IOSR Journal of Nursing and Health Science (IOSR-JNHS)
e-ISSN: 2320–1959.p- ISSN: 2320–1940 Volume 14, Issue 3 Ser. 1 (May. – June. 2025), PP 18-26
www.iosrjournals.org

The Effect Of Applying Sepsis Care Bundle On Critically Ill Patients' Outcomes

Nora K. Mohamed, Gamal L. Abdelrahman, Zeinab H. Ali
Assistant Lecturer Of Medical Surgical Nursing, Faculty Of Nursing, Helwan University
Professor Of Anesthesia And Critical Care Medicine, Faculty Of Medicine –Al Azhar University
Professor Of Adult Health Nursing, Faculty Of Nursing- Helwan University

Abstract
Background: *The Sepsis care bundle has been shown to provide improvements in patient outcomes.*
Aim: *this study* ***aimed to*** *determine the effect of applying sepsis care bundle on critically ill patients' outcomes.*
Research design: *A quasi-experimental research design was used.*
Setting*: the study was conducted on 3 intensive care units (general, medical and new medical intensive care units in Sayed Galal Hospital*
Sampling: *a purposive sample of 70 adult patients was included in the study.*
Tools of data collection: *four tools were used,*
The first tool*: Patient Assessment Questionnaire.*
Second tool: *Physiological parameters data.*
Third tool: *APACHE IV (Acute Physiology and Chronic Health Evaluation) Score*.
Fourth tool: *Sepsis care bundle.*
Result*: The main results revealed that there was a statistically significant improvement in patient outcome. The study group showed a significant reduction in mortality rate (p = 0.000), shorter ICU stay (p = 0.000) and improved physiological and laboratory parameters (p < 0.05) of the study groups compared to the control groups.*
Conclusion: *The application of the sepsis care bundle has a significant impact on improving the outcomes of critically ill patients. Patients who received the sepsis care bundle exhibited a lower mortality rate, shorter ICU stays, and better physiological and laboratory parameters compared to those who received routine care*.
Recommendations: *this study recommended must be replication of this study in a large probability sample. Set long-term outcomes and refine sepsis management strategies for different patient groups.*
Keywords*: Critically Ill Patients, Sepsis Care Bundle and Patients' outcomes.*

Date of Submission: 25-04-2025 Date of Acceptance: 05-05-2025

I. Introduction

Sepsis, a potentially fatal organ failure brought on by an aberrant host reaction to infection, is causing death and morbidity all over the world. Because it uses a significant amount of healthcare resources, it is a major challenge for global healthcare systems. Tissue perfusion is drastically reduced in septic shock, and numerous fast organ failures affecting the liver, kidneys, and lungs may occur. ***(Paoli et al., 2024).***

Sepsis is a time-sensitive condition. Therefore, lowering sepsis morbidity, rapid treatment progression, fatality rates, patient deterioration, and intensive care unit length of stay can be facilitated by early detection and response by critical care nurses and members of the health team. ***(Harley et al., 2021).***

Care bundles are a minimal evidence-based therapy collection that, when implemented in conjunction, yield significantly superior results compared to their individual implementations. These therapies are provided to a specific patient segment or population and care setting (***Gilhooly et al., 2024)***

Critically ill patients represent a unique and vulnerable population requiring intensive and multidisciplinary care to manage life-threatening conditions. Critical illness often involves organ dysfunction or failure, necessitating complex interventions such as mechanical ventilation, hemodynamic support, and continuous monitoring. Advances in critical care medicine have significantly improved survival rates, yet challenges persist in addressing long-term outcomes, including physical, cognitive, and psychological impairments following recovery. ***(Smith et al.,2023)***

Nurses 'role may include among others recording of vital signs, notifying the medical team of alterations in a patient's health status, and performing orders to take laboratory tests, including blood cultures and lactate levels ***(Dierkes et al, 2021).***

Nurses typically deal with patients the most, they play a crucial role in detecting sepsis in patients. As a result, sepsis screening can be incorporated into patient evaluations and care rounds. Nursing education will improve nurses' proficiency in early therapeutic interventions and informed sepsis screening. The ability of nurses to assess a patient's vitals. ***(Gilhooly et al., 2024).***

Significance of the study:

Sepsis is a serious medical condition. It's caused by an overwhelming immune response to infection. The body releases immune chemicals into the blood to combat the infection. Those chemicals trigger widespread inflammation, which leads to blood clots and leaky blood vessels. As a result, blood flow is impaired, and that deprives organs of nutrients and oxygen and leads to organ damage ***(Deng et al., 2023)***

In Egypt, there was a study conducted in Ahmad Maher Teaching hospital. The results revealed that the incidence of sepsis in ICU was (43%). Medical sepsis cases represented (82.6%), with a high mortality rate (73.7%), while surgical sepsis cases were (17.4%), with (26.3%) mortality rate. Patients were admitted with infection category as community acquired (50%) and hospital acquired infections (50%). Comorbidities in the patients studied were mostly diabetes and IHD (56.5% and 37% respectively) followed by chest diseases (13%), renal diseases (10.9%), old Cerebro-vascular stroke (CVS) and previous surgery (8.7% each). ***(Mohammad, Ahmad & Zekry.,2018).***

Aim of the Study

The study aimed to determine the effect of applying sepsis care bundle on critically ill patients' outcomes.

