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Sepsis Identification in the Long-Term Care Facility

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ABSTRACT

BACKGROUND Each year approximately 1.7 million people in the United States develop sepsis, and an estimated 270,000 Americans die from this disease (Center for Disease Control and Prevention [CDC], 2020). Early recognition, and identification is essential in decreasing potential for mortality in this population.

METHODS: During a two-week period six individual sessions via a one-hour presentation was provided on evidence based best practice of Sepsis recognition. A pretest was utilized to determine prior knowledge of sepsis recognition. A posttest was provided to evaluate the effectiveness of the educational material. Finally, a survey was conducted to provide input for further educational endeavors.

RESULTS: With a small sample size the power of >0.55 did not achieve a power of >0.8 which made it difficult to achieve a true effect. Using a Fisher's exact test each question showed an increase in knowledge post education, indicating sepsis identification was achieved.

DISCUSSION: The population of this study varied in educational levels with participants including registered nurses, licensed practical nurses, and certified nursing assistants. The anonymity of

this project prevented identifying knowledge increase in each individual group but showed an increase overall.

CONCLUSIONS: This study was not intended to show a decrease in sepsis, but increased awareness for early identification. Although the sample size was low there was evidence that the increased knowledge of early identification of sepsis was achieved. Further research is needed to show if educational impact significantly reduces septic shock and mortality in the long-term care facility.

Key Words

Nursing Education, Long-term Care Facilities, Infection control, Sepsis

PICO Statement

For licensed professional and front-line staff, (P) early sepsis identification education (I) compared to general knowledge (C) will assist in decreasing mortality through recognition (O) over a minimum of 6 weeks.

Problem Recognition

Sepsis is a specific response the human body has to an overwhelming infection. This response can lead to a sequela of events and, if not treated, can lead to death. Sepsis does not discriminate against age, race, or social status, although some populations are more susceptible and at higher risk. Those at a higher risk are the young, the elderly, those with chronic diseases

and weakened immune systems (Sepsis Alliance, 2021). Each year approximately 1.7 million people in the United States develop sepsis, and an estimated 270,000 Americans die from this disease. Sepsis is a significant public health concern and in 2011 was noted to account for more than 20 billion dollars, or 5.2%, of US hospital costs (Singer et al., 2016, para .1). The desired outcome of this project was to provide Sepsis recognition, identification, and resuscitation education for long-term care facility front-line staff members. As sepsis in this population is often difficult to identify because the initial clinical picture may be ambiguous (Nasa et al., 2012, para. 1), reaching the educational goal is imperative. This project was evaluated by pre-education testing knowledge and for effectiveness by post educational testing. The goal was to establish a minimum of 15% increase in sepsis knowledge and awareness.

Adults, aged 65 and older, have more complications from sepsis than those of a younger generation. Elderly patients are 13 times more likely to be hospitalized with sepsis than adults younger than 65, and 63% of older adults 60 years and older are admitted to the ICU with sepsis present upon admission. Those in the long-term care setting have a higher incidence of complications and are up to 6 times more likely for hospital admission due to sepsis. (Sepsis Alliance, 2021, 1 section) Recognition reduces sepsis mortality among the elderly population, ages 75 and older. Mortality,

therefore, is due to a lack of sepsis recognition by healthcare providers. Therefore, it is imperative to engage long-term care facility front-line teams in early sepsis identification.

Residents in long-term care facilities are susceptible to infections such as Clostridium difficile (C Diff), Methicillin-Resistant Staphylococcus Aureus (MRSA), Urinary Tract Infections (UTI), and Pneumonia. There are many reasons why this population is more susceptible to infections, which lead to sepsis. These reasons include decreased immunity due to age, multiple comorbidities, and proximity to other residents. Higher usage of antibiotics in this population often leads to subsequent infections. (Juthani-Mehta & Quagliarello, 2010, p. 931)

Literature Review

This literature review includes professional peer-reviewed journal articles and published material. Internet searches included the use of EBSO Host, CINHAL, PubMed, and UpToDate. The utilization of a nursing education program has been investigated over time by many researchers. The purpose of the research is to find the importance of education and the delivery of the most effective method. As sepsis is a complex disease, and nursing education is vital to assisting with positive patient outcomes. Nurses are lifelong learners and search for knowledge to advance their care and practice. A lack of knowledge and understanding of sepsis

among nursing staff can result in a missed or delayed diagnosis. This delay hinders the treatment and increases the potential for patient death (Calderon et al., 2021, p. 37). Edwards & Jones (2021) identified that nurses who attended an educational program on sepsis demonstrated more confidence in screening patients for sepsis. Nurses are in critical positions to recognize early symptoms of sepsis, but they must have the competency necessary to care for these patients. American Nurse Association describes nurse competence as "Nurses also have a professional responsibility to maintain competence, and employers must support competent practice in the work environment" (Delany, M.M., Friedman, M.I., Dolansky, M.A., Fitzpatrick, J.J. (2015).

