Effectiveness of implementing sepsis bundle of care on nurses' knowledge performance and ICU patient outcomes

Ejlal Madany Ayoub1, Fatmah Omar Mohdz Zelae1, Laila Hussien Awaji Hakami1, Narjis ahmad shhar2, Talal Omar A hadi Mohammed3, Fatimah Mohammed Ahmed Mohammed4

1Nursing Specialist, Jazan General Hospital, Saudi Arabia.
2Pharmacy technician, Alqaaria Primary Health Care, Saudi Arabia.
3Medical doctor, Jazan university hospital, Saudi Arabia.
4Nursing technician, Jazan General Hospital, Saudi Arabia.

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Abstract

Background: Sepsis can cause severe degeneration in individuals it is vital to determined early. So important concern that can be addressed by critical care nurses' education is a lack of nursing competence and training about sepsis diagnoses. Aim: To evaluate effectiveness of implementing sepsis bundle of care on nurses' knowledge, performance, and ICU patient outcomes. Methods: Across-sectional correlational survey design was conduct in an intensive care unit, from 6 February 2022 to 29April 2022, study carry out in intensive care unit in Jizan hospitals. Conclusion: The study's results indicate that nurses' knowledge and practices about the sepsis bundle are insufficient in the intensive care unit's early days, but that when educational programs and policies were focused on, there was a significant improvement in the percentage of nurses' knowledge and practice. Recommendation: Provide Establish a new protocol that focuses triage and early detection of infection cases in emergency departments nurses with regular training sessions to help them succeed their sepsis bundle practices in critically ill patients.

INTRODUCTION

Sepsis is a systemic inflammatory response syndrome with a proven or predicted septic mechanism. It is described by the Institute for Healthcare Improvement as "a set of treatments connected to a disease process that result in improved outcomes when done collectively" (1). Among critically ill patients, septic shock is a leading cause of hospitalization and mortality, according to the American Hospital Association (2) In the United State the septic shock is the most common cause of death mortality rate consistently higher than 25% for severe sepsis and up to 70% for septic shock. The proportion of patients with multiple organ dysfunction increased (11.7% in 1997 to 27.6% in 2006), but there was little change in hospital mortality, averaging 30.8%. (2), the Septic Shock Center offers two packages for patients suffering from septic shock: the 6-hour resuscitation bundle and the 24-hour management bundle, both of which were introduced in 2004.(3) Because sepsis can cause severe degeneration in individuals, it is vital to determined early. So important concern that can be addressed by critical care nurses' education is a lack of nursing competence and training about sepsis diagnoses . (4) Critical Nurses are pivotal in spotting patients who are unwell, and in initiating life-saving management (5). Provision of such knowledge and practices related to sepsis bundle would be beneficial for critical nurses in different ways (6) (Alvin D Jeffery) mentioned in his study that there is poor knowledge of sepsis in identifying the characteristics of SIRS (Systemic Inflammatory Response Syndrome) criteria and patients at high risk for sepsis, which are key components of early sepsis recognition. (7) Also, reported that two-thirds (68%)7 of the studied nurses had unsatisfactory knowledge level (8)

Keywords: Septic shock –Sepsis -Blood culture, multiple organ f, outcome, sepsis bundle.

The aim of the study: To evaluate effectiveness of implementing sepsis bundle of care on nurses' knowledge, performance, and ICU patient's outcomes.
Operational Definition:

The outcome used to measure knowledge and competence of nurses regarding sepsis bundle of care in critical departments such as intensive care unit and clinical outcomes.

Hypothesis:

- Significant relationship between nurses' knowledge and evaluate practice regarding sepsis bundle.
- There is positive significant in morbidity and mortality due to the level of nurse's knowledge in critical unite.
- Sepsis-bundle adherence was associated with improve survival rate in intensive care unit.
- Bundle- adherent care associated with reduced multiple organ failure score.