Research Hypothesis:

H. Patients who receive sepsis care bundle would have a lower mortality rate and length of stay in intensive care unit compared to patients who would not receive sepsis care bundle.

Study design:

A quasi-experimental research design was used to conduct the study.

II. Technical Design:

The technical design includes the setting, subject & tools that are used in the study.

Setting:

The three intensive care units at Sayed Galal Hospital were the focus of this study. Patients on each of the 3 intensive care units are primarily specialty populations: medical intensive care unit, general intensive care unit and new medical intensive care unit., with a capacity of 10, 12, and 11 beds, respectively.

Sampling:

Sample type:

A purposive sample was used based on selected criteria.

Sample size

70 adult patients from both genders involved in this study from the above-mentioned setting who agreed to participate in the study.

The sample was divided into two equal groups (35 patients for each group).

- **Group 1**: study group, they received a sepsis care bundle by the researcher.
- **Group 2:** control group, they received routine hospital care by hospital nursing staff.

The subjects were selected according to the following criteria:

Exclusion criteria

1- Old age more than 65 years old.
2- Patients who had a diagnosis of sepsis or disseminated infection on admission.
3- Patient who receives immunosuppressive therapy.

Tools of data collection:

Four tools were used for data collection:

Tool I: Patient Assessment Questionnaire. It consists of the following two parts:

Part 1: Demographic characteristics to cover the personal data and the characteristics of the studied patients such as age, gender, level of education, occupation, marital status, and place of residence.

Part 2: Past and Current Health Assessment Questionnaire

It was concerned with medical data of the patient and included the following: Date of admission, Co-morbidity disease, Medication, History of previous surgery, medical diagnosis, Types of Connections, type of culture, Length of stay in ICU, and outcome.

Part 3: Sequential Organ Failure Assessment (SOFA) Score:

This tool was adopted from ***(Singer et al., 2016)*** to assess the occurrence of sepsis among the subjects studied. The patient has at least two of the four signs of Sequential Organ Failure Assessment (SOFA), which include a Bilirubin level < 1.2 mg/dL (20 micromole/L) or PaO2/FIO2 < 400 mm Hg**,** Platelets < 150 × 103/mcL (< 150 × 109/L), Cardiovascular MAP < 70 mm Hg, Urine output < 500 mL/day.;

Part 4: patients' laboratory investigations:

It was adapted from ***(Yealy et.al,2021)*** to monitor changes of patients' laboratory investigations such as white blood cells, hemoglobin, creatinine, total bilirubin, CRP ,lactate level, albumin and blood sugar**.**

Tool II: Physiological parameters data

To monitor changes in heart rate, peripheral O2 saturation, respiratory rate, temperature and blood pressure before and after intervention.

Tool III: APACHE IV (Acute Physiology and Chronic Health Evaluation) Score

- This tool was adopted from (Zimmerman et al.,2006). The APACHE IV score was used to predict the mortality rate of patients during critical therapy and care starting with the date of ICU admission

Tool IV: Sepsis care bundle

This was adopted tool from (***Levy, Evans& Rhodes.2018)*** to evaluate the application of sepsis care bundle on a sepsis critically ill adult patient's outcome, which included measure lactate level. Re-measure if initial lactate is > 2 mmol/L, obtain blood cultures prior to administration of antibiotics, administer broad-spectrum antibiotics, rapidly administer 30 ml/kg crystalloid for hypotension or lactate ≥ 4 mmol/L, and apply vasopressors if patient is hypotensive during or after fluid resuscitation to maintain MAP ≥ 65 mmHg

Administrative design:

An official permission was obtained by submission of a formal letter from the administrators of Faculty of Nursing, Helwan University to the Managing Director of Sayed Galal hospital to get an approval for data collection to conduct the study after explanation of purpose of the study.

III. Operational Design:

There were three distinct phases to the study that needed to be finished: planning, pilot study, and field work.

Preparatory phase:

It includes reviewing related literature, and theoretical knowledge of various aspects of the study using books, articles, internet, periodicals and magazines to develop tools for data collection.

Pilot study:

A pilot study was carried out to test the study tools in terms of their clarity, applicability, and efficiency. It was conducted on 7 patients of the study sample, and then they were excluded from the study sample. Data obtained from the pilot study was analyzed and accordingly the necessary modifications were made.