Long-term care facilities are at a higher risk for infectious diseases for several reasons, such as immunocompromised states, comorbidities, grouped living quarters, and even degenerative diseases (Juthani-Mehta & Quagliarello, 2010, para. 2). An environment of shared rooms, the difficulty of isolation of infected residents, and lack of resources for infection identification are low. Long-term care facilities' need for infection prevention, and control is an increasing problem as global aging increase (Lee, 2019). A needed resource is the presence of an infection prevention nurse. Infection preventionist can help decrease the presence of sepsis with prevention and control programs. With a lack of resourced

preventionists, there would be an increase in infection surveillance and prevention methods. These aspects lead to residents developing infections leading to the condition of sepsis.

Summary

The literature provides many articles supporting the importance of sepsis identification and resuscitation. Reports of high mortality and poor prognosis bring evidence of the severe nature of this illness. Knowledge of early signs of sepsis, and the identification of systemic inflammatory response, for early intervention, has been well documented by institutions such as Society of Critical Care Medicine. Utilizing a protocolized approach to treatment provides a consistent guide to the inconsistencies of signs of sepsis in the elderly. Literature supports the importance of nursing education, continuing education, and utilizing evidence-based practice. The weakness of the review was the specific target for front-line staff in long-term care facilities and sepsis identification.

SWOT Assessment

Strengths included an accessible population in which the staff is readily available for educational events. The patient population is consistent with patients who, for this project, are elderly immunocompromised or have multiple comorbidities.

Weaknesses include the lack of front-line staff's current knowledge of sepsis recognition. The elderly population is vulnerable to variations of comorbidities, and sepsis presentation can be challenging to discern, and staff may miss opportunities for sepsis recognition.

There were several threats to this project. Because of the multiple educational levels of the targeted audience, the audience will need varied academic instructions. COVID-19 with multiple restrictions did not hamper this project as the COVID-19 surges had decreased. With the devastation, and limitations created by COVID-19, a potential lack of morale and staffing levels could have been in place, although this did not affect the participation.

Problem Scope

The in, and out of, scope criteria were identified. The in-scope criteria included two designated long-term care facilities affiliated with a hospital system in upstate South Carolina. Licensed practice professionals, and front-line staff, who provide patient care received the education. The focused patient population was the nursing facility residents. The limitation of time for the intended project was less than six months for completion. Collaboration with Gardner-Webb University Internal Review Board, Host Hospital Review Board, Host Hospital Nursing Research Council, and Host hospital leadership was required. Out of scope were those who were

not facility-associated clinical staff or residents. This project did not include institutions outside the host hospital and Gardner Webb University.

Objectives

"Goals are where you want to be, and objectives are how you get there" (Zaccagnini & Pechacek, 2021, p. 369). For the goals of increased sepsis education, it was imperative to have a process map of the goal achievement.

The utilization of pre and post-tests would demonstrate the degree to which the sepsis education affected the targeted audience's learning (Bryan & Karshmer, 2013).). Pretesting would determine the knowledge base in place regarding the specific educational criteria for sepsis care. Attendees needed to demonstrate a knowledge of greater than 42% to show proficiency. A study done in 2017 by Padmanabha Thiruganahalli Shivaraju and colleagues. utilized pre- and post-testing in pre-medical students. Those with a 42% increase in post scores demonstrated higher knowledge than pre-testing (Shivaraju et al., 2017).

As there are differences in types of learners: visual, auditory, reading, and kinesthetic, so educational material was needed to target these groups for successful implementation.