Literature Review

Sepsis is associated with a high rate of mortality and a high overuse health-care resource. Severe sepsis remains a huge healthcare cost, with a fatality rate of up to 54 percent each year. In 1992, the presence of both suspected infection and two of the four criteria of the systemic inflammatory response syndrome (SIRS) was formally classified as "sepsis". Additional terminology has emerged since then. "Severe sepsis" refers to sepsis that is complicated by organ dysfunction. (13)

Septic shock, the most prevalent type of distributive shock is septic shock, which is characterized by severe infection or sepsis. It is profound enough to substantially increase mortality, moreover Septic shock can affect the heart, brain, kidneys, liver, and intestines, among other organs. (14) Patients with a probable or confirmed infection and all the following symptoms to be diagnosed with sepsis as Alteration in mental state, Systolic blood pressure is less than or equal to 100 millimeters of mercury, which is the first number in a blood pressure reading (mm Hg), a respiratory rate of more than or equal to 22 breaths per minute, Cool, pallid arms and legs are common symptoms Moreover, Temperatures that are too hot or too cold, chills and Palpitations (14,15)

The symptoms of septic shock appear as the requirement for medication to maintain systolic blood pressure at or above 65 mm Hg. Lactic acid levels in the blood are high (serum lactate).(15) These patients require intensive care with high financial cost, and in the end 50-80% of them die (1) furthermore, risk factors include advanced age, diabetes, cirrhosis of the liver, chronic renal failure, pregnancy and childbirth, invasive surgeries and procedures, prolonged use of antibiotics and malnutrition (16). Sepsis has appeared recently as one of the world's major causes of death and critical illness, with in-hospital mortality rates in the United States as high as 25%–30%. Each year, sepsis affects around 1.7 million persons in the United States, potentially resulting in over 250,000 deaths. (17) The high prevalence of sepsis and the belief that most sepsis-related deaths may be avoided with better care has inspired plenty of sepsis performance improvement programs in hospitals all over the world. (18) In France, however, the incidence of sepsis and septic shock increased from 206 to 243 and 135 to 171 incidents per 100,000 people, respectively. (19) Septic shock requires a prompt, aggressive, multidisciplinary team approach with monitoring and treatment facilities found in intensive care unit The Initial therapy objectives are to increase DaO2, to meet cellular oxygen demand, and stop the overactive inflammatory repos.

Subject & Methods

1-Study design: A cross-sectional correlational survey design was conduct in an intensive care unit, from 6 February to 29April 2022.

2-Sitting: Study conducts in Intensive care unit in jazan hospitals.

3-Subject of study:
All nurses (60) in intensive care unit both genders, convenient sample of adult patients (60), admitted to intensive care unit, divided in two group 30 patients in each, control group reserved routine nursing care while study group reserved nursing care after intervention. Data selected from the population based on the sample size calculation of G power and through the formula.

\[
\text{Sample size} = \frac{z^2 \times p \times (1-p)}{e^2} \cdot \frac{1}{1 + \left( \frac{z^2 \times p \times (1-p)}{e^2N} \right)}
\]

Inclusion criteria:

All adult patients, age ≥ 18 years, both gender with critical cases and high risk in intensive care units and patients.

Exclusion criteria

All paediatric patients, pregnant women and septic patients, a primary diagnosis of an immediate brain or heart attack, Patient refusing care.

Study tools

In order to meet the study's goal, data was collected by four tools that design by the researcher after literature reviews which consist of:

Tool 1: Socio demographic characteristics and clinical data.

Part 1: Socio demographic characteristics for nurses:

It consists of sex, age, nationality, educational level, work experience, Workplace, attending training programs / workshops / scientific conferences regarding the care of patients with sepsis, and social status.

Part 2: Socio demographic and clinical data for patient:

Socio demographic: includes patient's code sex, age, nationality weight, height, and Body Max Index.

Clinical data: diagnosis, Glasgow Coma Score, history, health status, date of admission. (11)

Tool 2: Electronic Interview questionnaire sheet self-administered after a review of relevant linked in the article literatures, to assessment the experiences and attitude it involved of 16 questions to measure level of experience of critical nurse to word septic shock strategic care and SIRS criteria in form of multiple-choice questions use as Pre/Post Test.

Scoring system: One score was allocated to each correct performance, and zero to incorrectly done, incompletely done, and not done performance. Scores less than 50% are considered unsatisfactory; however, scores from 50% -100% are considered satisfactory. Tool 3: Observation checklist for observe nurses' performance it developed by researcher after literature review. (12) It contains steps use for Pre/Post Test to assess nurses' performance of sepsis using 3-point Likert scale (High Competent/poor Competent/Not competent and need training)

Tool 4: Measures patients Outcome includes mortality rates, the length of time patients spent in the hospital and intensive care unit., The length of time they spent on mechanical ventilation. (11)
Methods

Ethical consideration:

Ethical approval was taken from the ethical committee of Hafr AL-Batin University and from the Ministry of Health. Informed consent was attached in front of the questionnaires to give them understanding about the research objectives, rights of the participants to participate and withdrawal at any point of research and informed verbal consents were obtained from the nurses before the beginning of the study after explanation of the purpose and nature of the study. The gathered data's privacy and confidentiality were safeguarded. The content and tools validity of the amendment was assessed by three jurors to see if it is clear, thorough, and relevant.