Validity:

The content validity of the tools was done by a panel of 5 experts and who reviewed the content of the tools for comprehensiveness, accuracy, clarity, relevance and applicability. Minor modifications were made.

Reliability:

It was conducted using Cronbach's Alpha coefficient worker test, which showed that each tool had mild to moderate reliability and that the tools' items were generally homogeneous.

Fieldwork:

According to the selected theoretical framework:

The actual field work started at the beginning of August 2023 and was completed and ended in March 2024. The study time took about 9 months. The researcher visited the selected setting regularly, three days per week.

Fieldwork includes five phases based on conceptual framework for Orlando's theory.

I-First phase (Professional Nursing Function):

Upon admission, patients in both groups were evaluated using two tools to collect relevant data throughout the study period.

The assessment of each patient's sociodemographic and clinical data was conducted using Tool I (Parts 1 and 2), gathering information from the patient, relatives, hospital staff, and ICU records.

II-Second phase (Patient's Presenting Behavior):

Patients' clinical indicators (vital signs, lab results like lactate levels, SOFA scores) represented the presenting behavior that showed sepsis was developing. Laboratory investigations, including white blood cells, hemoglobin, creatinine, total bilirubin, albumin, lactate level, CRP, and blood sugar, were performed once before intervention, as outlined in Tool I (Part 4). Physiological parameters data were assessed before intervention for both the study and control groups using Tool II. In addition, APACHE IV (Acute Physiology and Chronic Health Evaluation) Score was conducted using by tool (III). It took around ten to fifteen minutes.

III-Third phase (Immediate Reaction)

Upon recognizing signs of sepsis, nurses had an immediate reaction: a sense of urgency to implement the sepsis bundle**.** Control group participants received routine ICU care, while study group patients were managed using a sepsis care bundle implemented by the researcher alongside standard hospital care over a period of 7 days in the ICUs. The sepsis bundle included the use of a Sepsis Resuscitation Bundle, which involved five key elements to be completed within 6 hours after identifying sepsis: determining serum lactate levels, collecting blood cultures before administering the initial antibiotic, administering broad-spectrum antibiotics, administering 30 mL/kg crystalloid for hypotension or lactate levels greater than 4 mmol/L, and, if hypotension persisted after fluid resuscitation, providing vasopressors to maintain a mean arterial pressure (MAP) above 65 mmHg. In addition to the resuscitation bundle, antimicrobial and symptomatic therapy were provided, including the use of vasoactive drugs to maintain blood pressure, administering the required medications for the infected lesion, continuous monitoring of vital signs, and close observation for changes in tissue perfusion, such as decreased urine output, altered mental state, and fluid intake/output monitoring.

IV- Fourth phase (Deliberate Nursing Process):

Deliberate steps were taken, blood cultures were drawn, fluid management initiated, lactate measured, antibiotics administered.

V- Fifth phase (Improvement):

Positive changes in the patient's condition because of appropriate nursing interventions.

Evaluation was done for both groups through length of stay and mortality rate. Laboratory investigations, including white blood cells, hemoglobin, creatinine, total bilirubin, albumin, lactate level, CRP, and blood sugar, were evaluated three times through the intervention, as outlined in Tool I (Part 4). Physiological parameters data were evaluated three times through the intervention for both the study and control groups as outlined in Tool II

Ethical consideration:

Before beginning the study, approvals were obtained from the faculty ethics committee and the dean. Every participant in the research gave their verbal consent. The shared subjects received clarification on the goals and advantages of the study as well as information about the study's instruments, which included the questionnaires they were required to complete. Concerning the study data's confidentiality, they were comforted.

Statistical Design:

The data obtained was analyzed, and presented in numbers, percentages, in the form of tables and figures as required and suitable statistical tests were used to test the significance of the results obtained.

The following statistical techniques were used:

Percentage, Mean value, Standard deviation, Chi-square (X2), Correlation test (r) and Proportion probability (P-value).

Significance of results

- When P> 0.05 it is a statistically insignificant difference.
- When P< 0.05 it is a statistically significant difference.
- When P< 0.01or P< 0.001 it is a high statistically significant difference.

The main findings of this study were summarized as follows:

Table (1): this table reveals that the mean age of the control group was 49.54±12.54 years and 44.58±11.36 years of the study group. Concerning patient's gender 51.4% of the control group and 57.1% of the study group were male. In relation to the level of education, 62.9% of the control group and 85.7% of the study group had secondary education. Concerning marital status, 60 % of the control group and 85.7% of the study group were married. Regarding occupation, 67.2% of the control group and 82.8% of the study group patients were working. According to the place of residence, 51.4% of the control group were from rural areas, while 57.1 % of the study group were from urban areas. In general, there was no significant statistical difference between the study and control groups regarding their demographic characteristics.

