will have basic knowledge of the standard presentations of common diseases, injuries, and accepted treatments, but problems perceiving indistinct variations or determining perilous changes may arise due to inexperience (Benner, 2004).

After the nurse has gained two or three years of experience in the same clinical area, they move to the next stage, which Benner calls “competent.” The speed with which the nurse develops competence is mainly contingent on the diversity and complexity of the patient pool. Developing competence may not follow a smooth track, depending on the patient pool and the availability of high-quality clinical education in the workplace. The competent nurse can now manage time and prioritize tasks more effectively. Less positive aspects of becoming competent include a possible loss of confidence in some co-workers following erroneous advice, detecting co-worker ineptitude, and lack of ongoing mentorship (Benner, 2004).

The fourth stage of nursing experience is proficiency. A proficient nurse knows what to expect in given circumstances and can modify plans when indicated. Benner observes that in the previous stages, the nurse’s development had been steadily additive, while in this stage, the nurse’s development requires a more subjective surge. The nurse becomes more easily adaptable to changing situations and develops the skill of blending

subjective with objective information. The nurse will experience "just knowing" episodes based on experience and “practical understanding” of changes that may progress without intervention. When the proficient nurse responds to unanticipated changes, the result can be correct actions or incorrect. In the event of inappropriate actions, the nurse remains receptive to revising plans and negating prior expectations. New challenges are opportunities for continued refinement of the nurse’s ability to read and respond to patients' conditions (Benner, 2004).

Benner's final stage of nursing experience is expert. Benner has used the word “phronesis, " a knowledge of practical action (Benner, 2004). An expert nurse's performance is supple, fluent, and effective. The expert nurse's actions will come from an intuitive understanding and broad experience (Nursing Theory, 2020). There are stages in the learning process where the student cannot rely on previous experience but, through new experience, develops knowledge and skills over time. Experience is required for nurses to develop expertise, beginning as novices to become experts (Davis & Maisano, 2016). The goal of beginning early sepsis recognition education for prelicensure nursing students is to assist novice nurses in gaining knowledge and, through experience, becoming experts. The process begins with education.

This educational module was designed for undergraduate nursing students with basic pathophysiology knowledge and limited clinical experience who would be considered novices. While the students learn some parameters and guidelines regarding sepsis assessment and care, by experiencing the activities in the proposed module, the students will also gain the experience to become more confident in the septic patient's care. Benner felt that by innovatively linking factual knowledge with personal, aesthetic,

ethical, and sociopolitical knowledge, nurses gain the experience essential for operating in the empathetic realm. Nurses can effectively combine knowledge and experience to provide appropriate, integrated care to meet patient health goals.

Methodology and Procedures

Design

This early sepsis recognition module aims to provide prelicensure nursing students with advanced education on identifying and treating sepsis over and beyond their clinical experiences. The setting for this project was a baccalaureate program at a midwestern university. A descriptive study has been developed to address the learning needs of the undergraduate student. The study uses a pretest/post-test design to evaluate student learning and engagement. The education is offered online, asynchronously, using a convenience sample. Student participants were selected from several undergraduate nursing courses, and all students enrolled in the courses were invited via email that included a link to the university learning platform where the educational module was housed. For a comprehensive copy of the Undergraduate Nursing Sepsis Education Module materials, see Appendix B. Students were recruited during the summer and fall semesters of 2023.

The university learning platform was used for this learning module as it offers a program familiar to the students, allowing ease of use. The module was created with support from the university design team. This platform permits various applications and tools, including embedded video, linking to all evaluation tools (pretest/post-test) in one location. Once students began the module, the platform directed them through the learning experience. The participants could also begin the module, log out as needed, and

return to finish it later. Upon completion, the students receive a certificate of completion for their records.

The proposed Undergraduate Nursing Sepsis Education Module Materials (Appendix B) were developed to meet the student learning objectives. During this module, the student will respond to two demographic questions and participate in a five-question true/false pre-quiz. Module participants will then view a 16-minute PowerPoint presentation followed by a 10-question multiple-choice post-quiz. Participants will have the opportunity to provide feedback through a five-item Likert scale satisfaction survey. The learning objectives of the education module are for the student participants to be able to 1) recognize the impact of sepsis on older adult patient outcomes, 2) understand the use of the nursing process in developing a nursing care plan for the septic patient, and 3) decide appropriate nursing diagnoses for the septic patient.

Critical stakeholders for this project include the Director of the Nursing Program, members of the undergraduate nursing faculty, the undergraduate student body, and the future patients of these students. Inclusion criteria for participation included any of the university's undergraduate nursing classes, including pre-licensure, R.N. to BSN, or the accelerated BSN program. Exclusion criteria included graduate and postgraduate students.

Implementation for this project began when participating faculty sent their students the Oakland University Participant Recruitment Invitation (Appendix C). Potential participants were Oakland University School of Nursing undergraduate nursing student body members. The sepsis module invitations were sent during the Summer and Fall 2023 semesters.

Project approval was obtained on June 13, 2023, via the Institutional Review Board Determination before implementation (Appendix D). It was determined that the educational intervention project has no human subjects and requires no informed consent. Project participants were self-selected through their election to participate in the undergraduate nursing sepsis education module.

