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# Knowledge And Compliance About Sepsis Care Bundle And Its Impact On In-Patient's Outcome With Sepsis: A Prospective Observational Study

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***Abstract:***
***Background****: Sepsis is a potentially fatal organ failure brought on by an improperly controlled host response to infection. If not treated immediately, it can cause multiple organ failure, septic shock, and even death. Sepsis bundles if completed within time has a significant improvement on patient's outcome.Compliance with a bundle implies achieving all the specified goals in that bundle. Nursing staff education and compliance with the bundle are essential for good patient care.*
***Materials and Methods****: In this prospective observational study, done for duration of 3 months, 100 sepsis patients presented to ER were studied. Their source of infection and final outcome was studied. Proper implementation of bundle and compliance of nurses to sepsis bundle is assessed by difference in pre and post bundle lactate levels. Effect of nursing education on improving knowledge of sepsis is assessed by comparison of pre and post-test questionnaire scores*
***Results****: The most common source of infection is lung (42%) followed by urine (17%), followed by blood (11%).82% got discharged, DAMA is 13%, and Total Number of Patients Expired is 5%.Initial and post bundle lactate levels showed a significant difference in mean and standard deviation with a p value <0.001.The total score of Pre and post-test questionnaire was compared and it showed a significant difference in the total score with a significant p value<0.001.*
***Conclusion:****Evidence-based educational intervention in the ICU increases sepsis bundle compliance.*
***Key Word****:Sepsis, sepsis bundles, Nursing education, Compliance*

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## I. Introduction

Sepsis is a potentially fatal organ failure brought on by an improperly controlled host response to infection[1]. If not treated immediately, it can cause multiple organ failure, septic shock, and even death. In 2004 the initiation of the Surviving Sepsis campaign aims to improve sepsis patient diagnosis, care, and survival. Care bundles are a collection of the finest evidence-based therapies that, when used together, produce the best results. Care Bundles are straightforward, standardised, and practically applicable everywhere.

The Surviving Sepsis Campaign (SSC) has released a new updated Hour-1 Bundle to reflect the latest evidence from the International Guidelines for Management of Sepsis and Septic Shock 2016[2]. In this revision of the SSC bundles, the 3-hour and 6-hour bundles have been combined into a single "Hour-1 Bundle"[2] with the explicit intention of beginning resuscitation and management immediately. The complicated procedures of caring for people with severe sepsis are made simpler by using "bundles." The new "Hour-One Bundle" consists of 5 measures that are advised to start right away after presentation in all patients who have clinical indicators suggestive of sepsis or septic shock. "Time zero" refers to the moment a patient presents for triage in the emergency room OR, if presentation takes place elsewhere (outpatient, home, ICU). This new sepsis "Hour-1 Bundle" should be introduced to staff in the emergency department (ED), wards, and intensive care unit as the next iteration of ever-improving tools in the care of patients with sepsis and septic shock.

All healthcare professionals must become more alert as part of the sepsis bundle timeline. One of the reasons hospitals fail to comply with bundle requirements is that nursing staff misunderstands the time frame for sepsis treatment. Ineffective interdisciplinary collaboration, insufficient training, a lack of time, unfamiliarity with the recommendations, disagreement with the recommendations, a lack of education, and a lack of supplies and equipment are additional frequent justifications given for non-compliance with established protocols and treatment guidelines[3]. Bundle non-compliance has a wide range of causes, and while they may differ between institutions and suppliers, the issue is widespread.

The goal of the study is to ascertain how well the nursing staff working in the emergency and intensive care units adheres to the sepsis bundle. The study also sought to ascertain if an educational intervention provided to critical care nursing staff and providers would increase the sepsis bundle compliance. This was tested by evaluating a pre-designed pre-and post-test questionnaire.

## II. Material And Methods

This was a prospective observational study. The data for this study was obtained for 3 months from the month of October 2022 to December 2022. The study was conducted at Department of Critical care medicine, Apollo Hospitals, Hyderabad.

We have included all sepsis patients with age >18years who came to ER.

**Study Design:** Prospective open label observational study

**Study Location**: This was a tertiary care teaching hospital based study done in the department of Critical care medicine, at Apollo Hospitals Jubilee Hills, Hyderabad

**Study Duration:**3 months from the month of October 2022 to December 2022.

**Sample size:** 100 patients.

**Sample size calculation:** This is an observational study, all sepsis patients who came to the hospital within 3 months were included.