Table (2): this table reveals that concerning PaO2/FIO2 there was a statistically significant difference between patients in both groups. Regarding the Platelets, there was a statistical difference between patients in both groups. In relation to Cardiovascular, there was a statistically significant difference between patients in both groups. As regards Glasgow Coma Scale score, there were statistical differences between patients in both groups.

Table (3): this table reveals that there was highly statistically significant difference among the study and control group regarding laboratory investigation after (1^{st} , 4^{th} , 7^{th} day) of application of bundle such as white blood cells, hemoglobin, creatinine, total bilirubin, albumin, lactate level, CRP and blood sugar with p-value = (0.001, 0.001, 0.001, 0.001, 0.000, 0.0000, 0.001, and 0.001 respectively).

Table (4): this table reveals that there was highly statistically significant difference among the study and control group regarding laboratory investigation after (1^{st} , 4^{th} , 7^{th} day) of application of bundle such as white blood cells, hemoglobin, creatinine, total bilirubin, albumin, lactate level, CRP and blood sugar with p-value = (0.001, 0.001, 0.001, 0.001, 0.000, 0.0000, 0.001, and 0.001 respectively).

Table (5): this table reveals that there was a highly significant difference among the study and control group regarding mortality rate and length of stay with p-value = (0.000 and 0.000 respectively).

Figure (1): this table reveals that, (48.6%) of the study group were aged from 40 to 59 years, while the control group was (57.1%). (34.3%) of the control group patients were aged from 20 to 39 years, while the study group patients were (42.8%). Only (8.6%) of both study group and control group in age group (60 - 65) years.

Table (1): Frequency distribution of patients in both groups according to their demographic characteristics (n=35) for each group.

Demographic characteristics	Studied patients				X2	P-Value
	Control group (n=35)		Study group (n=35)			
	N	%	N	%		
Age:						
• 20 - 39	12	34.3	15	42.8	0.577	0.749
• 40 - 59	20	57.1	17	48.6		
• 60 - 65	3	8.6	3	8.6		
Mean ±SD	49.54±12.54		44.58±11.36		t=1.125	0.847
Gender:						
Male	18	51.4	20	57.1	0.230	0.405
Female	17	48.6	15	42.9		
Marital status:						
Single	7	20	14	40	3.548	0.479
Married	21	60	18	51.4		
Divorced	7	20	3	8.6		
Educational Level:						
Don't read and write.	4	11.4	2	5.7	4.897	0.342
Secondary Education	22	62.9	30	85.7		
University Education	9	25.7	3	8.6		
Occupation:						
Working	23	67.2	28	82.8		
Not working	12	32.8	7	17.2	5.003	0.834
Place of residence:						
Urban	17	48.6	20	57.1	1.542	0.594
Rural	18	51.4	15	42.9		

Figure (1): Bar graph representing age group of the study and control group

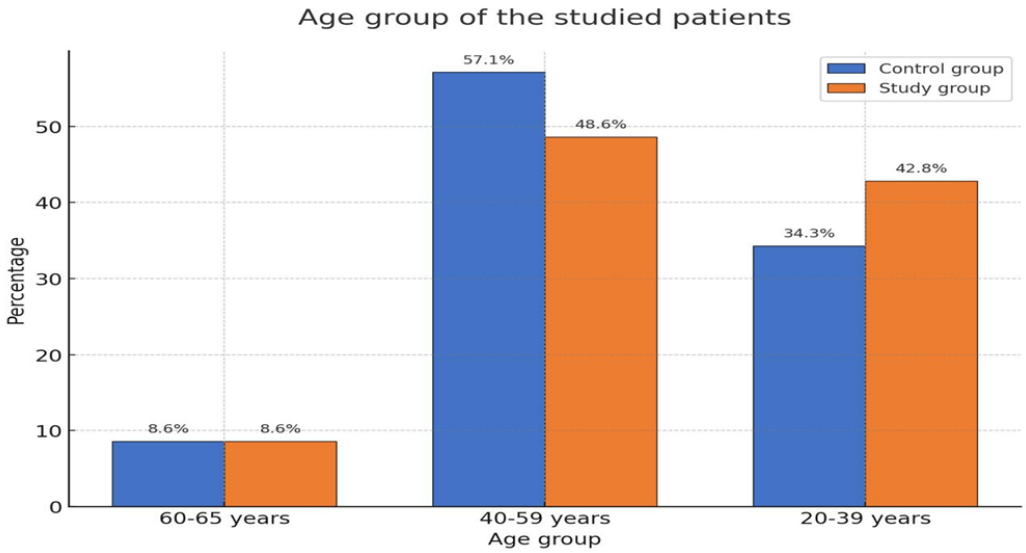

Table (2): Comparison between control and study group regarding SOFA score items before and after applying bundle (n=35 for each group).