Project implementation consisted of the DNP Project Data Instruments (Appendix E), which included a demographic form that gathered two information items (specifically previous personal or professional sepsis experience and years of post-high-school education). Demographics were attached to a five-question True/False pre-quiz. Once demographics and pretest were completed, students were then directed to the sepsis recognition presentation and post-test before receiving their certificate. The Early Sepsis Recognition PowerPoint video included historical and statistical information, differential diagnoses, and assessment hints. The video presentation also included a case study that discussed the initial assessment, possible nursing diagnoses, care planning, interventions, and evaluation goals. The following link brought the participants to a ten-question multiple-choice post-quiz and the five-question Likert scale satisfaction survey. The final step was a completion certificate.

Implementation of the DNP project “Sepsis Education for the Undergraduate Nursing Student” began with an invitation email sent to students by participating faculty in the Summer 2023 semester and continued to the Fall semester. Implementation team members include the DNP student and participating faculty members. Roles and responsibilities for the team members specify that the DNP student was responsible for creating and testing the educational module for functionality and the final data analysis.

The participating faculty members were responsible for sending the invitation email to their undergraduate students.

Module Description

The Undergraduate Nursing Sepsis Education module was designed to provide the student with knowledge regarding the appearance and symptoms of the older adult with sepsis. The student will learn why older adults are at greater risk of developing and dying from sepsis. The presentation will review the components of a nursing care plan to address the nursing care needs of the septic older adult patient to allow the participants to explore what they have learned. Required resources are the student's existing Oakland University email and their computers. Anticipated costs are minimal or nil.

The advantage of an online learning experience is that it allows students to participate in learning according to their availability. The module utilized automatic data migration to Google Forms for logistic data collection. All demographic information, pre/post-quizzes, and satisfaction survey results were anonymous. Data results were reviewed and analyzed for demographic information, pre/post-quiz results, and satisfaction survey responses. The educational module opened in the Summer semester during an accelerated course, which resulted in low enrollment. The undergraduate nursing sepsis education module was offered again in the Fall semester. This larger potential participant pool resulted in six participants, with four students completing the module.

Results

Demographic Results

There were six students who began the undergraduate nursing sepsis education module, with four students completing the entire module. As seen in the Graphic Results of Demographic Questions (Appendix F), all six students completed the demographic data, with three reporting personal or professional sepsis experience. All participants were self-described as having four years of post-high-school education.

Pre-Quiz Results

Four students completed the five-question pretest. Students answered all questions correctly with the exception of “Question 4: Less than 17% of nurses surveyed had up-to-date sepsis knowledge," where only two students answered correctly (Appendix G).

Post-Quiz Results

Four participants completed the ~~ten~~10-question post-quiz. All four participants correctly responded to nine post-quiz questions. Two participants responded incorrectly to “Question 9: Sepsis recognition tools include:" by responding “A. SIRS” instead of the correct response, which was “D. All of the above.” Post-Quiz results are seen in the Graphic Results of Post-Quiz Questions (Appendix H).

Satisfaction Survey Results

Responses to the survey indicated that all participants completing the module agreed or strongly agreed with every question. Two satisfaction survey responses that indicated “Agree” were for question two, “The instructional materials increased my knowledge and skills in sepsis.” The remaining two responses were “Strongly agree.”

There were no “Neutral,” “Disagree,” or “Strongly Disagree” responses to any of the survey questions, as seen in the Graphic Results of Satisfaction Survey (Appendix I).

Discussion

While undergraduate prelicensure students have some basic knowledge, providing higher-level education can help produce new graduates with a more thorough knowledge base. Better-educated novice nurses are more prepared to progress through Benner’s stages effectively. Providing undergraduate nursing sepsis education can help ensure that, unlike the emergency department nurses surveyed by Storozuk et al. (2019), future nurses do not feel unprepared for the challenge of a septic patient. Additionally, increased awareness of the impact of sepsis can motivate potential nurse leaders to eliminate the organizational barriers found by Harley et al. (2019), or these future nurse leaders will be inspired to develop nurse-inclusive sepsis clinical pathways.

Sepsis education is essential for all nurses, and beginning to instill this knowledge early in the educational process will improve the novice nurse’s awareness that early recognition of sepsis reduces mortality. Expanding the pretest may provide more accurate insight regarding the students’ baseline sepsis knowledge. Module improvement considerations include asking the students for comments regarding the most compelling part of the module compared to their impression of the least compelling part. Seeking this information to improve the module may provide insight into more effective teaching methods and guide content. Effective learning ensures that the students have an established foundation to build on and become competent practitioners capable of recognizing sepsis earlier to improve patient outcomes. Limitations of this project include the small sample size, which makes it challenging to make inferential generalizations.

While the number of voluntary participants for a non-credit educational experience was less than anticipated, it is acceptable for a limited analysis. Furthermore, limitations of online learning include that some students perform best with in-person teaching, may not perform at their best with standard online learning methods, and would benefit from innovative techniques.

Potential barriers to project implementation and sustainability included teaching impediments such as participant recruitment and learning obstacles faced by students with multiple demands on their limited available time. Facilitators include the nursing student's desire to learn the material and improve the quality of their nursing care as well as the minimal time commitment to complete the module. Online education effectively increases students' knowledge of sepsis in older adults. There is an inherent difficulty in engaging students who are already very busy to engage in an optional educational opportunity.

