An-Najah National University

Faculty of Graduate Studies

PREDICTORS OF ADMISSION, OUTCOMES, SURVIVAL, AND MORTALITY RATES IN MEDICAL ICU ADULT SEPSIS PATIENTS IN A TERTIARY CARE HOSPITAL: A RETROSPECTIVE STUDY

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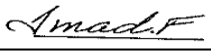
Dr. Imad Fashafsheh	
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Dedication

I dedicate this work to all those who helped me and supported me during my work and studies, and I dedicate this achievement to my dear family and parents in particular, to my friends and colleagues at work, and to all those who loved me.

Acknowledgment

First, I give all the glory to God, the source of my strength, for granting me both the mental and physical endurance to complete this monumental task.

I would like to express my gratitude to my awesome supervisors: Dr. Ramzi Shawahna and Dr. Aidah Alkaissi for believing in me and for their diligent supervision, clear guidance, continued support, and encouragement throughout this process.

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Last but not the least; I would like to thank my family, my parents, and lovely ones, for supporting me throughout my life. This accomplishment would not have been possible without them.

To everyone who gave me moral support for the completion of this task, Thank you.

Author

Elias Ashqar

Declaration

I, the undersigned, declare that I submitted the thesis entitled:

PREDICTORS OF ADMISSION, OUTCOMES, SURVIVAL, AND MORTALITY RATES IN MEDICAL ICU ADULT SEPSIS PATIENTS IN A TERTIARY CARE HOSPITAL: A RETROSPECTIVE STUDY

I declare that the work provided in this thesis, unless otherwise referenced, is the researcher's own work, and has not been submitted elsewhere for any other degree or qualification.

Student's Name: [redacted]

Signature: [redacted]

Date: 4/8/2024

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Abstract

Background: Sepsis is a serious illness that results from the body's overreaction to an infection. Because of its high mortality rate, high treatment costs, and long-lasting effects on survivors, Unanimous treatment techniques, early detection, and awareness are critical due to diagnosing challenges and the need for timely treatment.

Aim: to evaluate the predictability of admission, outcomes, survival, and mortality in ICU Adult Patients admitted to medical ICU who developed sepsis in a tertiary care hospital.

Method: A retrospective study design from 2018 to 2023 was carried out the sample size consisted of 326 patients. The focus of this study was on patients who had been identified as having sepsis attending An-Najah National University Hospital (NNUH). The instrument for collecting data used in the present study was demographic, clinical, laboratory data, and predictive tools enrollment from the electronic health record system and patient survival.

Results: The results showed that 135 patients (41.41%) did not survive, whereas 191 patients (58.59%) did. It was discovered that these patients' mortality was not significantly influenced by their demographics. Many clinical variables, however, were significantly associated with death, indicating their potential as predictors of sepsis outcomes. These variables included systolic blood pressure, heart rate, Glasgow Coma Scale, HCO3, PH, total serum bilirubin, serum sodium, albumin, serum lactate, and systemic inflammatory response syndrome. Furthermore, there was a strong correlation between death and the presence of cancer in sepsis patients. Predictive measures such as

APACHE II, SOFA, and SAPS II were found to be highly effective in predicting death in patients with sepsis.

Conclusion: Among sepsis patients, age and gender were not significant predictors of admission to the medical ICU. Yet, several parameters showed promise as predictors of ICU admission in sepsis cases, including systolic blood pressure, heart rate, Glasgow Coma Scale, HCO3, pH, total serum bilirubin, serum sodium, albumin, serum lactate, and systemic inflammatory response syndrome. Furthermore, there was a correlation between having cancer and a higher risk of sepsis.

Keywords: sepsis; medical intensive care unit; modified early warning signs; APACHE II; SOFA; SAPS II; predicting in-hospital; An-Najah National University Hospital.

Chapter One

Introduction and Theoretical Background

1.1 Introduction

One of the most public medical conditions that causes substantial disease and death in hospitalized patients is sepsis, it marks in potentially lethal organ failure because of the host's dysregulated and uncontrollably reactive reaction to infection (van der Poll et al., 2021). As a protection mechanism in contradiction of the invasive pathogen, inflammation is activated in response to infection, however depending on the previously pronounced variables, the degree and severity of this inflammatory response might differ significantly, the pathophysiology of sepsis can occasionally be aided by an exaggerated and dysregulated inflammatory state that results from the body's attempt to eliminate the infection, it is critical to understand that sepsis is the result of a dynamic interaction between the infecting bacteria and the host, with many variables affecting the result, comprehending these complex systems is essential for expressing efficacious therapy approaches to handle sepsis and enhance patient results (Wiersinga & van der Poll, 2022). Acute kidney damage (AKI), acute respiratory distress syndrome (ARDS), sepsis-induced myocardial dysfunction (SIMD), liver dysfunction, brain dysfunction, and skeletal muscle wasting are among the serious significances that can arise from sepsis that develops into septic shock, these side effects have a significant role in the higher death rate linked to sepsis (Ning et al., 2021).

With a growing universal incidence of infection-related septic values, sepsis continues to pose a thoughtful challenge to medicine, patients who ache from sepsis and septic shock have death rates ranging from 20% to 50% (Minasyan, 2022). Septic shock is usually present in severe persons with untreatable hypotension or hyperlactatemia (Zhang et al., 2018). Among patients admitted to hospitals, sepsis is a significant cause of morbidity and mortality, sepsis patients require admission to the intensive care unit (ICU) to get closely monitored treatment and essential supportive measures, potential symptoms of organ failure, unstable vital signs, circulatory hemodynamics, and respiratory dysfunction all of which are common in sepsis cases need to be closely monitored, to tackle these difficulties, supportive treatment becomes essential and includes measures including mechanical breathing, renal replacement therapy, the use of vasopressors, and in certain situations, extracorporeal membrane oxygenation

(Y. Zhang et al., 2019). Sepsis is a serious medical condition that is becoming more common in patients receiving treatment in ICUs (ICUs; 17.3%–37.0% of cases occur during ICU stays), the prognosis for sepsis is remains dire, with ICU mortality rates ranging from 36.0% to 55.2% as a result of the limited therapeutic choices available, it is therefore the main cause of death in adult ICU (Fathi et al., 2019).

Tissue hypoperfusion as a systemic reaction to infection is the trademark of sepsis syndrome, a clinical sickness that affects 500,000 individuals in the US and results in 20–50% death, sepsis is the leading cause of death in adult non-coronary ICUs and 13th most common cause of death among hospitalized patients all-purpose, according to hospital release statistics, additionally, there has been an increase in the incidence of sepsis syndrome, which is probably related to the rising use of immunosuppressive medications as well as invasive diagnostic and treatment techniques (Schoenberg et al., 1998).

Because they offer specialized facilities, interdisciplinary teams, and access to cutting-edge diagnostic and treatment techniques, tertiary care institutions are vital in tackling sepsis concerns, there is an increasing need for more thorough research on the factors impacting ICU admission, treatment results, and survival despite the abundance of studies examining many facets of sepsis, especially in the context of tertiary care facilities (Fleischmann et al., 2016). Research has confirmed that in patients with severe sepsis and septic shock, the initiation of goal-directed therapy early on can considerably reduce mortality, As a result, when sepsis is identified, the emphasis is now on delivering an immediate and strong intervention (Thiel et al., 2010).