Items	Pre				Post				X2	P Value
	Control group		Study group		Control group		Study group			
	N	%	N	%	N	%	N	%		
PaO2/FIO2										
• 0 (< 400)	4	11.4	5	14.3	5	14.3	10	28.6		
• 1 (< 400)	9	25.7	7	20	8	22.9	9	25.8		
• 2 (< 300)	10	28.6	15	42.9	12	34.3	12	34.2	2.021	0.05*
• 3 (≤ 200)	7	20	5	14.3	6	17.1	3	8.5		
• 4 (≤ 100)	5	14.3	3	8.5	4	11.4	1	2.9		
Platelets										
0 (≥ 150 × 103/mcL)	5	14.3	3	8.5	8	22.9	9	25.7		
1 (≤ 150 × 103/mcL)	15	42.9	12	34.3	10	28.6	12	34.3		
2 (≤ 100 × 103/mcL)	7	20	10	28.6	6	17.1	10	28.6	1.254	0.02*
3 (≤ 50 × 103/mcL)	6	17.1	5	14.3	10	28.6	4	11.4		
4 (≤ 20 × 103/mcL)	2	5.7	5	14.3	1	2.8	0	0		
Bilirubin										
• 0 (< 1.2)	9	25.8	11	31.4	8	22.9	12	34.3		
• 1(1.2–1.9)	10	28.6	12	34.3	8	22.9	10	28.6		
• 2 (2–5.9)	5	14.3	7	20	10	28.6	12	34.2	3.89	0.008*
• 3 (6–11.9)	6	17.1	3	8.5	4	11.4	1	2.9		
• 4 (> 12)	5	14.3	2	5.7	5	14.3	0	0		
Cardiovascular										
0 (MAP ≥ 70										
1(MAP < 70	2	5.7	3	8.5	3	8.5	5	14.3		
2 (Dopamine < 5	4	11.4	7	20	5	14.3	10	28.6		
mcg/kg/minute)	9	25.7	9	25.8	2	5.7	10	28.6	1.025	0.02*
3 (Dopamine 5.1–15	10	28.6	8	22.9	10	28.6	8	22.9		
mcg/kg/minute	10	28.6	8	22.9	15	42.9	2	5.7		
4 (Dopamine >										
15mcg/kg/minute										
Glasgow Coma Scale score										
• 0 (15 points)										
• 1(13–14 points)	2	5.7	5	14.3	3	8.5	8	22.9		
• 2 (10–12 points)	15	42.9	10	28.6	12	34.2	12	34.2	8.02	0.01*
• 3 (6–9 points)	10	28.6	7	20	5	14.3	8	22.9		
• 4 (< 6 points)	8	22.9	8	22.9	7	20	5	14.3		
	0	0	5	14.3	8	22.9	2	5.7		
Creatinine										
• 0 (< 1.2)	6	17.1	7	20	4	11.4	5	14.3		
• 1 (1.2-1.9)	6	17.1	7	20	7	20	15	42.9	6.46	0.02*
• 2 (2-3.4)	10	28.6	10	28.6	7	20	10	28.6		
• 3 (3.5-4.9)	8	22.9	4	11.4	10	28.6	7	20		

Table (3): Comparison between control and study group regarding patients' physiological parameters after (1st 4th, 7th day) application of bundle (n=35 for each group)

physiological parameters	Studied patients (n=70)						F, p
	Control group (n=35)			Study group (n=35)			
	1st day	4th day	7th day	1st day	4th day	7th day	
Temperature Range Mean±SD	38.9-39.8 39.1±5.55	39.1-40.2 39.6±4.56	38.5-40.1 39.3±5.21	39.4-40.1 39.5±8.12	38.7-39.4 38.9±3.54	38.2-38.8 38.3±5.21	11.021, 0.001*
t, P	2.879, 0.641			1.658, 0.05*			
Heart Rate Range Mean±SD	80-154 120.87±9.98	78-143 90.66±10.59	78-139 94.66±12.54	90-140 111.14±18.41	88-120 101.57±12.74	62-110 91.98±15.99	10.932, 0.001*
t, P	1.921, 0.215			1.578, 0.002*			
Blood Pressure Range Mean±SD	60/40-90/50 65.3/45.6± 20.02	80/50-85/30 83.1/35.7± 16.85	70/30-90/50 80.7/45.1± 18.68	70/30- 80/35 76.9 /33.3 ±18.81	88/40- 100/70 96.9 /59.2 ±18.81	90/60- 140/100 126.9 /79.2 ±18.81	13.01, 0.001*
t, P	1.302, 0.102			1.024, 0.001*			
Respiratory Rate Range Mean±SD	29-50 30.24±4.81	25-48 27.4±1.25	14-39 20.54±3.35	25-47 35.84± 5.13	21-36 33.41± 5.41	14-27 21.72± 4.03	12.243, 0.000*
t, P	2.871, 0.502			2.05, 0.001*			
Spo2 Range Mean±SD	78-91 80.64 ±4.87	80-88 83.25 ±2.71	80-92 86.16 ±1.73	74-82 78.72±3.15	82-94 90.65±5.12	86-99 92.92±2.55	10.550, 0.001*
t, P	1.365, 0.405			2.987, 0.02*			