Conclusion

Implications for future work include recruiting participants from several levels of the undergraduate nursing class to compare pre and post-sepsis knowledge on an individual and class basis at different stages of their education. Plans for future work include researching methods to enhance participation along with continued research to ensure the sepsis module content remains current. Since all nurses must maintain a current knowledge base, many potential sites would benefit from a sepsis education program. Outside of acute care, these sites include (among others) outpatient dialysis centers, urgent care facilities, rehabilitation facilities, skilled nursing centers, adult day care, and home health care. In a retrospective cohort study, Riester et al. (2022) found

that sepsis was the cause of unplanned hospital readmission from skilled nursing facilities in 22.4% of older adults previously discharged. Researching the role nursing homes can have in the Surviving Sepsis Campaign (SSC), Mylotte (2019) discusses that staff education is critical to sepsis awareness and containment. Sepsis education for nurses is necessary for every clinical site to improve early sepsis recognition and outcomes by providing high-quality patient care.

Indeed, in-depth sepsis education is indicated for undergraduate nursing students who, without doubt, will encounter a patient experiencing sepsis in their nursing practice upon graduation. Before implementation, expectations were that the student participants would demonstrate a lower degree of initial sepsis knowledge but the same degree of post-education learning. The development and implementation of this project have resulted in significant personal growth and strengthened internal tenacity.

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Appendix A
Literature Review Matrix

Author and Year	Design & Setting	Sample, Sample Size, Sampling Method	Protocol, Intervention	Outcomes: Statistical & Narrative	Limitations	Implications for Nursing and Phenomenon
Storozuk, 2019	Descriptive cross-section survey of four Canadian Emergency Department's registered nurses	Emergency department registered nurses (758), *N*=312, quantitative voluntary response sample.	Survey, assessing knowledge of sepsis and viewpoints of sepsis patient care	A mean score of 51.8% indicates poor general sepsis knowledge and possible improper sepsis treatment. Substantial knowledge gaps were apparent.	Response rate not supportive of analysis of subgroups, software limitations, limited to one city, survey timing	Nurses felt septic patients were challenging, and many did not feel well prepared. Need for more sepsis education and resources.
Coiner, 2021	The literature review included nine articles, hospital setting	Nine articles	Search terms were sepsis education, training, recognition, identification, nursing, nursing, nursing school, sepsis knowledge, and knowledge assessment. Assessing nurse sepsis knowledge, using electronic learning methods, and including simulation in sepsis training	One study found a 15.7% improvement in post-test scores but only 5.2% retention.	This study did not include many statistics, no sample size, and few statistical results.	Assumptions of nurses' knowledge or competence should be avoided. Knowledge and skill assessments should be customized for different groups. Simulation empowers nurses to initiate early treatment. Educational methods should be appropriate and effective.
Harley, 2021	Cross-sectional 9-question survey from nine different Australian schools of nursing's final year students	1075 eligible students received an emailed link to the survey, and 237 responded (22%)	17 An online survey included sepsis identification, basic pathophysiology, and prevalence. Analysis of results performed by Statistical Package for Strata (v13) and Microsoft Excel	237/1075 completed surveys, 53 reported formal sepsis education, 91 had sepsis education included with other acute conditions, 77 taught using lectures, 57 were self-directed, 37 had case studies, 30 were lab simulations, and 43 were taught in clinical. A small but significant difference in scores between total knowledge for respondents receiving formal sepsis education (*n*=144, mean 4.0 [SD 0.12]) and those without (*n*=93, mean 3.3 SD 0.17]; t= -3.86, p<0.01). Less than ¼ of students received sepsis-specific education.	The newly modified survey needs a more extensive study to perform full factor and subgroup analyses. Possible "opt-in" bias: the survey was focused on student recall and self-reporting and may not accurately reflect the curriculum.	Reassess nursing curricula for possible inclusion of mandatory sepsis education to ensure graduates are prepared to enter the nursing workforce. Develop sepsis education to promote knowledge retention.

Moody, 2022	Retrospective chart review at a medical center	Data exam before and after targeted nursing education using Pearson's chi-squared (significance $p<.05$ two-tailed probability)	Instruction included Sequential Organ Failure Assessment (SOFA) and Quick Sequential Organ Failure Assessment (qSOFA)	Before the intervention, screening occurred on 26% of patients; 42% were screened after education.	Quality improvement project included one site.	Nursing education resulted in improved compliance with sepsis screening protocols.
Harley, 2019	Qualitative study Emergency Department	14 R.N.s	The interview included 21 questions	Explored nurses' experience and perception of sepsis recognition and response	In retrospective interviews, perceptions may have been inaccurate due to time delay. Interviews occurred in the busy, fatiguing work environment.	Organizational barriers impact recognition and response to sepsis; a nurse-inclusive clinical pathway is suggested.

Appendix B
Undergraduate Nursing Sepsis Education Module Materials

The educational module, Sepsis Recognition Education in the Older Adult, is designed to provide the student with knowledge and statistical information regarding the appearance and symptoms of the older adult with sepsis. The student will learn why older adults are at greater risk of developing and dying from sepsis. The students will engage in a case study and specialized study and review a care plan for the patient with sepsis. This module will provide the student with active learning encounters. During this module, the student will gain sepsis experience through a case study involving a septic patient. The case study will provide knowledge promoting participant confidence while caring for a patient spiraling into septic shock. The presentation will review the components of a nursing care plan to address the nursing care needs of the septic older adult patient to allow the participant to explore what they have learned fully.