1.2 Problem statement

A major contributor to morbidity and mortality in intensive care units (ICUs), sepsis accounts for 25% of all ICU deaths. Over the past ten years, the prevalence of sepsis has increased annually, with estimates ranging from 8% to 13%. Reasons for this increase include increased use of immunosuppressive drugs, chemotherapy, invasive procedures, and organ transplants. One major barrier to reducing the impact of sepsis is the delay in diagnosing and treating the condition in emergency departments (EDs). Additionally, this condition has substantial negative social and economic ramifications and depletes a substantial amount of healthcare resources (Yu Zhang et al., 2019).

The leading cause of sepsis, which accounts for around 6 million mortalities each year, is a dysregulated host response to infection, because sepsis is a dynamic disease, early identification is essential to lowering its high mortality rate, this important role of early prediction is made more difficult by the lack of an accurate test or scoring system (Zabihi et al., 2019). Sepsis continues to be a main problem for patients, medical employees, and healthcare systems across the world, despite years of yearly studies targeted at lowering its death rate, identifying and predicting those who are at risk for sepsis early on, and being aware of the potentially harmful effects of the illness are important issues that must be taken care of (Wang et al., 2021).

Sepsis is one of the most common and deadly diseases in the world, it is the leading cause of illness and death worldwide, high treatment costs and prolonged hospital stays indicate the significant healthcare weight it presents, however, the total death rate and financial burden associated with treating sepsis might be significantly reduced by precisely identifying risk factors and choosing treatments.(M. M. Islam et al., 2019)

Empirical evidence indicates that timely initiation of antibiotic treatment following an early diagnosis of sepsis improves patient consequences, there is a 7.6% increase in the possibility of death for every 6-hour delay in treatment, however, sepsis frequently confronts problems in good diagnosis and adequate treatment because of the overlap of symptoms with other conditions that also entail organ failure and deterioration (Yan et al., 2022).

1.3 Significance of the study

I have seen a steady rise in the number of patients being admitted to the Intensive Care Unit (ICU) with a diagnosis of sepsis, as well as an increase in the number of patients who have sepsis while in the ICU, through my work there. The selection of this study topic was largely influenced by this noteworthy tendency.

To predict sepsis outcomes, the Sequential Organ Failure Assessment (SOFA), Acute Physiology and Chronic Health Evaluation II (APACHE II), and Simplified Acute Physiology Score II (SAPS II) are now used in clinical settings, but in some cases particularly when it comes to sensitivity and specificity, they might not always perform well enough, developing improved prediction models and gaining a thorough understanding of the processes behind sepsis-induced death are authoritative, to develop

individualized therapies for a range of sepsis patients, immediate care is needed (Wang et al., 2020).

The Sepsis is a condition that is difficult to diagnose and identify due to its high frequency and prevalence, as well as its unclear early signs, such as a rapid pulse and chilly skin. Patients with sepsis can quickly progress to a severe stage of the illness, so prompt and effective treatment is crucial to improve survival chances. Additionally, patients with sepsis typically require longer hospital stays than people without the condition (Teng & Wilcox, 2020). Research has shown that prompt administration of antibiotics following an early diagnosis of sepsis improves patient outcomes; however, a six-hour treatment delay increases the risk of death. Sadly, sepsis is frequently misdiagnosed and poorly treated because its symptoms can mimic those of numerous other conditions, which can result in organ failure and degradation (Yan et al., 2022).

Accurately identifying risk factors and choosing the best medications are essential for reducing overall death rates and easing the cost burden of treating sepsis, although there are already screening methods in place, such as the systemic inflammatory response syndrome (SIRS) and modified early warning system (MEWS), their efficacy in accurately identifying sepsis patients and easing their transition to higher levels of care is still insufficient (Md Mohaimenul Islam et al., 2019).

1.4 Aims of the study

The purpose of the study is to assess how predictable ICU admission, results, survival, and death are. Adult patients at a tertiary care hospital who were admitted to the medical ICU and developed sepsis

1.4.1 Research question

- Do white blood cell count, albumin, C - -reactive protein, platelet count, and lactate levels predict admission to the medical ICU in patients with sepsis?

- Do age and gender affect the outcome, survival, and mortality in medical ICU patients with sepsis?

- Do the Comorbidities and pre-existing conditions affect the outcome, survival, and mortality in medical ICU with sepsis?

- This investigation analyzes risk factors predicting admission to the intensive care unit in patients with sepsis the outcome of these patients and prognostic factors predicting their survival.

1.4.2 Research hypotheses

- WBCs, CRP, albumin, platelet count, and lactate levels indicate sepsis outcomes (length of ICU stay, need for mechanical ventilation,) among sepsis patients in the medical intensive care unit (MICU).

- MICU patients' sepsis is predicted by the Modified Early Warning Score (MEWS), which can alter outcomes (length of ICU stay, need for mechanical ventilation).

- Age and gender predict sepsis patients' admission, outcomes (length of ICU stay, need for mechanical ventilation), survival rate, and mortality rate in the MICU.

- Pre-existing illnesses and comorbidities affect sepsis patients' admission, outcomes (length of ICU stay, need for mechanical ventilation, organ failure), survival rate, and mortality rate in MICU.

1.4.3 Independent variable

- Demographic variables (age, gender)

- Clinical variables (vital signs (blood pressure, heart rate, temperatures, respiratory rate mental status, and urine output) and laboratory values (CRP, albumin, WBCs, lactate).

- Co-morbidities and pre-existing conditions

1.4.4 Dependent variable

- Intensive care unit (ICU) admission

- Outcomes (length of ICU stay, need for mechanical ventilation, organ failure)