Table (4): Comparison between the control and study group regarding patients' laboratory investigations after (1st , 4th , 7th day) of application of bundle (n=35 for each group):

laboratory investigation	Studied patients (n=70)						F, p
	Control group (n=35)			Study group (n=35)			
	1st day	4th day	7th day	1st day	4th day	7th day	
White blood cells Range Mean±SD	20-48 33.65 ± 6.64	18-44 29.32 ± 7.21	23-42 30.59 ± 5.24	22-45 34.38 ± 5.87	17-30 20.45 ± 5.41	11-19 11.63 ± 4.66	15.432, 0.001*
t, P	1.272, 0.201			1.302, 0.001*			
Hemoglobin: Range Mean±SD	8.1-11.1 8.44 ± 3.54	8.2-11.2 8.12 ± 1.52	8.5-11.4 8.99 ± 2.15	8.2-11.6 9.56 ± 4.95	8.4-12.1 10.23 ± 5.36	8.9-12.5 11.87 ± 6.85	13.021, 0.001*
t, P	2.871, 0.154			1.201, 0.001*			
Creatinine: Range Mean±SD	1.7-7.9 4.25± 5.52	2.1-8.2 5.32± 6.52	1.5-9.9 6.25± 8.01	2.1-7.8 4.58 ±1.56	1.39-5.9 3.95 ±1.54	1.1-4.6 2.25 ±1.78	14.02, 0.001*
t, P	1.625, 0.814			1.320, 0.001*			
Total Bilirubin: Range Mean±SD	1.5-8.9 4.98±3.57	2.4-7.1 4.52±2.12	2.2-7.6 5.02±2.37	2-7.5 5.41 ± 2.33	2.1-5.9 3.65 ± 2.74	0.5-3.5 2.4 ± 1.08	12.952, 0.0001*
t, P	1.624, 0.402			1.805, 0.001*			
Albumin: Range Mean±SD	2.01-3.8 3.10 ± 1.57	1.05-3.9 2.99 ± 1.62	1.01-3.5 2.54 ± 1.52	1.2-3.1 2.01 ± 3.14	2.2-4.01 3.35 ± 3.06	2.4-5.01 4.05 ± 2.16	13.512, 0.000*
t, P	1.176, 0.302			2.012, 0.001*			
Blood sugar: Range Mean±SD	90-130 107.4±2.99	70-190 105.3±2.78	110-230 115.5±2.54	70-100 88.12 ± 5.14	90-110 105.21 ± 4.56	110-140 115.39 ± 3.89	9.251, 0.000*
t, P	2.402, 0.804			1.642, 0.001*			
Lactate level: Range Mean±SD	2.89-4.41 4.54±3.77	3.15-4.98 4.87±3.68	3.45-5.18 4.95±3.46	4.21-5.34 4.45±1.45	3.54-3.21 3.12±2.43	2.5-3.2 2.62±2.87	8.941, 0.001*
t, P	1.604, 0.801			2.051, 0.002*			
CRP Range Mean±SD	33-61 60.84±5.22	40-79 68.87±5.58	50-89 73.87±5.89	51-67 50.12±4.54	43-61 45.78±4.45	38-58 39.31±4.21	7.987, 0.001*
t, P	1.302, 0.611			1.253, 0.001*			

***: Significant at P ≤ 0.05- x2 = chi-square test**

Table (5): Comparison between control and study group regarding patients' outcomes (n=70): -

patients' outcomes	Studied patients (n = 70)				X2	P-Value
	Control group		Study group			
	N	%	N	%		
Mortality rate:					7.734	0.000*
• Discharge	6	17.1	28	80		
• Dead	29	82.9	7	20		
Length of stay in ICU:					5.565	0.000*
• one week	6	17.1	19	54.3		
• less than one week	2	5.7	10	28.6		
• more than one week	27	38.6	6	17.1		

*** Significant at P ≤ 0.05 r: Pearson correlation coefficient**
****Highly significant at level; p < 0.01**

IV. Discussion

Concerning the demographic characteristics of the patients studied, the present study results revealed that more than half of the control group patients were in the age group 40 - 59 years, while less than half of the study group patients were in the age group 40-59 years. This fact that getting old and immune system may weaken, making them more liable to infections that may lead to sepsis. This finding is inconsistent with ***Driessen (2022),*** who studied sepsis in the intensive care unit from definitions to outcomes and reported that more than half of the studied group was between 54 and 64 years. This finding is inconsistent with ***Sayed et al. (2020),*** entitles for assessment the risk factors of patients with septic shock in the intensive care unit and reported that more than half of patients studied were aged 18 to less than 38 years.