1. Module Overview

Sepsis in older adults is a significant cause of hospitalization, disability, and death. In this module, the student will view a PowerPoint presentation. Module participants will participate in a true/false pre-quiz, a multiple-choice quiz, and they will be able to provide feedback through a 5-item Likert scale survey. The educational module, Sepsis in the Older Adult, provides the student with knowledge and statistical information regarding the appearance, symptoms, and possible differential diagnoses of older adults with sepsis. The student will learn that older adults are at greater risk of developing and dying from sepsis. This module will provide the student with active learning encounters. During this module, the student will gain sepsis experience through

a case study involving a septic patient. This case study will provide knowledge promoting confidence when the student is facing a patient spiraling into septic shock. To allow the student to explore what they have learned, the student will consider components of a nursing care plan to address the nursing care needs of the septic older adult patient.

2. Module Objective: Upon completing this module, the participant will recognize the impact of sepsis on older adult patient outcomes.

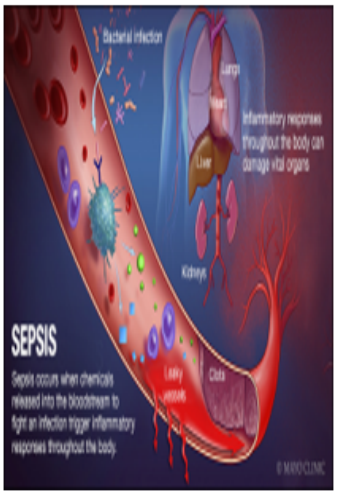
3. Learning Activity: Scenario-Based Case Study

Virginia is a 72-year-old female who presented to the Emergency Department with the following appearance vital signs: shaking chills, abnormal temperature (fever >101.3), pulse (128), hypotension (SBP 88mmHg), increased respiratory rate (35), SPO2 (90% on room air), and an altered mental status. Virginia is accompanied by her daughter, Jill, who reports that Virginia has been complaining of urinary frequency, severe dysuria, and foul-smelling urine for several days but that today, Virginia had not voided for at least eight hours. What tentative medical and nursing diagnoses come to mind for this case? What actions should Virginia's nurses take based on the history and nursing assessment?

Appendix C
Participant Recruitment Invitation

Oakland University School of Nursing

IMPLEMENTING SEPSIS RECOGNITION EDUCATION FOR UNDERGRADUATE NURSING STUDENTS



Dear Oakland University School of Nursing undergraduate student

I am a student in Oakland University School of Nursing's DNP program, specializing in education. For my DNP final project, I have developed a sepsis educational module. I am inviting you to participate in this project which should not take any more than 30 minutes of your time.

While you will not receive class credit, following completion of the module each participant will be awarded a personalized certificate of completion. No personally identifiable information will be collected.

Thank you in advance for your help with my project. I hope that you will feel that your participation was worthwhile.

https://espace.oakland.edu/course/view.php?id=1800

This module includes:

- Consent
- 5-question pre-test
- PowerPoint presentation
- 10-question post-test
- 5-question satisfaction survey

If you have any questions please contact: Donna Kroger, MSN Ed., RN donnakroger@oakland.edu 386-341-8527

DNP project chair: Claudia Grobbel, DNP, RN, CNL cgrobbel@oakland.edu 248-321-

Appendix D
Institutional Review Board Determination

OAKLAND UNIVERSITY
Powered by Google

Donna Kroger <donnakroger@oakland.edu>

IRB-FY2023-307 - Initial: No Human Subjects Research Decision
1 message

do-not-reply@cayuse.com <do-not-reply@cayuse.com> Tue, Jun 13, 2023 at 10:33 AM
To: cgrobbel@oakland.edu, donnakroger@oakland.edu

OAKLAND UNIVERSITY

Institutional Review Board

Date: June 13, 2023

Study #: IRB-FY2023-307

Study Tile: IMPLEMENTING SEPSIS RECOGNITION EDUCATION FOR UNDERGRADUATE NURSING STUDENTS

Submission Type: Initial

IRB Decision: Not Research

Research Team:
Donna Kroger
Claudia Grobbel

The above referenced study has been has been determined to be Not Research according to federal regulations.

The IRB decision is based on the following:

The PI is conducting an educational intervention as a class project. The intention of this project is for internal use only and will not yield results that can be applied universally. Results will only apply to the immediate environment where the project will occur.

Please retain a copy of this correspondence for your records.

If you have any questions, please contact the IRB staff.

Thank you.

The Oakland University IRB

Appendix E
DNP Project Data Instruments

1. Demographics “Getting to Know You”
This anonymous information will only be used for data analysis.
Have you had personal or professional experience with sepsis in the past?
1. No
2. Yes
I have the following years of post-high school education
1. One year (freshman)
2. Two years (sophomore)
3. Three years (junior)
4. Four years (senior)
2. Pre-Quiz
Information about prior sepsis knowledge
1. Sepsis presents an elevated risk to infants and older adults
1. True
2. False
2. Sepsis may cause abnormal body temperature, elevated heart rate, lower systolic blood pressure, increased respiratory rate, and a decline in mental status.
1. True
2. False
3. The mortality rate for older adults from sepsis is higher than for most other age groups
1. True
2. False
4. Less than 17% of nurses surveyed had up-to-date sepsis knowledge
1. True
2. False
5. Older adult patients experiencing sepsis are at 40% increased risk of returning to the hospital within three months
1. True
2. False
Pre-Quiz Answer Key
1. T, 2. T, 3. T, 4. T, 5. T
3. Post-Quiz
1. Sepsis is defined as
A. A slight infection
B. The body’s extreme response to infection
C. An open wound
D. All of the above
2. Sepsis may
A. Affect vital signs but not mental status