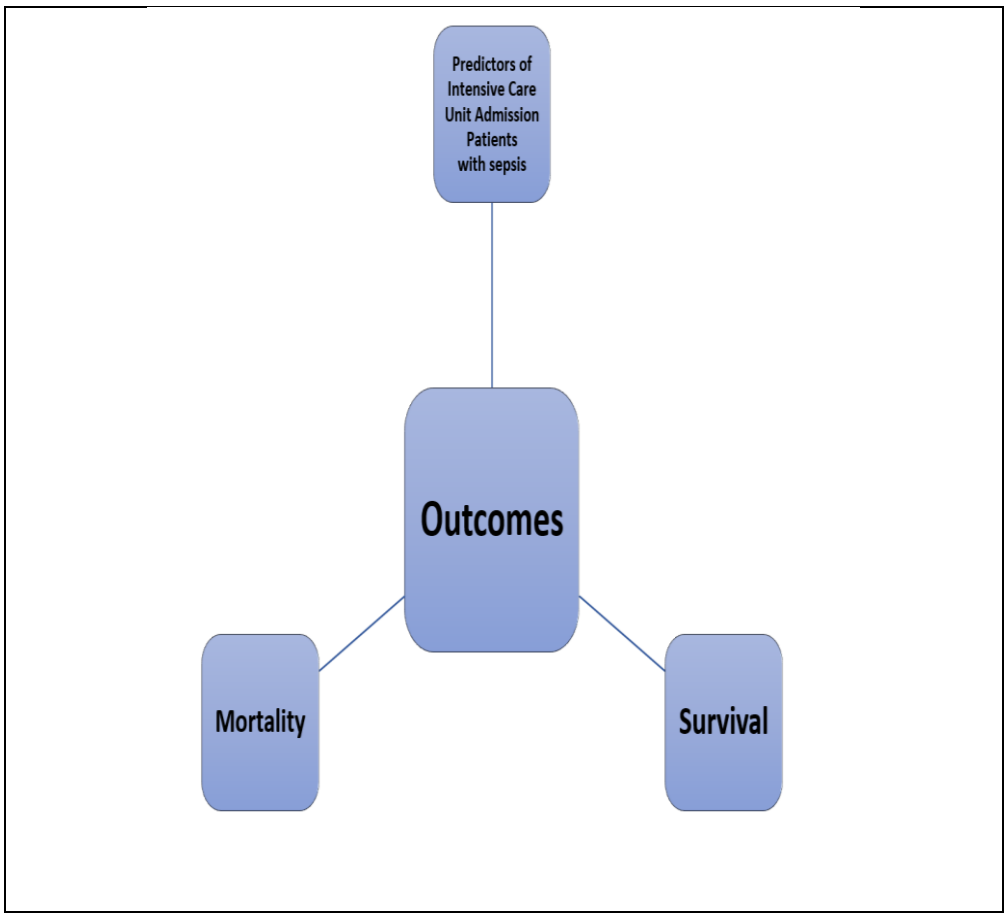
- Survival and mortality

These are the variables that researchers are trying to understand, explain, or predict based on the independent variables and other factors studied in the research.

The diagram that follows shows the actions we will take in this study; the diagram that follows shows the title of the study and the effects of sepsis.

Figure 1

Framework



1.5 Literature review

It was noted in a 2015 study that procalcitonin and C-reactive protein were the most public biomarkers used when sepsis was present, this study was done by (Ryu et al., 2015). A total of 157 patients with septic shock and severe sepsis were hospitalized to Samsung Medical Center's ICU between March 2013 and February 2014, procalcitonin and C-reactive protein (CRP) concentrations were shown to be connected with the outcomes of critically sick sepsis patients according to a retrospective analysis of 171 occurrences connecting these patients. it was noted in these cases that CRP might not do

less well than procalcitonin in terms of prognostic assessment. Another Researchers found that sepsis has a main role in critically sick patients' morbidity, death, and rising healthcare expenses, in a 2018 study, the significance of prompt antibiotic intervention in enhancing the chances of survival for individuals suffering from sepsis was underlined, the problem though, is that there are no clinically validated techniques for accurately predicting when sepsis will begin in real time, the researchers used artificial intelligence (AI) to create a sepsis prediction model in order to close this gap, According to their research, an AI-based Sepsis Expert could precisely predict when patients in ICU will begin to experience sepsis, ironically using publicly available real-time data from the ICU, this prediction could be performed 4–12 hours prior to clinical recognition, this creative strategy has potential, for strengthening prompt responses and eventually increasing critically sick patients' outcomes who are susceptible to sepsis (Nemati et al., 2018). In a different study, scientists used albumin as a marker for sepsis in elderly patients and found that age is a significant predictor of sepsis incidence and fatality in the elderly, the patients in the ED of a tertiary teaching hospital were the subject of the retrospective study. which ran from January 2016 through June 2017, the goal was to investigate the variables affecting the prognoses of elderly patients with sepsis who were being treated in a tertiary care hospital emergency room, the study's conclusions imply that reliable indicators of mortality, such albumin levels, should be taken into account when determining prognosis and creating possible treatments for elderly sepsis patients (Isabel. Arnau-Barrés et al., 2019).

Finding the death rate from acute sepsis among adult patients admitted to the med MICU was the main goal of a study conducted in 2017, finding risk factors for death was the secondary objective, which centered on baseline clinical, laboratory, and demographic data gathered at the time of study enrollment, the variables that contribute to the risk of death were investigated using univariate analysis, then to identify independent mortality predictors, statistically significant covariates were included to multivariate analysis, the results of the study showed that adult patients with severe sepsis in the MICU had higher blood levels of CRP, higher platelet counts, an APACHE score of more than 25, and the need for invasive mechanical ventilation, these variables were found to be independent predictors of severe sepsis-related mortality (Mohamed et al., 2017). The aim the following research was to determine whether the platelet-to-lymphocyte ratio (PLR) might be used as a predictive marker for the

inflammatory response in sepsis. The results, which were published in a 2019 publication, were obtained using information from the Multiparameter Intelligent Monitoring in Intensive Care III database, the study used a retrospective cohort approach, analysis was done on a group of 5537 sepsis patients, the results showed that increased PLRs upon admission were linked to a greater probability of death, but in patients who were receiving vasopressors, AKI, or had a SOFA score higher than 10, this correlation did not achieve statistical significance (Shen et al., 2019).

A examining the variables affecting the length of ICU stays and in-hospital mortality among sepsis patients was the goal of a prospective research that was published in 2017, the predictive significance of high red cell distribution width (RDW) in detecting sepsis was also investigated in this study, after 27 patients were removed from the experiment, which had a starting enrollment of 187 people, adult patients who had been suspected of having sepsis were added, the principal finding of the study indicated that the APACHE II score might be improved in critically sick patients in order to improve the differentiation between sepsis and SIRS by include an increased RDW value, this suggests that a better way to distinguish sepsis from SIRS in critically sick patients may be to combine elevated RDW with the APACHE II score (Farzanegan & Zangi, 2017). CRP became a widely used biomarker for sepsis in a 2016 research, sepsis is the leading cause of death in ICUs, though acknowledged, further investigation is necessary to confirm its dependability for diagnosing sepsis and to advocate for its incorporation into medical practice firmly, this study suggests that CRP is a sensitive biomarker of sepsis, although not being particularly specific (Pradhan et al., 2016).

Researchers looked at the persistent problem of sepsis as the primary cause of morbidity and death for patients in ICUs in a study conducted in 2017, according to the study, there is an 8% increase in sepsis-related mortality for every hour after diagnosis, underscoring the importance of prompt care, the study investigated the utility of high-resolution blood pressure (BP) and heart rate (HR) time series dynamics for early sepsis diagnosis, with a focus on patients in an academic urban hospital who met the criteria for the third edition of the international consensus definition of sepsis (sepsis-III), the results of the study demonstrated that evaluations based on multiscale entropy of HR and BP dynamics might be used to predict sepsis, this strategy presents a viable path for

early identification and intervention, with the potential to enhance sepsis treatment results in critical care environments (Shashikumar et al., 2017).

Validating the linkage, a research was conducted in 2015 that looked at the relationship between troponin levels and mortality in patients with sepsis, although cardiac troponins have been shown to be sensitive and accurate markers of heart injury, there has been disagreement over their predictive value in sepsis, the results of the study provided credence to the idea that elevated troponin levels indicate mortality and a worse prognosis in individuals with sepsis, the conclusion emphasized the need for more study to determine whether introducing novel therapeutic techniques or more aggressive therapy might successfully lower mortality in this particular patient subgroup (Sheyin et al., 2015). Researchers looked at the predictive significance of the albumin/CRP ratio in 2018 to see if it may predict mortality or poor outcomes in a variety of patient demographics, the purpose of this study was to determine whether there was a reliable link, if any, between the CRP/albumin ratio and 28-day mortality in patients admitted to the MICU, the study which used a retrospective cohort analysis, concluded that higher CRP/albumin ratios were linked to a higher risk of 28-day death in patients receiving MICU care, the results highlighted the potential importance of this ratio as a prognostic indication in such clinical settings, suggesting that higher CRP/albumin ratios acted as a predictor for worse outcomes in critically sick persons (Park et al., 2018).