Study Duration:

Recruitment for this study was completed between February 6, 2022, and April 29, 2022.

Pilot study-out of total sample: 5 of nurses involved in pilot study out of total sample 60 nurses, and 5 of patients involved in pilot study out of total sample 60 patients.

The Implementation Phases of Study:

Phase 1: Pre- intervention initial assessment and the baseline clinical data. It collected from nurses' group and patients' group by using the Tool 1 part 1 and part 2.

The researcher explain to all Nurses goal and purpose of Study and time is needed to Answer the interview questionnaire sheet in Tool 2 which it uses to assess experiences and attitude of nurse's practices about sepsis bundle during two days for all participants in this study in all periods

Phase 2: Implementation phase: Explanation of research-related interventions to all intensive care unit nurses that participated in the study to obtain results regarding the implementation of the research intervention, which aim to raise the level of knowledge and competence and improved patient outcomes in critical units, continuous educational program and intervention was content focused and concentrated on pathophysiological review of the current SIRS/sepsis criteria

Phase 3: This phase Evaluation the participants by re-assessment of the participant nursing team after a period estimated at 30 days from attending the educational program and using tool-2 and tool-3 as post- test to measure the level of knowledge and awareness of nursing about sepsis care immediately after the intervention phase and second re-assessment after 30day.

Tool 4 to measure patient's outcome in ICU for both group (control and study) before and following the training program.

Statistical analysis .

Data were fed to the computer and analysed using IBM SPSS software package version 20.0. (Armonk, NY: IBM Corp) Qualitative data were described using number and percept. The Kolmogorov-Smirnov test was used to verify the normality of distribution. Quantitative data were described using range (minimum and maximum), mean, standard deviation, median. Significance of the obtained results was judged at the 5% level.

The used tests were

1. Mc Nema analyse the significance between the different stages
2. Paired t-test for normally distributed quantitative variables, to compare between two periods
3. Wilcoxon signed ranks test for abnormally distributed quantitative variables, to compare between two periods
4. Friedman test for abnormally distributed quantitative variables, to compare between more than two periods or stages
Results:

Distribution of the studied nurses according to socio-demographic characteristics (n =60).

The socio demographic profile of nurses is summarized.

Statistically significant differences in the distribution of nurses across the age, gender, work area, education level, job position, and years of experience categories (p<0.005) . In the pre-test group, most of the nurses were 31-40 years (56.5%), female (67.7%), work in ER (59.7%), married (72.6%), have bachelor's degree (51.6%), work as staff nurses (75.8%). In the immediate-post-test group, most of the nurses are aged 31-40 years (56.7%), female (85.0%), work in ICU (75.0%), married (75.0%), have higher diploma (60.0%), work as staff nurses (83.3%), and have 5-10 years of experience (51.7%).

Distribution of the studied nurses according to level of knowledge (pre-test/ immediately/post-test) (n =60)

Concerning to the level of knowledge analysis shows 98.3 of the studied nurses had been not screened sepsis as pre-test and 66.7% in immediately. 90.0% in post-test had been not screened, and it was also clear that 65.0% of the studied nurses were not familiar systemic with inflammatory response syndrome (SIRS) criteria as pre-test, 90.0% were familiar in immediately and 88.3% were as post-test, while that 98.3% of the studied nurses did not have early determination for signs and symptoms of sepsis or septic shock used in ICU as pre-test, 65.0% had it immediately post-test and 80.0% in post-test, also analysis clarified that 70.0% of the studied nurses in pre-test not familiar with sepsis strategic bundle care, 91.7% in immediately and 83.3% in post-test were familiar with sepsis strategic bundle care within 6 hours., 91.7% in immediately and 78.3% in post-test were familiar with sepsis bundle within 24 hours. Similarly, 70.0% of the studied nurses in pre-test were not familiar with sepsis bundle within 24 hours. 93.3% in immediately and 96.7% in post-test were familiar with sepsis bundle within 24 hours. In addition to, there were 58.3% of the studied nurses in pre-test, 96.7% in immediately and 100.0% in post-test had sepsis as Organ damage produced by inappropriate inflammation in response to infection. Furthermore, 88.3% of the studied nurses in pre-test, 95.0% in immediately and 100.0% in post-test had Fever or chills & Shortness of breath as warning signs for sepsis. Likewise, 10.0% of the studied nurses in pre-test they chose the wrong answer while, 100.0% in immediately and 100.0% in post-test had Meningitis & Pneumonia as the infections that caused sepsis. Also, 60.0% of the studied nurses in pre-test, 88.3% in immediately and 98.3% in post-test had decreased perfusion. Otherwise, there were 45.0% of the studied nurses in pre-test, 90.0% in immediately and 93.3% in post-test had hypotension as cardiovascular failure in severe sepsis.