As regards patient's gender, the study result showed that more than half of both the study and control group patients were males. In general, testosterone level (in males) is immunosuppressive, reducing macrophage and neutrophil function, which can worsen infections. This finding aligns with ***Vésteinsdóttir et al. (2022),*** entitles for sepsis requiring Intensive care unit admission studies on temporal trends in epidemiology, cancer, elective surgery and local infectious outbreaks reported that most of patients studied were males.

In relation to the level of education, the study result showed that more than half of the studied groups had secondary education. Also, the findings were inconsistent with ***Ayoub et al. (2022),*** who studied effectiveness of implementing sepsis bundle of care on nurses' knowledge performance and ICU patient outcomes and reported that half of the studied groups had bachelor.

The study indicated significant differences between the study and control groups on all SOFA (Sequential Organ Failure Assessment) items. This supporting that adherence to the care bundle is associated with a lower multiple organ failure score. These results align with ***Ayoub et al. (2022),*** who found that the study group had a significantly lower rate of organ failure than the control group.

The present study clarified that a significant difference was observed in the 1st, 4th, and 7th days for all physiological parameters in the study group, including temperature, blood pressure, respiratory rate, heart rate and Spo2. This could be attributed to the sepsis care bundle's effects. The bundle places a strong emphasis on working together to detect sepsis as soon as possible, carry out necessary tests, and deliver treatments on time, all of which enhance patient outcomes. This is the same line with ***Liu et al. (2021),*** who found that the treatment group had statistically significant improvements compared to the control group after implementing sepsis bundle care.

Regarding laboratory investigations, the study revealed a significant difference among patients in the study group regarding hemoglobin, white blood cells, CRP, blood sugar, albumin, hemoglobin, serum lactate levels, creatinine, and total Bilirubin on the 1^{st}, 4^{th}, and 7^{th} days. This effect may be related to the applying sepsis care bundle. These results were aligned with a study by ***Ahmed (2020),*** which showed significant differences in laboratory investigations between the study and control groups following the implementation of an evidence-based care bundle,

Concerning length of stay and mortality rate, the study results showed that the length of ICU stay has significantly decreased than the routine care group. This finding is in the same line as ***Mouncey et al., (2015),*** which reported that significantly decreased reduced LOS and mortality were reflected in the post-intervention group as compared to the pre-intervention group. This finding was consistent with ***Miller et al., (2023),*** who found that early implementation of bundle elements was associated with decreased rates of severe disease development.

V. Conclusions

Implementing structured sepsis care interventions can play a crucial role in reducing complications and improving patient survival in intensive care units. The current study proved that the application of the sepsis care bundle has a significant impact on improving the outcomes of critically ill patients. Patients who received the sepsis care bundle exhibited a lower mortality rate, shorter ICU stays, and better physiological and laboratory parameters compared to those who received routine care.

VI. Recommendations

Based on these findings of the present study the researcher recommended.

- Implement sepsis care bundles as a standard protocol for managing critically ill patients with suspected sepsis.
- Implement continuous assessment programs to monitor the effectiveness of sepsis care bundles and modify protocols based on patient outcomes.
- Replicate the study on a larger probability sample selected from different geographical areas in Egypt is recommended to obtain data for more generalizability of findings**.**

References

[1] Ahmed Sayed, Z. (2020). Effect Of Evidence-Based Sepsis Care Bundle On Patient Outcome In Medical Intensive Care Unit. Egyptian Journal Of Health Care, 11(2), 826-836. Doi:10.21608/Ejhc.2019.191832.

[2] Ayoub, E., Omar, F., Hussien, L., Ahmad, N., Omar, T., & Ahmed, F. (2022). Effectiveness Of Implementing Sepsis Bundle Of Care On Nurses' Knowledge Performance And ICU Patient Outcomes. Journal Of Pharmaceutical Negative Results, 9, 1330-38.

[3] Deng, J., Wang, R., Huang, S., Ding, J., & Zhou, W. (2023). Macrophages-Regulating Nanomedicines For Sepsis Therapy. Chinese Chemical Letters, 34(3), 107588.

[4] Dierkes, A, M., Aiken, L.H., Sloane, D.M., & Mchugh, M.D., (2021). Association Of Hospital Nursing And Postsurgical Sepsis. Plus One, 16, E0258787. Https://Doi.Org/10.1371/Journal.Pone.0258787.

[5] Driessen, R. (2022). Sepsis In The Intensive Care Unit: From Definitions To Outcomes. Doctoral Thesis, Maastricht university. Ridderprint. Https:// Doi.Org/10.26481/Dis.20220407rd.