In other study made by (Rowe et al., 2016). Specifically aimed at older persons, this study focused on sepsis, a common health issue in this population, the goal of the study was to find risk factors for increased mortality in the elderly and investigate the relationship between sepsis at the time of ICU admission and death, the results showed that older patients with sepsis who are admitted to the ICU had a greater death rate than older patients who do not have sepsis, interestingly the association between sepsis and mortality vanished when early treatment of antibiotics and vasopressors was taken into account, it is notable that patients with cancer were included in the study's analysis. In a study conduct by (Manjappachar et al., 2022). This is the first thorough analysis of the rates of immediate death for adult patients who meet the Sepsis-3 criteria for septic shock, particularly those who are brought to the ICU and have hematologic malignancies, the results highlight the fact that, even with the advancements in survival rates for cancer patients and sepsis patients over the past 20 years, and even with the

impact of the Sepsis-3 definition, septic shock is still associated with higher mortality rates and worse 90-day survival outcomes in patients who are specifically coping with hematologic malignancies.

In study conduct by (Sanderson et al., 2018). the goal of the 155-person research was to forecast the 30-day death rate for sepsis patients, higher age (adjusted odds ratio [adjOR] = 1.05), thrombocytopenia (adjOR = 3.10), hospital-acquired sepsis (adjOR = 3.34), elevated lactate concentration (adjOR = 1.16), persistent hypotension despite vasopressors (adjOR = 3.89), and mottling (adjOR = 3.80) were found to be significant contributors to increased odds of 30-day mortality, on the other hand, variables that were shown to be protective against 30-day mortality were fever (adjOR = 0.46), fluid-refractory hypotension (adjOR = 0.29), and being diagnosed on a surgical unit (adjOR = 0.35) in our patient, remarkably, promptness of therapy was not determined to be a major contributing factor. The SOFA, APACHE II and SAPS II were used in the study's retrospective analysis of sepsis data in order to estimate mortality, the findings revealed that rather than being intervention-specific, death projections appeared to be more patient-related, the application of the identified parameters has the potential to enhance the care provided to those who are more vulnerable to death, as highlighted in the conclusion, (Raith et al., 2017). By removing the SIRS criterion from the definition of sepsis and establishing the fast Sequential [Sepsis-related] Organ Failure evaluation (qSOFA), the study sought to improve the speedy evaluation of sepsis, it underlined how crucial it is for the SOFA score to change by two or more points, according to the study's findings a rise in the SOFA score of two or higher in patients with suspected infections admitted to an ICU was associated with a higher predictive accuracy for in-hospital mortality than either the SIRS criteria or the qSOFA score, In conclusion the study findings suggest that the SIRS criteria and qSOFA may not be very useful in predicting death in the ICU context, Compared to the classic SIRS criterion or the recently developed qSOFA score, the study indicates that a significant rise in the SOFA score (2 or more points) is a more accurate indication of in-hospital death among persons with suspected infection admitted to the ICU.(Raith et al., 2017)

In study made in ED by (Javed et al., 2017), Finding early mortality predictors in patients hospitalized to ED due to severe sepsis was the study aim, the results of the study showed that initial blood lactate levels and qSOFA score were independent

predictors of mortality during the first 24 hours of ED admission in patients with severe sepsis.

In systematic study done by (Fathi et al., 2019), In a comprehensive analysis, evaluated the risk variables associated with sepsis in patients admitted to several types of ICUs: trauma, medical, surgical, neurologic, and general the outcomes of study analysis extensively detailed the risk variables linked with sepsis across these varied patient groups, according to this research, sepsis rates among ICU admissions may be considerably decreased by improving the care given to surgical patients and effectively managing critical care treatments, it was shown that while modifiable risk factors especially those connected to critical care treatments and surgical procedures offer chances for intervention and risk reduction, non-modifiable risk factors like age, sex, and comorbidities play a role in the development of sepsis.

In other study done by (Martin-Loeches et al., 2019), This prospective multicenter investigation revealed that hospital mortality risk was higher for critically sick elderly and very senior patients with sepsis than for those 65 to 79 years of age, in particular those 80 years of age or beyond had a higher risk of death. Notably, among the very old, advanced age became a separate risk factor, but the study also found that prompt medication given in the first six hours after resuscitation was positively correlated with a lower rate of hospital death for this particular patient population.

Another study done by (Yu Zhang et al., 2019)Although the SOFA score is considered the gold standard, the study contends that looking at various biomarkers may improve the diagnostic and prognostic capacities for determining sepsis in patients receiving ICU treatment. Another prospective study intends to investigate the variables linked to the outcome of patients hospitalized to the critical care unit at Northwest General Hospital and Research Centre, Peshawar, Pakistan with severe sepsis and septic shock done by (Ullah et al., 2016). Conclude that Patients with septic shock have slim recovery prospects.

Particularly among critically sick patients, sepsis, especially its more severe forms such as septic shock and severe sepsis, continues to be a major global cause of morbidity and death. It is a potentially fatal illness that develops when the body's reaction to an infection causes extensive inflammation, which damages organs, causes tissue damage,

and can even be fatal. Because of its complicated etiology and variable clinical presentation, sepsis can be difficult to diagnose and predict in terms of prognosis, despite the fact that early detection and prompt care are essential to improve outcomes. Additionally, individuals with urinary tract infections and respiratory infections had the lowest survival rates, C-reactive protein (CRP) and albumin have drawn attention among the many biomarkers available for their predictive and diagnostic value in the therapy of sepsis. CRP is an acute-phase protein that is useful for determining the existence and degree of sepsis because it rises quickly in response to inflammation and infection. Conversely, severe inflammation, infection, and other systemic stresses tend to cause a reduction in albumin, a plasma protein that is mostly generated by the liver. Low albumin levels, or hypoalbuminemia, indicate the severity of the disease and the body's diminished ability to maintain homeostasis, and have been linked to poorer outcomes in critically sick patients, Combining CRP and albumin levels has been suggested as a possible way to improve the prediction accuracy for sepsis outcomes due to their respective relevance. This strategy seeks to capitalize on the physiological and nutritional state represented by albumin levels, as well as the inflammatory response shown by high CRP. Researchers want to ascertain if baseline CRP and albumin levels upon ICU admission, when evaluated in combination, might function as independent predictors of long-term outcomes, namely 180-day death, in patients suffering from severe sepsis and septic shock, In the critical care situation, our integrated biomarker approach may provide physicians with a straightforward yet effective tool for patient stratification based on mortality risk, enabling more individualized treatment plans and resource allocation (Kim et al., 2015). Another study said A dysregulated host response to infection causes organ failure, which is the hallmark of sepsis, a potentially fatal illness. Clinically, it is recognized by an abrupt rise of two points or more on the Sequential (Sepsis-related) Organ Failure Assessment (SOFA) score, which denotes a serious decline in organ function, The respiratory, cardiovascular, liver, coagulation, renal, and neurological systems are among the major organ systems whose functions are assessed using this score method. A increased risk of morbidity and death is correlated with a score of two or more points. Severe sepsis can develop into septic shock, a subtype of sepsis marked by severe abnormalities in the circulatory, cellular, and metabolic systems. In addition to prolonged hypotension that need vasopressor treatment to maintain a sufficient mean arterial pressure, patients with septic shock also