Theoretical Underpinnings

Dr. Benner provided the theory of Novice to Expert in stages of knowledge. These include novice, advanced beginner, competent, proficient, and expert. Based on the knowledge that those in the long-term care setting are up to 6 times more likely to have a hospital admission due to sepsis (Sepsis Alliance, 2021, 1 section), it is proposed that sepsis recognition is at the novice level of understanding. Novice nurses can perform tasks but do not have the skills provided by situational experiences (Benner, 1982). Therefore, basic sepsis knowledge would move the novice nurse to an advanced beginner. The conceptual, theoretical, and empiric model (CTE) diagram provides a visual to this theoretical concept. (See Appendix A).

The project lead was unable to locate established pre and post tests therefore these were created based on the educational content. Because there was not a way to evaluate validity of the tests a subject matter expert was utilized to validate the educational content. The paper pre-test was a minimum of 10 questions related to sepsis identification and was a multiple-choice test. The paper post-test reflected the pretest in questions and answer availability. A survey was included after the post-test to obtain participant perspective of project effectiveness. There were no surveys found to utilize therefore this survey was created by the project lead. Validation of the survey was completed by the project chair. The

survey consisted of a Likert scale ranking 1-5, with 1 being not effective to 5 being most effective. This was a paper survey to allow for all to participate as electronic resources were not available. At each presentation, the pre-test, post-test, and survey were provided to the participant with verbal instructions given to not place any identifying items and to complete the only the pre-test prior to education. Careful observation had to occur to ensure the process was followed correctly. Post education the participants were instructed to complete the post-test and survey. After each session, the final project papers were gathered, placed in random order, and stored in a secured method of transport to the project lead office. The educational portion was presented with an opportunity for comment interjection and questions during the presentation. After leaving the facility the project lead reviewed each pre-test, post-test, and survey to determine if all were completed

The project at both long-term care facilities took a total of five days and nine sessions. A follow-up with the data analyst was completed to ensure the analysis would be entered in the correct format.

This was a quantitative study. The pre and post-test answers were counted as numbers resulting in a pass-fail scenario, which determined whether the educational session proved to be successful

in achieving increased knowledge. A Likert scale was used for the educational survey, with 1 equaling not at all and 5 equaling strongly agree the education was beneficial. Any question that does not apply used 3 for not applicable (N.A.)

Pre and Posttest data were entered into an EXCEL spreadsheet using the binary entry of 0 = fail and 1=pass. Each pre and post-test were then manually graded, and the correct versus incorrect answers were then transposed into these categories.

The outcome was a low power result as the tests had a slight chance of detecting a true effect or that the results may be distorted because of random or systematic error. The sample size power of >0.55 did not achieve a power of >0.8. Because the sample size was so small, it was difficult to achieve a true effect. Left-tailed test: The critical region is in the extreme left region (tail) under the curve. Right-tailed test: The critical region is in the extreme right region (tail) under the curve. For this study, a significant left tail test meant a significantly larger amount scored higher on the post test. A right tailed significance meant the opposite, that they scored higher on the pretest than the post test.

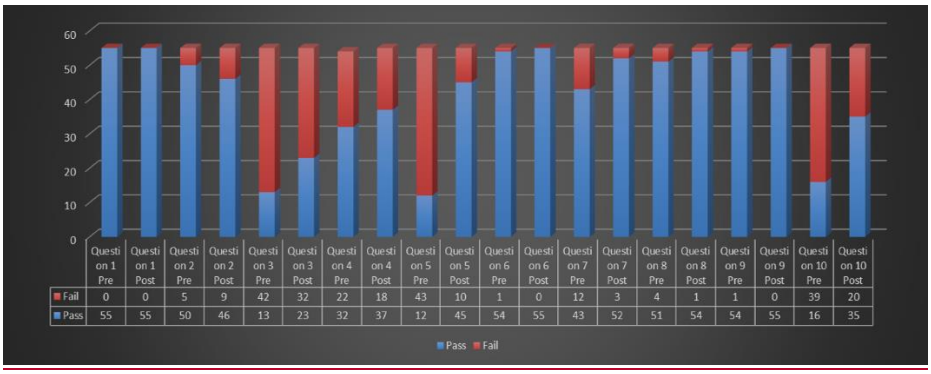

Figure 3 Results of the pre and post test

The two-tail test meant there was a difference, it did not detect which was different and how, just that the pre and post were not the same. Therefore, the outcome of this data showed some that were only left tail and not two tailed, it is suspected this result is because the sample size did not meet power.