On the other hand, medical management of septic shock There were 40.0% of the studied nurses in pre-test, 86.7% in immediately and 98.3% in post-test had medical management of septic shock EXCEPT administration of colloids and 45.0% of the studied nurses in pre-test, 90.0% in immediately and 100.0% in post-test had the main goal of treating septic shock was Identification and elimination of the cause of infection. In connection with, screening patients for sepsis by using SIRS The total correct answers in the pre-test ranged from 52– 59 %, while it ranged from 86-100% in immediately and post-test so, we find 73.7% of the studied nurses in pre-test, 98.3% in immediately and 100.0% in post-test had Temp >38°C (100.4°F) or < 36°C (96.8°F). However, 31.7% of the studied nurses in pre-test, 86.7% in immediately and 96.7% in post-test had Surviving Sepsis Campaign guidelines suggested that initial fluid resuscitation with 30 mL / kg in 3 hours and There were 58.3% of the studied nurses in pre-test, 93.3% in immediately and 100.0% in post-test had infection in hospitals.

Distribution of the studied nurses according to scores of levels of knowledge (n =60)

Shows that there was highly statistically significant difference between (pre-test, immediately and post-test) as regard overall knowledge.

Distribution of the studied nurses according to scores of Checklists for observing nurses’ performance (n =60)

Chi-square test compared adherence to the sepsis bundle pre- immediately-post, and post-test. Analysis indicates statistically significant increase in adherence to bundle over the period. Only in one bundle phase, V/S Review (p = 0.254), was a statistically significant increase not observed. The results indicated no statistically significant increase in adherence to first bundle phase – “Give oxygen to keep blood oxygen levels normal again” (p=0.161). However, this is because all nurses reported competence in both the immediately-post and post-test.

Distribution of the studied nurses according to scores of Checklists for observing nurses’ performance (n =60)
shows that there was highly statistically significant difference between (pre-test, immediately and post-test) as regard (hour-1 bundle: initial resuscitation for sepsis and septic shock, Within 24 hours after emergency department admission and Overall nurses' performance).

Distribution of the studied patients according to Socio demographic and clinical data for patient (n =30)

A total of 60 subjects were included in the study30 each for the control and study groups. The socio-demographic profile of these respective groups, including age, gender, nationality, education level, are provided in Table7. Among the socio-demographic variables, Chi-Square test established significant difference only in the distribution of education level. There were no significant differences in the distribution of the other variables. So, Table below shows that there were 40.0% of the studied patients were at age between 18-39 years, 26.7% were at age between 40-59 years and 33.3% were at age ≥60 years, 73.3% of the studied patients were males and 26.7% were females. In addition to, there were 80.0% were married and 20.0% were single and 66.7% were from Saudi and 33.3% were non-Saudi. Also, 10.0% had diploma, 50.0% had bachelors, 3.3% had masters and 36.7% had other education level.

Distribution of the studied patients according to Baseline clinical characteristics of patient (n =30)

shows that there was statistically insignificant difference between (pre-test and post-test) as regard Date of discharge, Body mass index.

Distribution of the studied patients according to Baseline clinical characteristics of patient (n =30)

The distribution of the clinical characteristics between the control group and the study group were analyzed using a T-test and Chi-Square. As shown the distribution indicated that the value for GCS is significantly higher for the study group (9.43 ± 5.309) than the control (8.30 ± 3.715) (p<0.001). There are no significant differences in the BMI and duration of stay in care for the two group’s Diabetes mellitus, respiratory history, cardiac history, and hypertension account for the majority of past medical conditions. Pneumonia is the most common cause of infection in both the study and control group (36.7%).

Distribution of the studied patients according to diagnosis (n =30)

Shows in pre-test, there were 13.3% of the studied patients had DKA, 6.7% had Drug toxicity, 6.7% had Gun shot-head injury, 6.7% had Gun shout and 6.7% had Malaria. Whilst, in post-test, there were 13.3% of the studied patients had DKA, 13.3% had pulmonary edema and 10.0% had Dengue fever.