have high blood lactate levels even after receiving appropriate fluid resuscitation. Septic shock is linked to severe multi-organ failure, and these individuals have a significantly increased chance of dying, Early detection and treatment of sepsis are crucial due to its fast development and high fatality rate. The most common cause of infection-related deaths is sepsis, especially in the intensive care unit (ICU), when prompt treatment can mean the difference between life and death. The chance of dying from sepsis increases significantly and can cause irreparable organ damage if diagnosis or treatment is delayed. Therefore, the management of patients with sepsis or septic shock requires immediate medical care as well as the prompt deployment of suitable medicines, such as hemodynamic support, organ function monitoring, and antibacterial medications, he Third International Consensus Definitions for Sepsis and Septic Shock (Sepsis-3), released in 2016, provides new criteria to effectively detect sepsis and septic shock. This consensus highlighted the significance of evaluating organ dysfunction as a fundamental diagnostic component and characterized sepsis as a syndrome of physiological, pathological, and biochemical abnormalities brought on by an infection. Sepsis-3 highlights the need of laboratory tests in the diagnosis and monitoring of sepsis, in addition to clinical examination. Leukocytosis or leukopenia might point to an underlying infection or inflammatory reaction, therefore laboratory studies examine white blood cell (WBC) counts and differentials to evaluate the body's immunological response. Additionally, platelet counts are crucial because thrombocytopenia, or low platelet levels, is frequently an indication of severe sepsis and is linked to increase risk of death, Bilirubin levels, which evaluate liver function, are among the other crucial indicators of organ disease. Increased bilirubin may be a sign of liver damage or failure, which is typical in septic patients because sepsis frequently results in multiple organ dysfunction. Since acute kidney damage is commonly observed in sepsis, where renal impairment can be an early symptom of developing organ failure, serum creatinine (sCr) levels are another essential indicator of renal function. A spike in blood creatinine suggests renal damage, which calls for immediate attention. Creatinine levels aid doctors in monitoring kidney function, Lactate concentrations are assessed as a sign of tissue hypoperfusion in septic shock patients. Serum lactate levels that are elevated indicate cellular stress and oxygen deficiency in tissues, which arise from insufficient circulation brought on by severe hypotension. When it comes to fluid resuscitation and vasopressor therapy, lactate monitoring informs treatment decisions and aids in

determining the severity of septic shock. Reduced lactate levels during therapy are thought to be an indicator of successful resuscitation, while elevated lactate levels are linked to a worse prognosis, All things considered, the Sepsis-3 guidelines provide a comprehensive approach to diagnosing and managing sepsis and septic shock that include both clinical criteria and laboratory tests to monitor the course of the illness and organ function. Using these techniques to identify patients early is essential to lowering sepsis-related mortality and improving patient outcomes (Kim et al., 2017), another study about another maker said Because of its simplicity and ease of computation, the neutrophil/lymphocyte ratio (NLR) has been investigated as a possible diagnostic and prognostic marker for sepsis. The absolute or relative numbers of neutrophils and lymphocytes in a patient's blood can be used to calculate this ratio. It is crucial because of the way the body reacts to infection and stress, increasing neutrophil numbers and decreasing lymphocyte levels respectively, In the setting of sepsis, there is a noticeable influence on the immune system, notably with the induction of lymphocyte apoptosis (programmed cell death), which further skews the NLR. In situations of septic shock, this effect is much more striking, with a large increase in the NLR resulting from a sharp decline in lymphocyte numbers. In light of these patterns, the NLR has been suggested as a possible marker for sepsis diagnosis and severity evaluation, Presepsin, a 13 kDa polypeptide that results from the proteolytic cleavage of the soluble version of cluster of differentiation CD14 (sCD14), is another marker that has drawn interest recently. Although it is mostly expressed on immune cells, CD14 is also present in organs such the brain, liver, intestines, and cartilage. Presepsin is a prospective biomarker for sepsis since it is believed to be involved in the immune system's reaction to bacterial infections , Previous research has demonstrated that presepsin levels have a predictive value in predicting mortality risk and have been found to correlate with the severity of sepsis. But thus far, there hasn't been any conclusive evidence of a relationship between presepsin and the NLR. The majority of research has looked at the connection between presepsin and other indicators that are frequently used to diagnose sepsis, including procalcitonin (PCT), white blood cell (WBC) counts, and C-reactive protein (CRP), Presepsin has generated interest, but it's yet unclear if NLR, a lot easier to use and more accessible metric, might be a better or additional marker for septic shock or sepsis diagnosis. The NLR is a more affordable choice for resource-constrained situations since it can be computed from ordinary complete blood counts

(CBC), unlike more intricate and expensive biomarkers like presepsin or procalcitonin. Nevertheless, more investigation is required to determine its complete potential in clinical practice, In a recent study, we examined the predictive utility of presepsin as a measure of the severity of sepsis and the risk of mortality. We discovered strong correlations between higher levels of presepsin and poorer outcomes in patients with sepsis. Building on these findings, we intended to further evaluate the efficacy of other putative sepsis indicators. In particular, we aimed to compare the NLR with presepsin and the Sequential (Sepsis-related) Organ Failure Assessment (SOFA) score, which is often used to quantify organ failure in septic patients, and analyze any possible link between the NLR and the severity of sepsis. One of the most important indicators of mortality in sepsis is the SOFA score, which measures the degree of organ failure across several systems, We hypothesize that the NLR may be a useful prognostic marker in sepsis, comparable to other well-known indicators like presepsin or the SOFA score, because of its simplicity of computation and physiological foundation. We suggest that the NLR might offer physicians a quick, practical, and affordable method for assessing the severity of sepsis and forecasting patient outcomes. This study's specific goal is to ascertain if the NLR, like presepsin or the SOFA score, can be utilized as a trustworthy prognostic marker in sepsis. If proven accurate, the NLR may provide a cost-effective substitute for more costly biomarkers, improving the management of sepsis, especially in medical facilities with limited resources (Drăgoescu et al., 2021). Other study said Since its discovery in rat medullary cancer cell lines, procalcitonin (PCT), a prohormone of calcitonin, has come to be understood as a key biomarker in relation to inflammation and infection. Procalcitonin production is strictly controlled under normal physiological settings, therefore levels are usually undetectable in healthy persons. But in some clinical conditions, especially bacterial infections, its production is markedly increased. Because of this, PCT is a useful tool for treating and detecting infectious diseases, especially when it comes to differentiating between bacterial and viral or non-infectious inflammatory states, Infection-related PCT's exact cellular source is still unknown, while hepatocytes and macrophages have been linked to its formation. Normally, the thyroid gland's C-cells generate calcitonin; however, systemic infections, particularly those caused by bacteria, cause extrathyroidal synthesis of PCT. It is believed that this process is stimulated by inflammatory cytokines, such as interleukin-1 (IL-1), interleukin-6 (IL-6), and tumor necrosis factor-α (TNF-α). PCT appears to