[6] Gilhooly, D., Green, S., Mccann, C., Black, N., & Moonesinghe, S. (2024). Barriers And Facilitators To The Successful Development, Implementation And Evaluation Of Care Bundles In Acute Care In Hospital: A Scoping Review. Implementation Science, IS, 14(1), 47. Https://Doi.Org/10.1186/S13012- 019-0894-2

[7] Harley, A., Schlapbach, L., Lister, P., Massey, D., Gilholm, P., & Johnston, A. (2021). Knowledge Translation Following The Implementation Of A State-Wide Sepsis Pathway In The Emergency Department- A Multi-Center Survey Study. BMC Health Services Research, 21(1), 1161. 10.1186/S12913-021-07128-2.

[8] Harrison, D. A., Sadique, M. Z., Grieve, R. D., . & Bion, J. F. (2015). Protocolized Management In Sepsis (Promise): Multicenter Randomized Controlled Trial Of The Clinical Effectiveness And Cost Effectiveness Of Early, Goal-Directed, Protocol Is Resuscitation For Emerging Septic Shock. Health Technology Assessment,97(19). Doi: 10. 3310/ Hta19970.

[9] Levy M.M., Evans L.E. & Rhodes A. (2018): Surviving Sepsis Campaign: International Guidelines For Management Of Sepsis And Septic Shock: Intensive Care Med.43(9):304–317. On Sunday, January 23, 2022, At 10:00pm.

[10] Liu, C., Wang, X., Zhang, K., Hao, G., Han, W., Tian, Y., … & Shen L. (2021). Study On Clinical Nursing Pathway To Promote The Effective Implementation Of Sepsis Bundle In Septic Shock. European Journal Of Medical Research, 26(1), 69. Https://Doi.Org/10.1186/S40001-021-00540-8.

[11] Miller, R., Dong, L., Nelson, N., Brown, S., Kuttler, K., Probst, D., … & Intermountain. (2023). Healthcare Intensive Medicine Clinical Program. Multicenter Implementation Of A Severe Sepsis And Septic Shock Treatment Bundle. American Journal Of Respiratory And Critical Care Medicine, 188(1), 77–82. Https://Doi.Org/10.1164/Rccm.201212-2199OC.

[12] Mohammad, E.M., Ahmad, M.G., & Zekry R.M., (2018): Incidence And Outcome Of Sepsis In Intensive Care Unit In Ahmad Maher Teaching Hospital, Volume 12, Issue (2), P 240-246. On Friday, January 14, 2022, At 22:00.

[13] Mouncey, P. R., Osborn, T. M., Power, G. S.,

[14] Harrison, D.A., Sadique, M. Z., Grieve, R.D., & Bion, J. F. (2015). Protocolized Management In Sepsis (Promise): Multicenter Randomized Controlled Trial Of The Clinical Effectiveness And Cost Effectiveness Of Early, Goal-Directed, Protocol Is Resuscitation For Emerging Septic Shock. Health Technology Assessment,97(19). Doi: 10. 3310/ Hta19970.

[15] Paoli, C., Reynolds, M., Sinha, M., Gitlin, M., & Crouser, E. (2024). Epidemiology And Costs Of Sepsis In The United States—An Analysis Based On Timing Of Diagnosis And Severity Level. Critical Care Medicine, 46(12), 1889–1897. 10.1097/CCM.000000000000334

[16] Sayed, N., Shawer, O., & Abdel-Aziz, M. (2020). Assessment The Risk Factors Of Patients With Septic Shock In The Intensive Care Unit. Assiut Scientific Nursing Journal, 8(20.0), 73-86. Doi: 10.21608/Asnj.2020.88483.

[17] Singer, M., Deutschman, S., & Seymour, W. (2016). The Third International Consensus Definitions For Sepsis And Septic Shock (Sepsis-3). JAMA 315, 801–810. Doi:10.1001/Jama.2016.0287.

[18] Smith, R., Johnson, T., & Lee, C. (2023). Emerging Technologies In Critical Care: ECMO And AI Integration. Journal Of Intensive Care, 11(2), 150-165.

[19] Vésteinsdóttir,E., Kárason,S., Sigurðsson,I.,M., Gottfreðsson,M.(2022): Sepsis Requiring Intensive Care Unit Admission Studies On Temporal Trends In Epidemiology, Cancer, Elective Surgery And Local Infectious Outbreaks. ISBN 978-9935-25-173-2. Reykjavik, Iceland.

[20] Yealy, D., Mohr, N., Shapiro, N.,Venkatesh, A., Jones, A., & Self, W. (2021). Early Care Of Adults With Suspected Sepsis In The Emergency Department And Out-Of-Hospital Environment: A Consensus-Based Task Force Report. Ann Emerg Med. 78(1):1-19.

[21] Zimmerman J.E., Kramer A.A., Mcnair D.S& Malila F.M., (2006).Acute Physiology And Chronic Health Evaluation (APACHE) IV: Hospital Mortality Assessment For Today's Critically Ill Patients. Critical Care Medicine Journal ;34(1) :297-310.