Distribution of the studied patients according to Past medical history and emergency surgery (n =30)

Shows that there was statistically insignificant difference between (pre-test and post-test) as regard Past medical history and Emergency surgery.

Distribution of the studied patients according to patient's outcome (n =30)

Shows that there was statistically significant difference between (pre-test and post-test) as regard Mechanical ventilation use, Infection source, Status on discharge and Incidence of organ failures. There was statistically insignificant difference between (pre-test and posttest) as regard Mechanical ventilation days if attached and length of ICU stay.

Overall, outcomes data assessed using Fishers

Exact test indicated that compared to the controls, subjects in the patient group had significantly higher rates of survival; 36.7% made complete recovery in the study group compared to 23.3% in the control group (p=0.017). This leads to acceptance of the first hypothesis that sepsis adherence bundle is associated with improved survival rate.

According to T-test analysis, the incidence of organ failure is significantly lower in the study group (8.5 ± 8.541) than the control (13.03 ± 6.682). Control Group Study Group N (%) N (%) Complete Recovery 7 (23.3%) 11 (36.7%) Referred 0(0.00%) 4 (50.0%) Died 23 (76.7%) 15 (13.3%). This leads to acceptance of the hypothesis that the bundle adherent care is associated with reduced multiple organ failure score.
Discussion:

Healthcare-associated infection is the most common complication of intensive care unit (ICU) hospitalization; sepsis is the leading cause of infection and has a high fatality rate. Since the intensive care nurses have a critical role in the prevention, detection, and initiation of treatment interventions for patients with sepsis and spend the most time with patients, they must be able to recognize the systemic inflammatory response syndrome and sepsis, as well as understand the importance of prompt care (6). Regarding nurses' socio demographic characteristics, the total number of the current studied sample was 60 nurses, more than half, their ages range between 31-40 years, and their experience is estimated from 5-10 years. Similarly, with Jeffery, et al. (2014) who carried out research about knowledge and recognition of SIRS and sepsis among pediatric nurses on 242 nurses and the study revealed that more than half of nurses carrying baccalaureate degree. Moreover, Gabriella, Anna, et al. (2018) they conducted Italian study about Physicians’ and nurses’ knowledge and attitudes in management of sepsis, the number of nurses with a bachelor's degree exceeded half of the total. This finding is contradicted Mostafa M. warda y., et al. (2016) in their research study on critical care nurses' knowledge and practices about sepsis bundle among critically ill the nurse's degree was near three quadrants of them carrying diploma nursing degree but in relation to age and years of experience, their results converged with our study, as more than half of them were between 30 and 40 years old, and their years of experience exceeded 10 years. With Mostafa M. warda y., et al. (2016) in their research majority of studied sample did not attend, while three quarters of the participants attended the training program with Eirian Edwards & Lorelei Jones (2021) in their study about Sepsis knowledge, skills, and attitudes among ward-based nurses. To achieve the goal of this study, 16 questions were formulated to measure nursing knowledge regarding the care of sepsis patients. The data analysis of this study showed that there was a significant improvement in the level of nursing knowledge about familiarity of systemic inflammatory response syndrome (SIRS). Concerning to assess the respondents' knowledge on the correct SIRS criteria elements on which to screen patients for sepsis. Our study showed that half the number of nurses in the pretest whose answers were correct, then the study illustrate a development so that the total participants in the Immediately post-test and post-test after month had their answers correct. So, these study shows that there was highly statistically significant difference between (pre-test, immediately and post-test) as regard overall knowledge, These finding are supported by Hope Moser (2014) in his research study about Early recognition and rapid intervention of sepsis: Implementation of a focused educational initiative emphasizing early goal-directed therapy in the emergency department, that clarified is The statistical analysis supports a significant increase between pre-test, the initial post-test, and the 1-month post-test. This is contradicted by several studies one of which is with Mostafa M. warda y., et al. (2016) in their research studied subjects Three quarters of them have got unsatisfactory knowledge level. Jeffery, et al. (2014) (15) who carried out research about knowledge and recognition of SIRS and sepsis among pediatric nurses revealed that a significant knowledge deficit among half of participants. Nurses according to scores of Checklists for observing nurses' performance in this part the current study clarifies increase in the level of performance of nurses compared to the period before and after the intervention, according to Likert scale notice the majority of nursing is highly Competent in the practice of hour-1 bundle initial resuscitation for sepsis and septic shock and 24 hours after emergency department admission (management bundle). Furthermore, evaluated ICU nurses' performance before, immediately after, and four weeks after attending a training workshop. After education, we discovered considerable improvements in performance of nurses. In other words, after the education, the study subjects performed better before, immediately after, and three months after the intervention. The present results are supported by concurrency by Hojatollah, Malieh, et al. (2012) in their study showed significantly higher performance of ICU nurses immediately and 3 weeks after the intervention. On the other hand, contrarian with Mostafa M. warda y., et al. (2016) in their research It was clear that all participating nurses had a low level of competence in performance. The current study represent correlation between nurses' total knowledge score and studied nurses according to scores of Checklists for observing nurses' performance was highly statistically significant difference between (pre-test, immediately and post-test) as regard overall knowledge. Conversely with Mostafa M. warda y., et al. (2016) their search results were no significant statistical correlation. Regarding studied patients according to Socio demographic and clinical data for patient the total number of the current studied sample was 30 patients each for the control and study groups, The socio-demographic profile of these groups, including age, gender, nationality, education level, Their average age from 18-39 years was less than half, while from 40-59 years it covered a quarter of the sample number, and half of them were males, married, and Saudi nationals. Peter K. and Shoma, et al. (2018) also appeared in their research More than half are men, and their average age is 54.8 years. According to Baseline clinical characteristics of patient the Source of Infection Pneumonia is most common cause in both the study and control group, this is supported by the agreement of several studies, Peter K. and Shoma, et al. (2018) Pneumonia was the most common source of infection, Shu-Lien, Khee-Siang, et al. (2013) The results of their study showed that the highest percentage as a source of infection was Pneumonia, While Yong and Yin-Chou (2021) in his study Explained in his study that the first source of infection is respiratory followed by urinary tract infection. In connection with Past Medical Condition for studied patients the majority Diabetes mellitus, followed by respiratory history. Compatible with While Yong and Yin-Chou (2021) in his study it shows that Diabetes mellitus is at the forefront of the diseases associated with its conditions.
According to patient's outcome, the results of the study were clarified for GCS analysis showed an improvement in study group than the control. As regard Mechanical ventilation use, Infection source, Statues on discharge and Incidence of organ failures shows that there was statistically significant difference between pre-test and post-test. Overall, outcomes data assessed indicated that compared to the controls,