function as a secondary mediator of inflammation, enhancing the immune response in tissues that have already been activated by other inflammatory mediators, rather than starting the reaction directly, however its precise physiological function is yet unknown. As a result, PCT is now considered a valuable indicator of the degree of infection and systemic inflammation, PCT is a highly specific marker for sepsis and other serious bacterial infections because of its heightened sensitivity to bacterial infections. When a bacterial infection first appears, its levels grow quickly—in as little as 4 to 6 hours—and for severe systemic infections, they can increase up to 1000 times. Importantly, PCT is a dynamic marker that may be used to advise the cessation of antibiotic medication and track treatment effectiveness since its levels decrease as the infection cures. It differs from other inflammatory indicators like C-reactive protein (CRP), which might continue to rise long after the illness has cleared up, due to this property, In other clinical diseases involving considerable tissue injury or inflammation, procalcitonin levels are similarly high. These include heat stroke, burns, trauma, surgery, and cancer, albeit the degree of PCT increase in these cases is often less than that of bacterial infections. PCT levels may increase in trauma and post-surgical recovery as a result of the body's inflammatory reaction to tissue damage; however, in contrast to bacterial sepsis, these levels often do not jump sharply and frequently return to baseline as the healing process advances. Similar to this, PCT may rise in cancer, especially in advanced stages or when systemic inflammation is present, even though it is not thought of as a particular indicator of malignancy, PCT is thought to have a role in inflammation via modulating nitric oxide (NO) production, which is an important mediator of vasodilation and hypotension in sepsis. According to in vitro research, PCT may be able to block the iNOS pathway, which would lower the amount of NO produced. The fact that this activity might lessen the extreme vasodilation and subsequent hypotension observed in septic shock raises the possibility that PCT functions not just as an inflammatory biomarker but also as an anti-inflammatory agent. Its more comprehensive function in immunological regulation is yet unclear, though, Another noteworthy element of PCT is its efficacy in directing antimicrobial therapy, particularly in critical care settings such as the intensive care unit (ICU). Measuring PCT can assist in determining if antibiotics are necessary and in tracking the efficacy of therapy as PCT levels are correlated with the severity of bacterial infections. Numerous investigations have demonstrated that PCT-guided antibiotic treatment can lower the

usage of antibiotics without endangering patient safety. This is particularly crucial in the battle against antibiotic resistance, as excessive antibiotic usage is a serious issue, To sum up, procalcitonin is a useful and adaptable biomarker in the clinical context, especially when it comes to helping identify bacterial infections and directing the treatment of sepsis. It is a dynamic and responsive marker that helps physicians monitor the course of disease and the efficacy of treatment because of its capacity to rise quickly in response to infection and lower when the infection disappears. PCT has a well-established therapeutic significance in infection control and inflammation, making it a valuable tool in the arsenal against infectious disorders, even though its precise physiological role in inflammation and immunity is still being investigated (Arora et al., 2015).

Chapter Two

Methods

2.1 Introduction

The processes and techniques used to conduct the research project are described in detail in this chapter. The study population and sample, data gathering techniques, ethical consideration, and statistical analysis are all covered in this chapter.

2.2 Study design

This study is a retrospective cohort design that includes data gathered at the time of admission for patients who were admitted to the MICU at An-Najah National University Hospital between 2018 and 2023.

2.3 Population

The population for this study consists of adult sepsis patients admitted to the Medical Intensive Care Unit (MICU) between 2018 and 2023. Patients included in the study were those with a confirmed diagnosis of sepsis as per the clinical criteria and admitted to the MICU for sepsis management, and individuals with significant co-morbidities that could confound the study outcomes. The data for this population was sourced from electronic health records and MICU databases, ensuring a comprehensive capture of relevant clinical and demographic information.

2.4 Sample and sampling

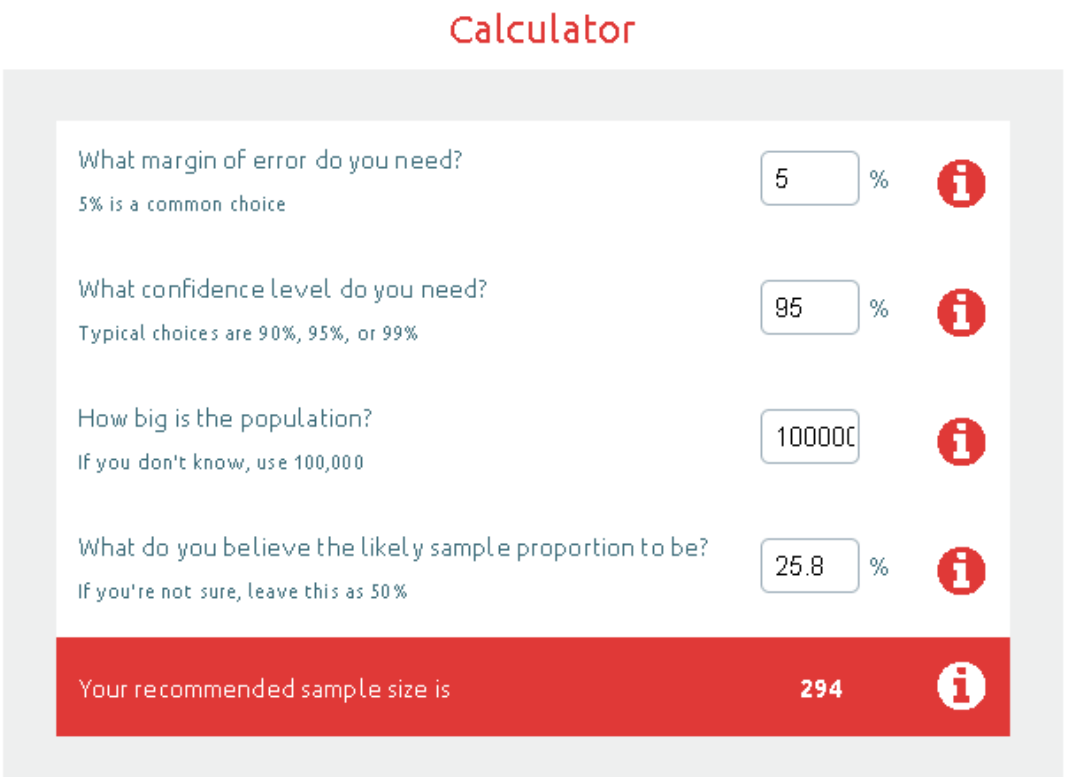
Thus, 294 NNUH patients included in the study. The sample is a convenience sample of all sepsis patients who match the research inclusion criteria and are admitted to an intensive care unit between 2018 and 2023.

2.4.1 Sample size calculation

Overall ICU death rates for sepsis patients were 25.8%, according to (Sakr et al., 2018). Population Proportion Sample Size calculator from Select Statistical Service computed the sample size for this investigation. The recommended sample size is 294. To cover dropout, 32 patients added. There were 326 patients in the trial.

Figure 2

Sample size calculation



2.4.2 Inclusion criteria for sampling

(1) Ages between (18-80)

2.4.3 Exclusion criteria for sampling

(1) ICU stays shorter than 24 hours.

2.5 Data collection

The study collected demographic, clinical, and laboratory data upon enrollment from the electronic health record system. Age, sex, blood pressure, mean arterial pressure, heart rate, temperatures, respiratory rate, Glasgow coma scale, mental status, urine output, CRP, bicarbonate, platelet count, bilirubin, pao2, hematocrit, WBCs, albumin, serum creatinine, blood urea nitrogen, serum sodium , serum potassium ,PH ,lactate, blood cultures, comorbidities and pre-existing conditions, mechanical ventilation Invasive or non-invasive mechanical ventilation and fio2%, APACHE II Score, SOFA, SAPS II scoring systems, reported sepsis severity within admission to ICU All patients were monitored until death or ICU release.