B. Cause elevated but not reduced body temperature
C. Affect the blood pressure but not the heart rate
D. Affect thermoregulation, increase heart rate, reduce systolic blood pressure, increase respiratory rate
3. Assessment hints include
A. Not listening to people who know the patient
B. Comparing current assessment findings with prior assessments
C. Not checking the medical problems or history
D. Delay reporting abnormal assessments
4. A survey of nursing sepsis knowledge showed
A. Less than 17% had up-to-date sepsis knowledge
B. More than 17% had up-to-date sepsis knowledge
C. The survey did not assess sepsis knowledge
D. Trained nurses can recognize 100% of septic patients
5. U.S. sepsis statistics show
A. One-third of hospital deaths are sepsis-related
B. Sepsis has an 18% mortality rate
C. There are over 1,700,000 cases of sepsis annually
D. All of these choices
6. U.S. sepsis statistics show
A. Older adults account for 25% of all ICU admissions
B. For older adults (age 65-84), sepsis hospitalizations more than tripled from 1997-2011
C. The sepsis mortality rate for those over 65 is 27.7%
D. Both B and C
7. Sepsis can result from
A. An infection in the lower respiratory system of the skin
B. An infection in the urinary system
C. A bad case of hiccups
D. Both A and B
8. Facts about sepsis in older adults include
A. 40% are readmitted to the hospital within three months
B. Nursing home residents are six times more likely to develop sepsis than non-nursing home residents
C. Survivors are more likely to develop cognitive impairment
D. All of the above
9. Sepsis recognition tools include
A. SIRS
B. MEWS
C. NEWS2
D. All of the above
10. Sepsis care planning includes
A. Head-to-toe assessment

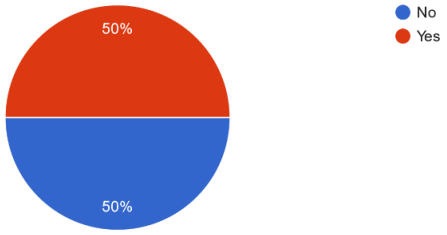
B. A NANDA nursing diagnosis
C. Nursing interventions and time-limited goals
D. All of the above
Post-Quiz Answer Key
1. B, 2. D, 3. B, 4. A, 5. D, 6. D, 7. D, 8. D, 9. D, 10. D
4. Satisfaction Survey
On a scale of 1 strongly disagree to 5 strongly agree, please select your response.
1. The instructor effectively organized and presented learning activities for sepsis
    1. Strongly disagree
    2. Disagree
    3. Neutral
    4. Agree
    5. Strongly agree
2. The instructional materials presented increased my knowledge and skills in sepsis
    1. Strongly disagree
    2. Disagree
    3. Neutral
    4. Agree
    5. Strongly agree
3. The Pre-Quiz, Post-Quiz, and case study were reflective of the Sepsis course content
    1. Strongly disagree
    2. Disagree
    3. Neutral
    4. Agree
    5. Strongly agree
4. This learning experience improved my ability to assess patients at risk for sepsis
    1. Strongly disagree
    2. Disagree
    3. Neutral
    4. Agree
    5. Strongly agree
5. Overall, my expectations were met for the content quality of a brief sepsis learning module
    1. Strongly disagree
    2. Disagree
    3. Neutral
    4. Agree
    5. Strongly agree

Appendix F

Graphic Results of Demographic Questions

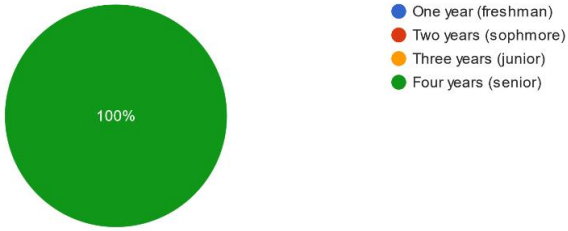
Have you had personal or professional experience with this sepsis in the past?

6 responses



I have the following years of post high-school education:

6 responses

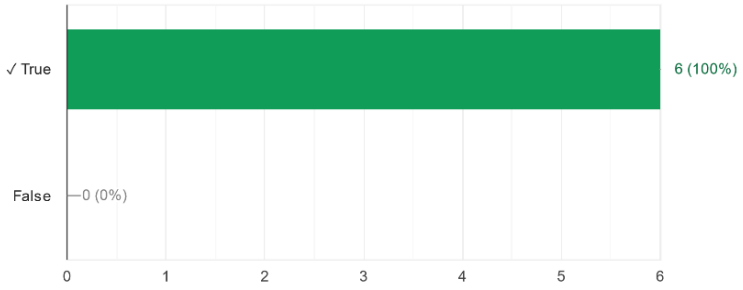


Appendix G

Graphic Results of Pre-Quiz Questions

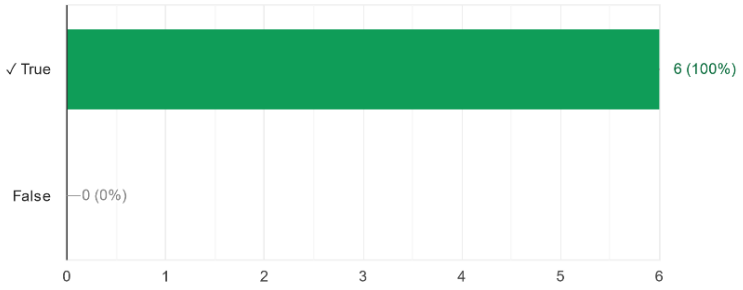
1. Sepsis presents an elevated risk to infants and to older adults