**Subjects & selection method**: The study population was drawn from all sepsis patients who came to ER at Apollo Hospitals, Jubilee hills, Hyderabad

**Inclusion criteria:**

1. All sepsis patients
2. Aged ≥ 18 years,

**Exclusion criteria:**Age <18years

**Procedure methodology**

After obtaining Institutional Ethics Committee approval this study was conducted. A written informed consent was obtained from all patients. All sepsis patients who came to ER with signs and symptoms of sepsis were included in the study. To check for the bundle compliance, initial pre-bundle implementation vitals and lactates were recorded. Bundle implementation was done by the trained nurses under the supervision of doctors. Post-bundle implementation vitals and lactate values are recorded. Patient is either shifted to Ward or ICU depending upon the condition of the patient. After shifting the patient, duration of ICU/Ward stay and outcome whether discharged, expired or unstable/DAMA is recorded.

To test the knowledge of nurses on bundle implementation and sepsis, a pre-test questionnaire has been given to nurses who work in ER and ICUs. A class on sepsis bundles was taught to the nurses by Intensivist. After the discussion on sepsis, post-test questionnaire was given to the same set of nurses to check for the improvement in knowledge on sepsis. This pre-test and post-test questionnaire has been recorded and final scores were compared. Final data has been drawn onto Microsoft Excel sheet and sent for statistical analysis.

**Statistical analysis**

All the qualitative factors like sex, source of infection, outcome, are, etc. represented with the frequencies and percentages. All the quantitative parameters like age, initial and post lactate, prep and post total points, etc., represented with means and standard deviation. To compare the mean difference between ore and post lactate and total point we used paired t-test. All the data entered in MS. Excel and analyzed by using SPSS19.0v. p value less than 0.05 will be considered as significant.

## III. Result

Table 1 shows mean age and gender distribution in the population.

| Age (Years) | No. of Subjects | Percentage |
|---|---|---|
| <=45 | 32 | 32.0% |
| 46 - 60 | 27 | 27.0% |
| 61 & Above | 41 | 41.0% |
| Sex | No. of Subjects | Percentage |
| Male | 48 | 48.0% |
| Female | 52 | 52.0% |

Table 2 shows the common source of infection for sepsis among the study population

| Source of Infection | No. of Subjects | Percentage |
|---|---|---|
| Abdomen | 4 | 4.0% |
| Abscess | 4 | 4.0% |
| Blood | 11 | 11.0% |
| CSF | 1 | 1.0% |
| Intestine | 1 | 1.0% |
| Kidney | 4 | 4.0% |
| Liver | 4 | 4.0% |
| Lungs | 42 | 42% |
| Lymph Nodes | 1 | 1.0% |
| PUS | 2 | 2.0% |
| Right Foot | 1 | 1.0% |
| Spleen | 1 | 1.0% |
| Stool | 1 | 1.0% |
| Surgical | 1 | 1.0% |
| Ulcer | 2 | 2.0% |
| Urine | 17 | 17.0% |
| Uterus | 1 | 1.0% |
| Wound | 2 | 2.0% |
| Total | 100 | |

The most common source of infection is lung (42%) followed by urine (17%), followed by blood (11%). Figure 1 showing that among the study population, 82% got discharged, DAMA is 13%, and Total Number of Patients Expired is 5%.

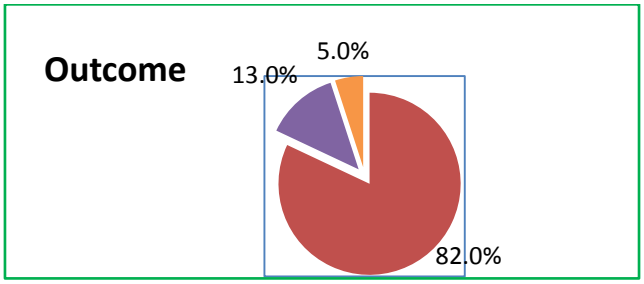


Figure 1 showing the outcome of patients in the study population.

Table 3 showing the paired sample statistics between the initial and post bundle implementation lactate levels.

| Lactate | Paired Samples Statistics | | P Value (t-test) |
|---|---|---|---|
| | Mean | Std. Deviation | |
| Initial | 4.65 | 3.823 | <0.001 |
| Post Bundle Implementation | 2.51 | 2.731 | |

Initial and post bundle lactate levels showed a significant difference in mean and standard deviation with a p value <0.001.