Part one: Demographic data

Age and sex are among the demographic characteristics of the participants.

Part two: Clinical variable using the MEWS

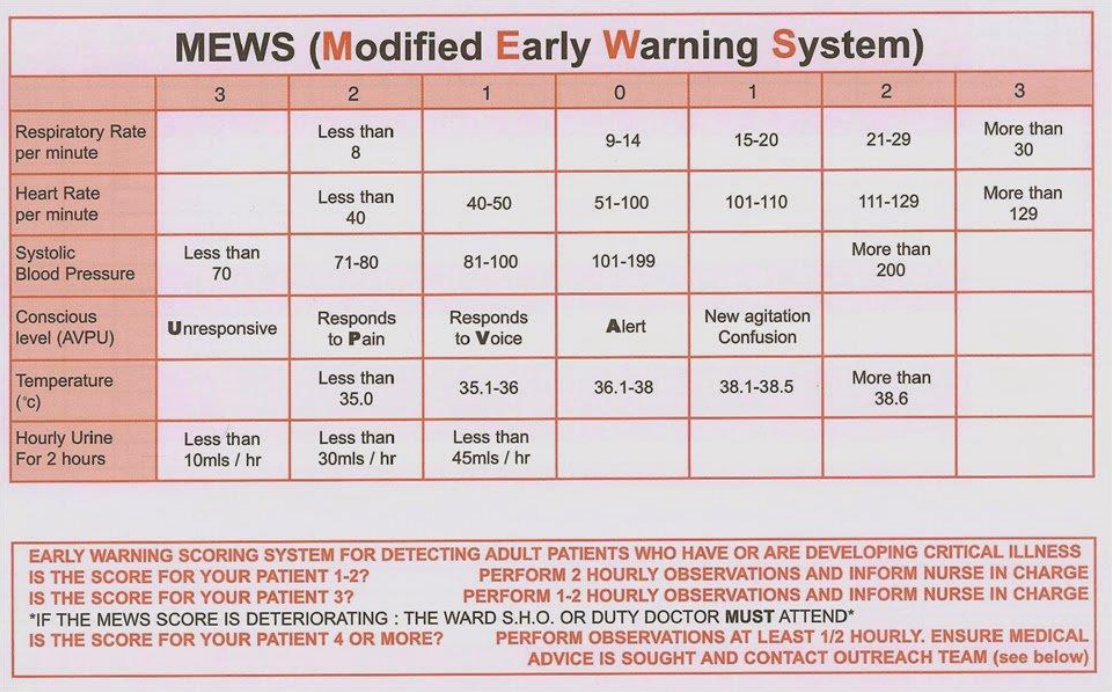
Vital signs (blood pressure, mean arterial pressure, heart rate, temperatures, respiratory rate, Glasgow Coma Scale, mental status and urine output) and laboratory values (CRP, albumin, bicarbonate, platelets count, Bilirubin, pao2, Hematocrit, WBCs, serum creatinine, blood urea nitrogen, serum sodium, serum potassium, PH, lactate, blood culture and cultures, and SIRS.

Systemic inflammatory response syndrome (SIRS) with a hypothesized or established microbial cause was used to define sepsis. SIRS requires at least two of the following to exist: (1) Body temperature >38 °C or 36 °C, (2) Heart rate >90 bpm, (3) Respiratory rate >20 bpm, and (4) White blood cell count >12,000 mm3.(Mohamed et al., 2017)

The Early Warning Score (EWS) is a technique for bedside evaluation based on five physiological parameters: systolic blood pressure, pulse rate, respiration rate, temperature, and AVPU score. Recent research has shown that a modified EWS, which includes relative departure from patients' normal blood pressure and urine output, can be used to identify patients who would benefit from intensive care (Subbe et al., 2001).

Figure 3

Modified Early Warning System (MEWS)



MEWS (Modified Early Warning System)

	3	2	1	0	1	2	3
Respiratory Rate per minute		Less than 8		9-14	15-20	21-29	More than 30
Heart Rate per minute		Less than 40	40-50	51-100	101-110	111-129	More than 129
Systolic Blood Pressure	Less than 70	71-80	81-100	101-199		More than 200	
Conscious level (AVPU)	**U**nresponsive	Responds to **P**ain	Responds to **V**oice	**A**lert	New agitation Confusion		
Temperature (°c)		Less than 35.0	35.1-36	36.1-38	38.1-38.5	More than 38.6	
Hourly Urine For 2 hours	Less than 10mls / hr	Less than 30mls / hr	Less than 45mls / hr				

EARLY WARNING SCORING SYSTEM FOR DETECTING ADULT PATIENTS WHO HAVE OR ARE DEVELOPING CRITICAL ILLNESS
IS THE SCORE FOR YOUR PATIENT 1-2? PERFORM 2 HOURLY OBSERVATIONS AND INFORM NURSE IN CHARGE
IS THE SCORE FOR YOUR PATIENT 3? PERFORM 1-2 HOURLY OBSERVATIONS AND INFORM NURSE IN CHARGE
*IF THE MEWS SCORE IS DETERIORATING : THE WARD S.H.O. OR DUTY DOCTOR **MUST** ATTEND*
IS THE SCORE FOR YOUR PATIENT 4 OR MORE? PERFORM OBSERVATIONS AT LEAST 1/2 HOURLY. ENSURE MEDICAL ADVICE IS SOUGHT AND CONTACT OUTREACH TEAM (see below)

Part three: Comorbidities and pre-existing conditions

Past medical

Part four: Mechanical ventilation

Invasive or Noninvasive mechanical ventilation and fio2%

Part five: APACHE II Score

This score is available to all patients who have recently been hospitalized in the ICU, it is a useful tool for risk stratification and comparing the therapy given to patients with similar risk factors in other units (Knaus et al., 1991). The APACHE II score is a broad indicator of illness severity based on age, prior health problems, and current physiological parameters, the score can aid in the evaluation of patients to establish the scope and intensity of therapeutic and diagnostic intervention, Minimum 0 and maximum 71 are the values for APACHE II; a higher score indicates a higher risk of hospital mortality, the benefit of the APACHE is that it may be used to track the patient's reaction to therapy during their stay in the hospital. About 75% of the time, the APACHE II is a reliable early prognostic indication of disease severity; it is equivalent

to the Ranson score in its ability to discriminate between mild and severe pancreatitis (Knaus et al., 1985).

Part six: SOFA Score

The SOFA Score may be used to determine the risk of death and organ failure for every patient admitted to an ICU, death is predicted using the SOFA Score, which is based on the degree of malfunction in six organ systems, the worst readings recorded during the preceding 24 hours are used to produce it upon admission and every 24 hours until release (Vincent et al., 1996).

Part seven: SAPS II score

The SAPS II was first presented in 1984 as an alternative to the APACHE scoring system, the worst number out of 12 standard physiological measurements recorded within the first 24 hours of a patient's admission, along with information on the patient's past health status and certain data gathered at the time of admission, are used to calculate the SAPS II score, 24 hours after ICU admission, the measurement is completed and the results are an integer point score between 0 and 163, coupled with a range for anticipated hospital mortality of 0% to 100%, a sigmoidal association exists between the SAPS II score and the mortality rate (Amina Godinjak et al., 2016).