6 / 6 correct responses



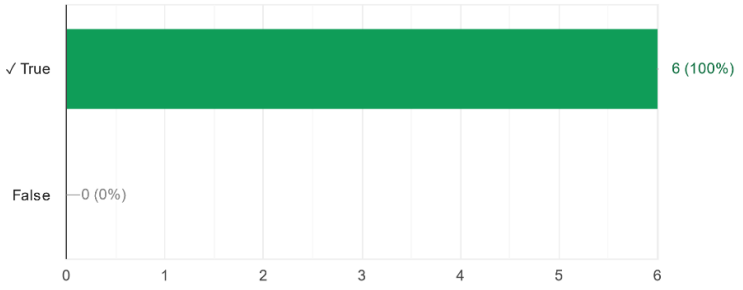
2. Sepsis may cause abnormal body temperature, elevated heart rate, lower systolic blood pressure, increased respiratory rate, and a decline in mental status

6 / 6 correct responses



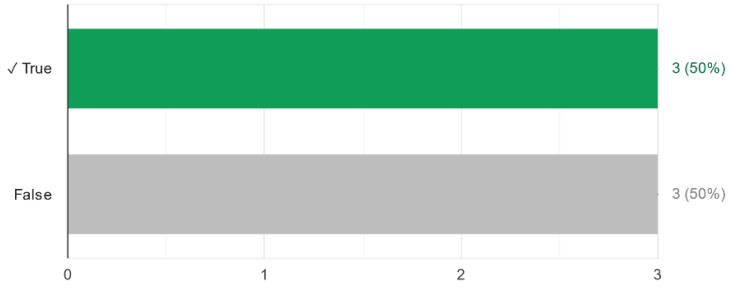
3. The mortality rate for older adults from sepsis is higher than for most other age groups

6 / 6 correct responses



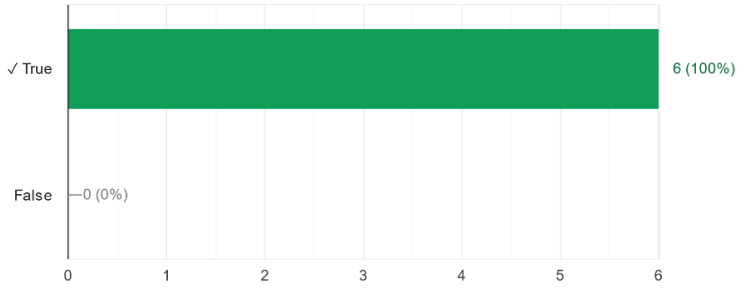
4. Less than 17% of nurses surveyed had up to date sepsis knowledge

3 / 6 correct responses



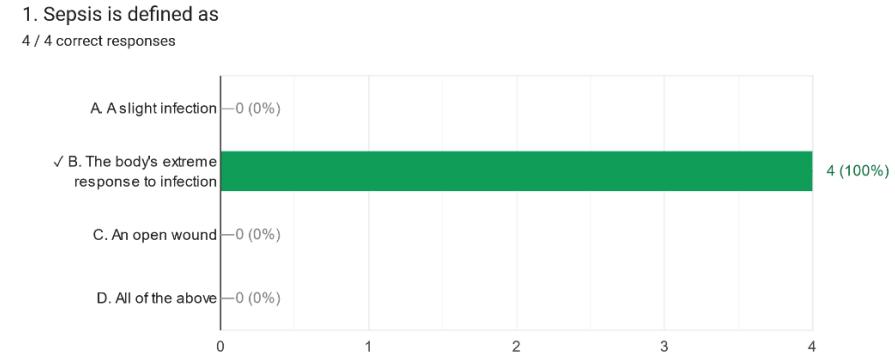
5. Older adult patients experiencing sepsis are at 40% increased risk of returning to the hospital within three months