The pre and post-test questions (Appendix B) were evaluated for pass-fail testing. Questions 1, 2, 4, 6, 8, and 9 showed no difference in Pass/Fail for the pre and post-test groups. The following questions showed a significant difference with more respondents passing the Post Test than the Pre-Test. Questions 3, 5, 7 and 10.

Indicator	Pre-Test N/% for Group	Post-Test N/% for Group	p-value
n	55	55	
Question 1 Pass Fail	 55/100% 0/0%	 55/100% 0/0%	1.0000

Indicator	Pre-Test N/% for Group	Post-Test N/% for Group	p-value
Question 2 Pass Fail	 50/90.91% 5/9.09%	 46/83.64% 9/16.36%	0.9246- Left 0.1958-Right 0.3916-2-Tail
Question 3 Pass Fail	 13/23.64% 42/76.36%	 23/41.82% 32/58.18%	0.03333*- Left 0.9876 -Right 0.0667-2-Tail
Question 4 Pass Fail	 32/59.26% 22/40.74%	 37/67.27% 18/32.73%	0.2518- Left 0.8569 -Right 0.4305-2-Tail
Question 5 Pass Fail	 12/21.82% 43/78.18%	 45/81.82% 10/18.18%	<.0001*- Left 1.0000 -Right <.0001*-2-Tail
Question 6 Pass Fail	 54/98.18% 1/1.82%	 55/100% 0/0.00%	0.5000- Left 1.0000-Right 1.0000-2-Tail
Question 7 Pass Fail	 43/78.18% 12/21.82%	 52/94.55% 3/5.45%	0.0118*- Left 0.9980-Right 0.0237*-2-Tail
Question 8 Pass Fail	 51/92.73% 4/7.27%	 54/98.18% 1/1.82%	0.1817- Left 0.9716 -Right 0.3634 -2-Tail
Question 9 Pass Fail	 54/98.18% 1/1.82%	 55/100% 0/0.00%	0.5000- Left 1.0000-Right 1.0000-2-Tail
Question 10 Pass Fail	 16/29.09% 39/70.91%	 35/63.64% 20/36.36	0.0003*- Left 0.9999 -Right 0.0005*-2-Tail

Figure 4. The pass-fail status of each question with a p-value using a 2 tail Fishers exact testing methodology.

Process Improvement Data

In question 1, all respondents identified that sepsis was the leading cause of death by infection. In addition, each question showed an increase in knowledge post-education, indicating improving sepsis identification was achieved.

The identity of the audience was evaluated based on job role, i.e., R.N., LPN, CNA. The following shows the percentage for each participating role. CNAs were the highest number of respondents at 44.83%. This result is notable as potentially the first to have the opportunity to identify a change in patient status R.N.s followed at 24.14% and LPNs at 29.69%; there were 3.45% who answered "other" and 8.62% who did not respond.

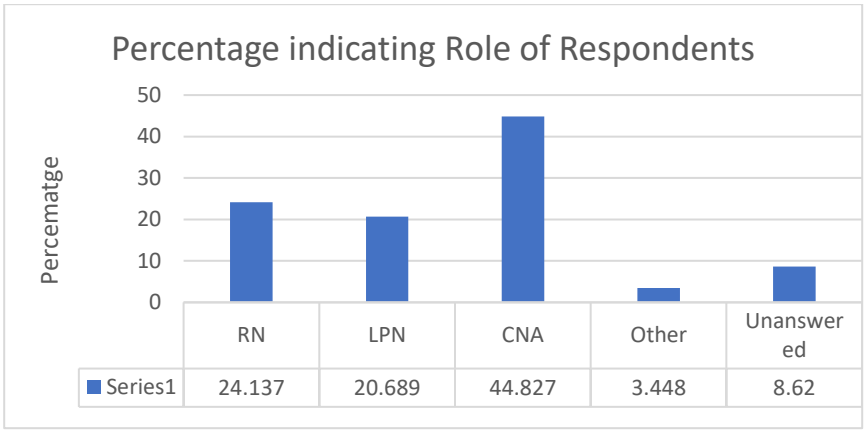

Figure 5. Percentage of the role of the respondent participating in the project

The educational survey demonstrated an increase in the understanding of sepsis after the educational session. The survey

also provided validation the educational presentation was effective (Appendix D)

Conclusion: The study outcome was noted to be successful with increasing knowledge for early sepsis identification in the long-term care facility. The education was completed one time with a goal of the facility implementing future educational sessions. The presence of an infection preventionist would continue reinforcement of early identification for successful outcomes. More research and studies are needed to determine if the increase in knowledge would have an impact on decreasing hospital admissions and mortality.