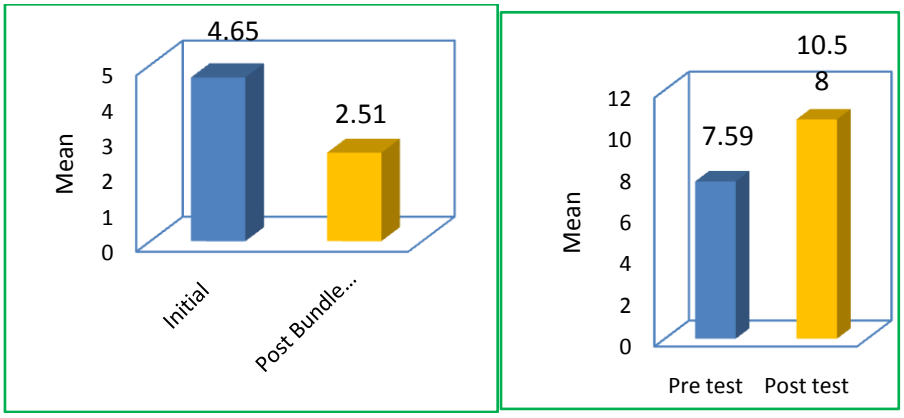


Table 4 showing paired sample statistics between pre-test and post-test questionnaire total score

| Total Points | Paired Samples Statistics | | P Value (t-test) |
|---|---|---|---|
| | Mean | Std. Deviation | |
| Pre test | 7.59 | 2.166 | <0.001 |
| Post test | 10.58 | 1.837 | |

The total score of Pre and post-test questionnaire was compared and it showed a significant difference in the total score with a significant p value<0.001.

## IV. Discussion

Septic shock is a medical emergency that requires prompt treatment. The main responsibility of medical professionals is to keep patients safe, and sepsis bundle can assist in this[4]. However, the total adherence of the sepsis bundle indicated by the guidelines in the treatment process of patients with septic shock was 77.25%, and there was a significant variation in achieving rate among components. Only 66.67% of patients in 6-hour early goal-directed therapy (EGDT) reached their goals[5].

In our study, we have seen and traced the sepsis patients presenting to the ER. The most common source of infection is lung followed by urine and blood. In our study there is a good compliance with sepsis bundles among the staff nurses which is shown by initial and post bundle implementation lactate values which is significant with a p value of <0.001.

The main factors that prevent the sepsis bundle for septic shock from being implemented effectively are that the nurses, do not follow the recommendations, have a poor understanding of time, are not as aware of the sepsis bundle, and have a low nurse-bed ratio. Compliance with a bundle requires completing all of its listed objectives.

In our study, nurses were trained and taught with the sepsis bundles, a sepsis pathway booklet has been created to ensure completion of all components of the bundle. This also adds to increase the compliance to bundle among healthcare workers especially the nurses. As a result, as time goes on, the sepsis bundle's completion rate for sepsis and septic shock gradually rises. To reduce hospital mortality from severe sepsis, Critical Care Units should adopt management techniques to ensure adherence to the sepsis bundles. Despite the documented benefit of bundle compliance, implementation into practice has proven to be slow because new nursing trainees are recruited into ER and ICU's every month. They may not be having a full knowledge about the sepsis and its bundles.

To increase knowledge and sepsis bundle compliance, healthcare staff implementing this treatment need thorough education to be better prepared and equipped to do such. This study implemented an evidence-based educational intervention on the sepsis bundle for nursing staff and providers in an ICU in a large tertiary

hospital and compared the bundle compliance. There was a statistically significant increase in bundle compliance after the educational session with a significant difference in the pre and post test score with a p value <0.001.

The improved bundle compliance further enhances the patients care and outcome. This outcome can be seen with the 82% discharged patients. Only 5% patients got expired.

## V. Conclusion

An updated evidence-based educational intervention in the ICU increases sepsis bundle compliance. The gained knowledge was well translated into clinical practice reflected by the increased discharge rate and increased bundle compliance. Not only in this field but regular educational sessions for every 6 months improves the knowledge of healthcare professionals and improves the patients care.Future research could be performed for a longer duration of time, repeat survey testing at a later date, and providing education to other units in the hospital.

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