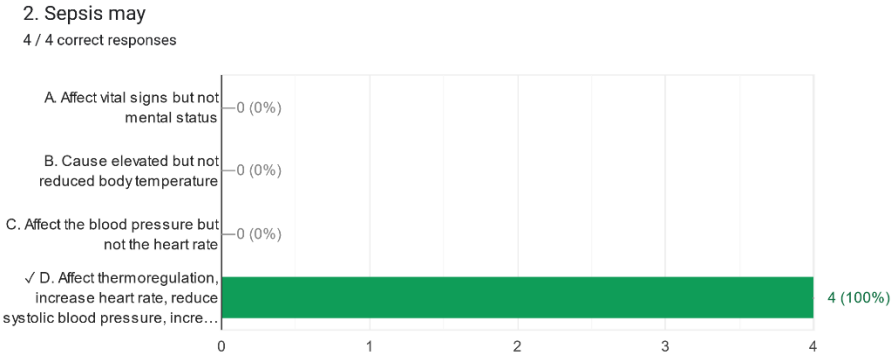
6 / 6 correct responses

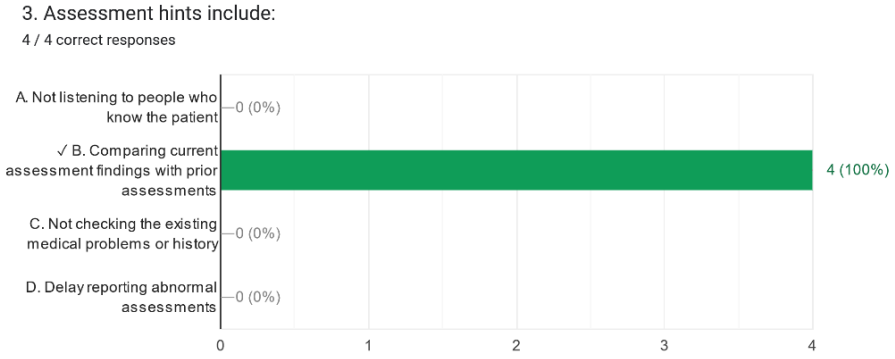


Appendix H

Graphic Results of Post-Quiz Questions

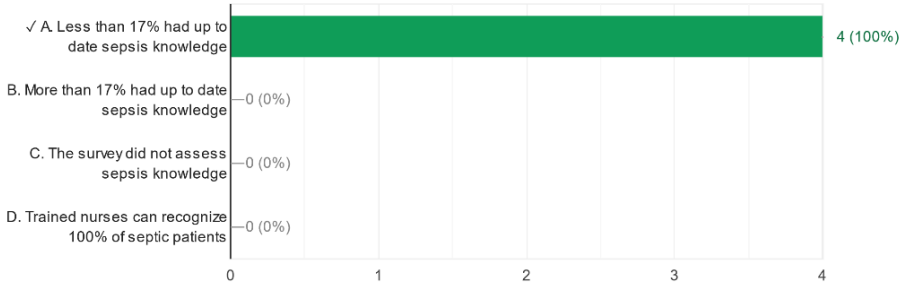






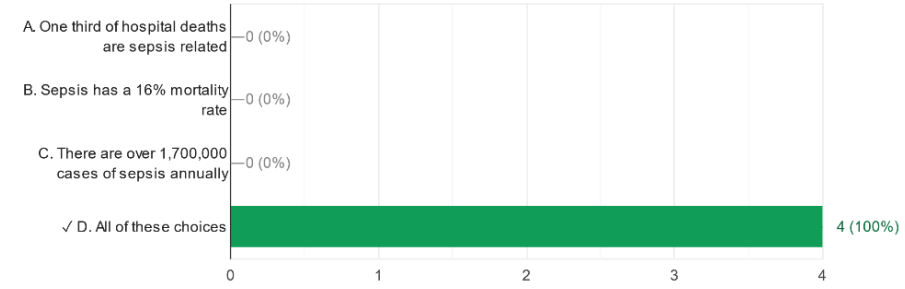
4. A survey of nursing sepsis knowledge showed:

4 / 4 correct responses



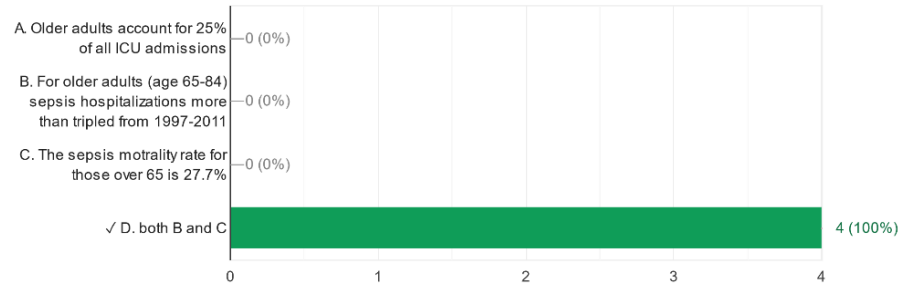
5. U.S. sepsis statistics show

4 / 4 correct responses



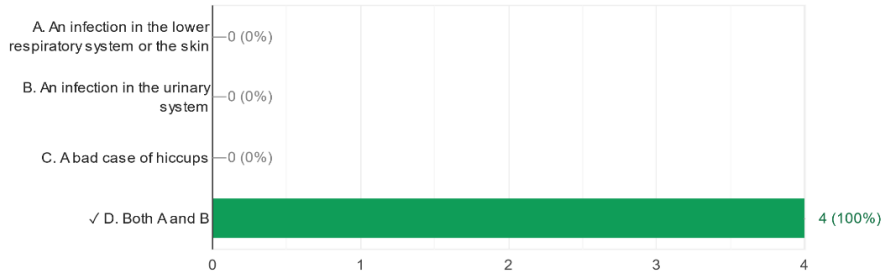
6. U.S. sepsis statistics show:

4 / 4 correct responses



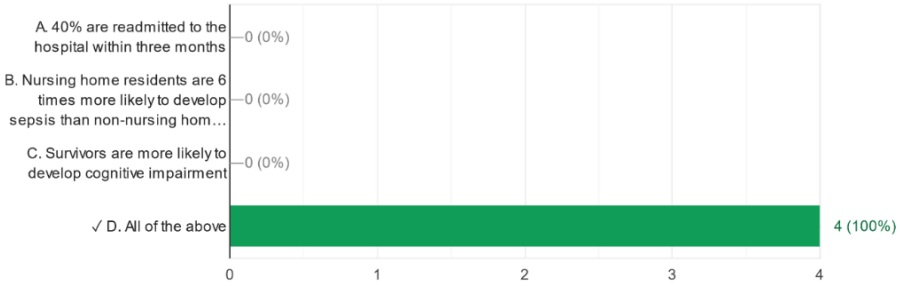
7. Sepsis can result from

4 / 4 correct responses



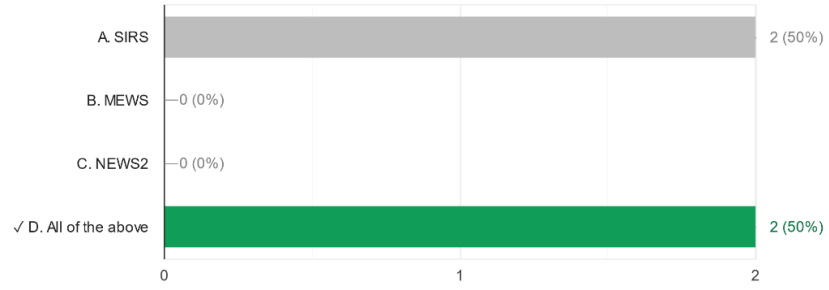
8. Facts about sepsis in the older adult include:

4 / 4 correct responses



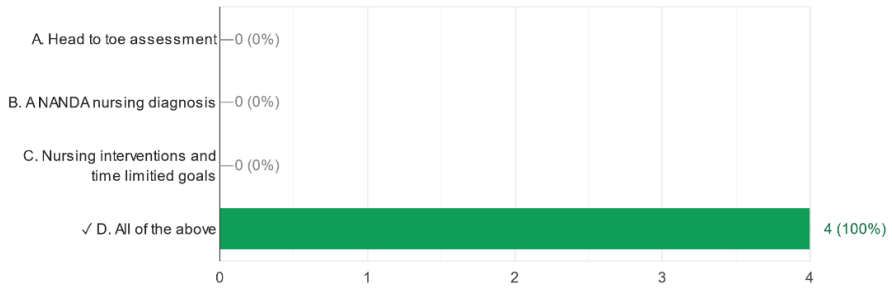
9. Sepsis recognition tools include

2 / 4 correct responses



10. Sepsis care planning includes:

4 / 4 correct responses

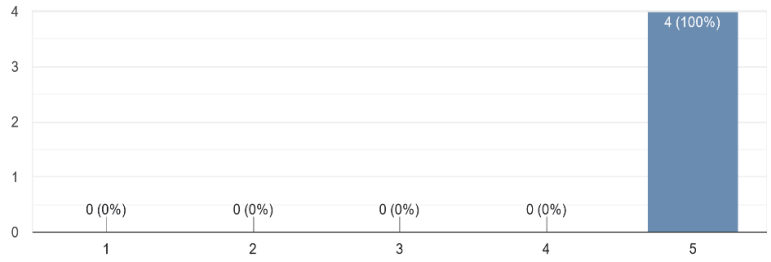


Appendix I

Graphic Results of Satisfaction Survey

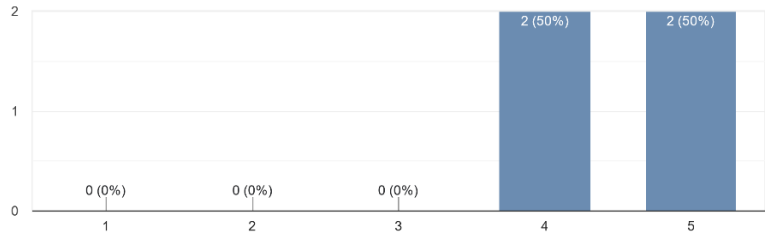
1. The instructor effectively organized and presented learning activities for Sepsis

4 responses



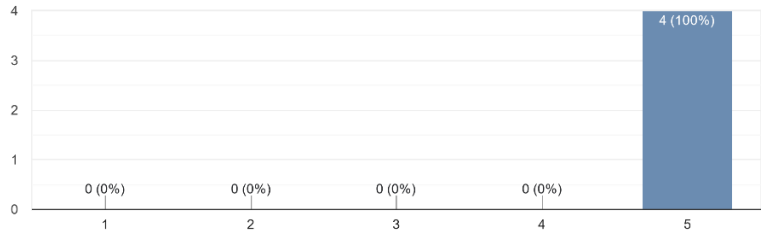
2. The instructional materials increased my knowledge and skills in sepsis.

4 responses



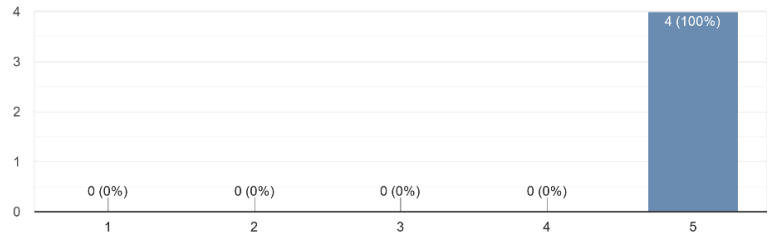
3. The Pre-Quiz, Post-Quiz and Case Study were reflective of the Sepsis course content.

4 responses



4. This learning experience improved my ability to assess patients at risk for sepsis.

4 responses



5. Overall, my expectations were met for the content quality of a brief Sepsis learning module.

4 responses