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References

Benner, P. (1982). From novice to expert. *The American Journal of Nursing*, 82(3), 402-407. http://www.jstor.org/stable/3462928?origin=JSTOR-pdf

Bryan, J. E., & Karshmer, E. (2013). Assessment in the one-shot session: Using pre-and post-tests to measure innovative instructional strategies among first-year students. *College & Research Libraries*, *74*(6), 574–586. https://doi.org/10.5860/crl12-369

Calderon, K., Van Landingham, E., Purcell, S., & Kennard, M. (2021). Identifying and treating sepsis in older people: A quality improvement project in hospitals and nursing homes in texas. *Nursing Older People*, *33*(3), 36–41. https://doi.org/10.7748/nop.2021.e1308

Center for Disease Control and Prevention. (2020, December 7). *Sepsis clinical information*. https://www.cdc.gov/sepsis/clinicaltools/index.html

Delany, M.M., Friedman, M.I., Dolansky, M.A., Fitzpatrick, J.J. (2015) Impact of a sepsis educational program on nurse competence. *The Journal of Continuing Education in Nursing. 46*(4) para 3.

Edwards, E., Jones, L., (2021) Sepsis knowledge, skills, and attitudes among ward nurses. *British Journal of Nursing. 30*(15) 923

Juthani-Mehta, M., & Quagliarello, V. J. (2010, October 15). *Infectious diseases in the nursing home setting: Challenges and opportunities*

for clinical investigation. Clinical Infection Disease. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3083824/

Lee, M.H., Geyeoung, A.L., Seong, H., Park, Y.H.(2020, March) A systematic review on the causes of transmission and control of outbreaks in long-term care facilities: back to the basics of infection control. *PLoS One, San Francisco, 15*(33). DOI 10.1371/journal.pone.0229911

Nasa, P., Juneia, D., & Singh, O. (2012) Severe sepsis and septic shock in the elderly: An overview. World Journal of Critical Care Medicine. *1*(1), 23-30. https://doi.org/10/5492/wjccm.v1.i1,23

Shivaraju, P. T., Manu, G., M, V., & Savkar, M. K. (2017). Evaluating the effectiveness of pre-and post-test model of learning in a medical school. *National Journal of Physiology, Pharmacy and Pharmacology*, *7*(9), 1.

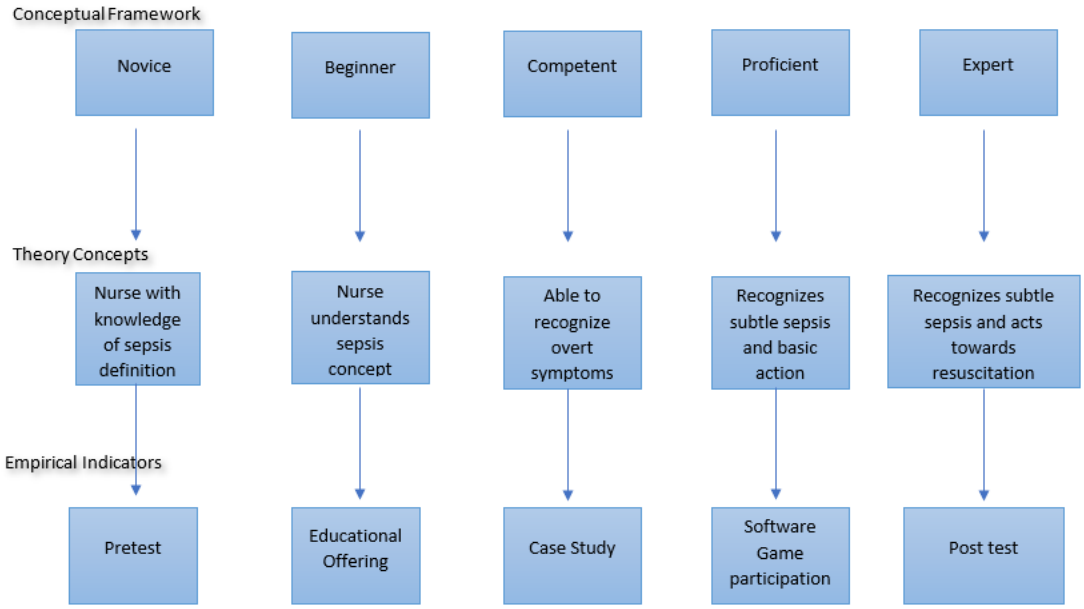
Sepsis Alliance. (2021, March 25). *Aging: Sepsis alliance*. https://www.sepsis.org/sepsisand/aging/