Subjects in the study group had higher rates of recovery this leads to acceptance of the first hypothesis that sepsis adherence bundle is associated with improved survival rate. as, the incidence of organ failure is significantly lower in the study group than the control this leads to acceptance of the hypothesis that the bundle adherent care is associated with reduced multiple organ failure score. Similarity with Sandra, Pereira, et al. (2011) in their study demonstrates that implementing a sepsis bundle improved the outcomes of patients with severe sepsis and septic, implementation of the Surviving Sepsis Campaign guidelines was associated with a significant decrease in mortality. It also corresponds to Russell R, Li Dong3, et al. (2013) in the finding of their studies is compatible with lower rates of progression to more severe disease in the first 24 hours when early bundle elements were performed.

As our study was a clear improvement in a short period, we look forward to expanding it in the future to achieve greater values in terms of knowledge, nursing efficiency and patient outcomes.

Conclusion:

The results of the study indicate that nurses' knowledge and practices about sepsis bundle are insufficient in the first stage in intensive care units; there was a lack of educational materials, policies, and protocol about sepsis bundle. As a result, establishing a standardized updated sepsis bundle protocol will be critical to ensuring enough knowledge and safe nursing practice. Consequently, it is possible to conclude that the passage of time has no adverse influence on the participants' knowledge, attitudes, or practice. In actuality, if education is provided on a regular basis, it can help to develop and encourage the aforementioned characteristics.

Recommendation:

Based on the findings of this study, the following recommendations are made:

1. Nurses' attitudes, knowledge, and confidence in sepsis screening and Instituting the Sepsis Six within 1 hour and the Sepsis Bundel within 24 hours improve with training
2. Provide nurses with regular training sessions to help them succeed their sepsis bundle practices in critically ill patients.
3. Create a nursing curriculum that covers both theoretical and practical aspects of the sepsis bundle

Limitations

1. The sample number was limited, and respondents were self-selected in the study, and this may have led to bias.
2. The duration of the study is short, but it gave results that may be of benefit to the hospital and others interested in developing a protocol and encouraging the expansion of the field in the future.
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