Singer, M., Deutschman, C.S., Seymour, C.W., Shankar-Hari, M., Annanae, D., Bauer, M., Bellomo, R., Bernard, C.R., Chiche, J. D., Coopersmith, C.M., Hotchkill, R.S., Levy, M.M., Marshall, J.C., Martin, G.S., Opal, S.M., Rubenfield, G.D..,Van der Poll, T.,

Zaccagnini, M., & Pechacek, J. M. (2021). *The Doctor of Nursing practice essentials: A new model for advanced practice nursing* (4th ed.). Jones & Bartlett Learning.

Appendix A

Benner's Theory of Novice to Expert (1982)



Appendix B

Sepsis identification PRE-POST TEST
Please circle the correct answer

1. Sepsis is the leading cause of death by infection?
    a. True
    b. False

2. Adults aged 65 and older are more likely to develop sepsis then younger adults.
    a. True
    b. False

3. A change in mental status and _____ may be the first signs that sepsis is starting
    a. Slow pulse
    b. Rapid breathing
    c. Increased urination
    d. Cyanosis
    e. All the above

4. SIRS (systemic inflammatory response syndrome) criteria include
    a. Temperature > 100.9 or < 98.6
    b. Respiratory rate > 20 breaths per minutes
    c. Heart rate > 90
    d. Systolic blood pressure <90
    e. A, B, C
    f. All the above.

5. Every hour sepsis treatment is delayed the mortality rate increases by
    a. 10%
    b. 1%
    c. 50%
    d. 8%

6. Urinary tract infection can lead to sepsis
    a. True
    b. False

7. Residents with these conditions have an increased risk of developing sepsis
    a. Diabetes
    b. Cancer
    c. Obesity
    d. None of the above
    e. All the above
8. A change in mental status is a significant clue to sepsis recognition
    a. True
    b. False

9. Sepsis is the body's overwhelming response to infection that can lead to death
    a. True
    b. False

10. There is a cure for Sepsis
    a. True
    b. False

Appendix C

Sepsis Identification in the Long-term Care Facility Educational Survey

Please answer the following questions by circling the appropriate answer. The answers are not identifiable.

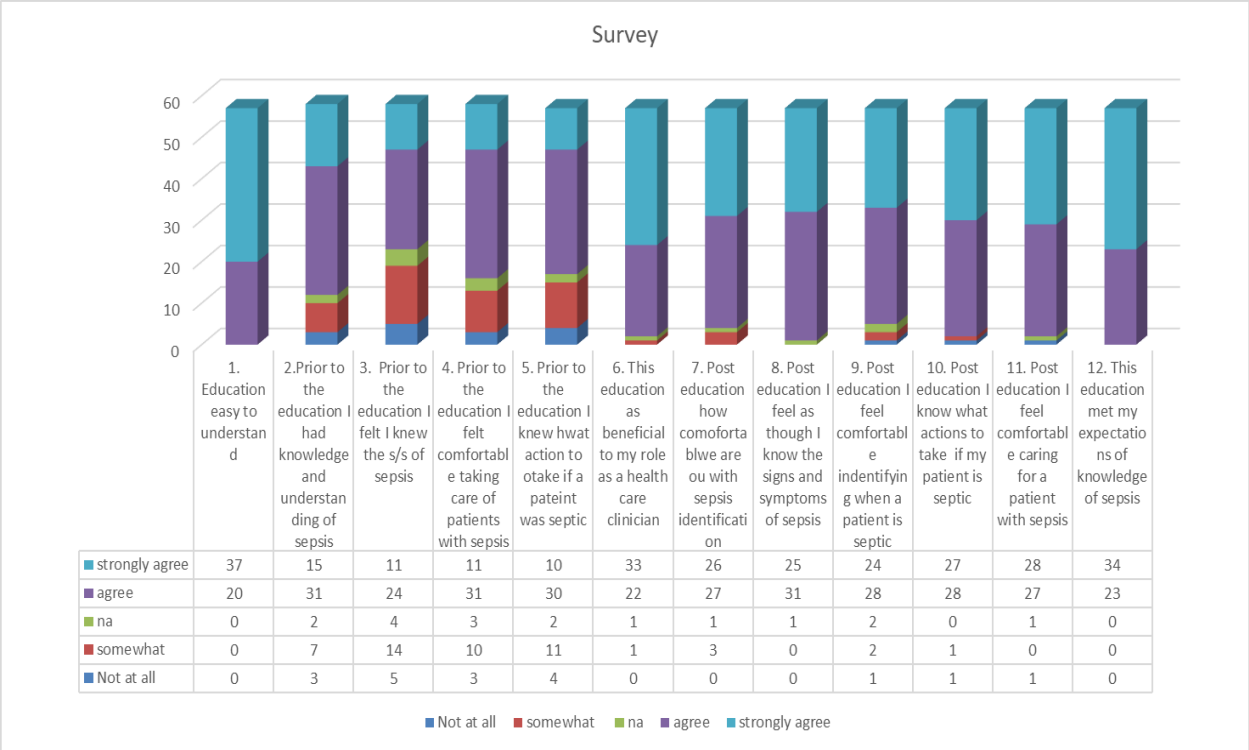
For the survey, each question is followed by a Likert Scale of **1 equaling not at all** and **5 equaling strongly agree**. If the question does not apply answer **3 NA.**

1. What is your role?
    a. RN
    b. LPN
    c. PCA/CAN
    d. Other

1. The education was easy to understand	1 Not at all	2 Somewhat	3 NA	4 Agree	5 Strongly agree
2. Prior to the education I had knowledge and understanding of sepsis	1 Not at all	2 Somewhat	3 NA	4 Agree	5 Strongly agree
3. Prior to the education I felt I knew the signs and symptoms of sepsis	1 Not at all	2 Somewhat	3 NA	4 Agree	5 Strongly agree
4. Prior to the education I felt comfortable taking care of patients with sepsis	1 Not at all	2 Somewhat	3 NA	4 Agree	5 Strongly agree
5. Prior to the education I knew what action to take if a patient was septic	1 Not at all	2 Somewhat	3 NA	4 Agree	5 Strongly agree

6. This education is beneficial to my role as a health care clinician	1 Not at all	2 Somewhat	3 NA	4 Agree	5 Strongly agree
7. Post education how comfortable are you with sepsis identification	1 Not at all	2 Somewhat	3 NA	4 Agree	5 Strongly agree
8. Post education I feel as though I know the signs and symptoms of sepsis	1 Not at all	2 Somewhat	3 NA	4 Agree	5 Strongly agree
9. Post education I feel comfortable identifying when a patient is septic	1 Not at all	2 Somewhat	3 NA	4 Agree	5 Strongly agree
10. Post education I know what actions to take if my patient is septic	1 Not at all	2 Somewhat	3 NA	4 Agree	5 Strongly agree
11. Post education I feel comfortable caring for patients with sepsis	1 Not at all	2 Somewhat	3 NA	4 Agree	5 Strongly agree
12. This education met my expectations of knowledge of sepsis	1 Not at all	2 Somewhat	3 NA	4 Agree	5 Strongly agree

Appendix D



	1. Education easy to understand	2.Prior to the education I had knowledge and understanding of sepsis	3. Prior to the education I felt I knew the s/s of sepsis	4. Prior to the education I felt comfortable taking care of patients with sepsis	5. Prior to the education I knew hwat action to otake if a pateint was septic	6. This education as beneficial to my role as a health care clinician	7. Post education how comoforta blwe are ou with sepsis identificati on	8. Post education I feel as though I know the signs and symptoms of sepsis	9. Post education I feel comfortabl e indentifyin g when a patient is septic	10. Post education I know what actions to take if my patient is septic	11. Post education I feel comfortabl e caring for a patient with sepsis	12. This education met my expectatio ns of knowledge of sepsis
strongly agree	37	15	11	11	10	33	26	25	24	27	28	34
agree	20	31	24	31	30	22	27	31	28	28	27	23
na	0	2	4	3	2	1	1	1	2	0	1	0
somewhat	0	7	14	10	11	1	3	0	2	1	0	0
Not at all	0	3	5	3	4	0	0	0	1	1	1	0