Ethical consideration

The study was approved by the institutional review board (IRB) of An-Najah National University, the NNUH ethics committee approved the study, guaranteeing that it complies with ethical guidelines. It also follows the guidelines of the Helsinki Declaration to the letter. Furthermore, precautions are taken to safeguard data confidentiality, reducing the possibility of unwanted access.

Statistical plan

For data input and analysis, the researcher employed the Statistical Package of Social Science (SPSS version 25) software. Frequency tables that illustrate variations across different medical histories for sepsis and provide baseline features by number (n) and percentage (%) in categorical data. Once the normalcy criteria were applied to numerical data, the mean ± standard deviation (SD) was used to characterize the normally distributed quantitative data. On the other hand, the median and range were

used to characterize data that was not regularly distributed and had outlier values. Additionally, various statistical tests such the Kruskal-Wallis test with percentiles and the Chi-square test to compare categorical variables are used in addition to cross-tabulation for the primary conclusions.

Chapter Three

Results

3.1 Introduction

This chapter discusses the outcomes of the statistical analysis conducted on the data, which includes a descriptive analysis that introduces the study and provides solutions to the study's research questions. The total sample number was 294 Sepsis patients, but we added 30 patients to cover dropouts. The total is 326 for the trial. Our sample was not normally distributed according to the normality test on SPSS. The Kruskal-Wallis test was utilized to assess if there was a statistically significant difference between alive and dead patients with respect to various variables, including age, systolic blood pressure (SBP), diastolic blood pressure (DBP), mean arterial pressure (MAP), heart rate (HR), temperature, respiratory rate (RR), Glasgow coma scale (GCS), urine output (over 24 hours), c-reactive protein (CRP), bicarbonate (HCO3), platelet count (PLT), total serum bilirubin (TSB), partial pressure of oxygen (Pao2), hematocrit (Hct), white blood cells (WBC), serum creatinine (Cr), blood urea nitrogen (BUN), serum sodium (Na), serum potassium (K), potential of hydrogen (PH), serum albumin, serum lactate, (MEWS), epinephrine, norepinephrine, dopamine, dobutamine, Fraction of inspired oxygen (Fio2), ventilator (days), partial pressure of oxygen/fraction of inspired oxygen ratio (Pao2/Fio2), APACHE II (points), APACHE II (mortality), SOFA (points), SAPS (points), SAPS (mortality), and length of stay (LOS) (days) Pearson's chi-squared test was utilized to assess if a statistically significant distinction existed between the anticipated and observed frequencies within one or more classes of a contingency table, such as the comparison between sex and death, including sex, comparison between mental statuses such as alert, verbal, painful, unresponsive, comparison between cultures and death, such as blood culture, urine culture, trap culture, sputum culture, comparison between antibiotics and death, such as Piperacillin-tazobactam, Vancomycin, Levofloxacin, Meropenem, Tigecycline, Amikacin, Ceftazidime, Ciprofloxacin, Gentamicin, Colistin, and others antibiotics, comparison between past medical history and death, such as hypertension (HTN), diabetes mellitus (DM), renal disease, liver disease, cardiovascular disease (CVD), comparison between invasive ventilation (IV), non-invasive ventilation (NIV), and death.

For the continuous data to obtain Pearson's chi-squared, we divided them by the median and compared them with death, such as median age and death, the statistical significance of the P-value was determined to be significant when $P < 0.05$, and non-significant when $P > 0.05$.

3.2 Descriptive statistics for study data

Our investigate in appendix G suggests that the data does not follow a normal distribution based on the descriptive statistics obtained from 326 sepsis cases. These metrics contain mean, skewness, kurtosis, lowest and maximum ranges, and standard deviations.

- **Distribution of the participants based on their demographic factors**

The findings derived from sepsis indicate that 191 patients (58.59%) had been determined as being survived, while 135 patients (41.41%) were reported died.

Table 1 presents a comprehensive overview of a number of demographic data, the information indicates that a proportion of patients, namely (48.46%) fell below the age of 58, whilst (52.16%) of patients were aged 58 years or above. With regards to gender, the demographic of patients consisted of males, accounting for (58.90%) of the total sample, while the rest of the sample (41.10%) encompassed females.

Table 1

Distribution of participants according to socio-demographic characteristics

Demographic characteristics	Total (N=326) N (%)	Survival status		Statistical test	
		Survived (N=191)	Died (N=135)	Chi-square	P-value
Age (Years)					
Less than "58"	157 (48.46)	98 (62.42)	59 (37.58)	1.832	0.179
58 ≥	169 (52.16)	93 (55.03)	76 (44.97)		
Sex					
Male	192 (58.90)	108 (56.25)	84 (43.75)	1.053	0.361
Female	134 (41.10)	83 (61.94)	51 (38.06)		

3.3 Distribution of participants according to clinical data, mental status, Systemic inflammatory response syndrome and Modified Early Warning Score

Results from a research that looked at a cohort of 326 individuals with sepsis are exposed in Appendix G1 . Out of this group, 46% (150 patients) had a SBP that was less than 110 mmHg when they were admitted, and 54% (176 patients) had a SBP that was at least 110 mmHg. 59.2% of the patients (193) in the latter group had a DBP equal to or more than 60 mmHg, whereas 40.8% of the patients (133) had a DBP less than 60 mmHg.

In addition, 47.2% of patients (154 patients) had a MAP below 76 mmHg, while 52.8% of patients (172 patients) had a MAP equal to or surpassing 76 mmHg. Furthermore, out of this subgroup, 39.9% (or 130 patients) had a HR that was less than or equal to 100 beats per minute (BPM), whereas 60.1% (or 196 patients) had a HR that was greater than or equal to 100 BPM.

In addition, 49.4% (161 patients) of those with a HR equal to or higher than 100 BPM had a Temperature below 37°C, while the remaining 50.6% (165 patients) had a Temperature that was equal to or higher than 37°C. 53.8% of the patients in this total sample 174 had a RR that was more than or equal to 23 BPM, whereas 47.2% of the patients 154 showed a RR that was lower than 23 BPM.

Furthermore, of the whole sample, 124 patients, or 38%, had a GCS of less than 14, and 202 patients, or 62%, had a GCS of 14 or higher. Lastly, out of the 326 patients, 162 patients, or 49.7%, had a UOP throughout the course of the 24 hours that was less than

1200 ml/day, and 164 patients, or 50.3%, had a UOP that was equal to or more than 1200 ml/day.

162 patients, or 49.7%, had serum HCO3 levels below 21.5 mmol/L, and 164 patients, or 50.3%, had levels that were equal to or higher than 21.5 mmol/L. Comparably, 164 patients, or 50.3% of the total, had a PLT of 134 K/uL or higher, whereas the remaining 49.7% (162 patients) had a count that was lower.

52.5% (171 patients) had TSB levels equal to or higher than 0.8 mg/dL, whereas 47.5% (155 patients) had levels below that threshold. In addition, 163 patients, or 50% of the total, had a Pao2 below 98.5 mmHg, and 163 patients, or the other 50%, had a level that was equal to or higher than 98.5 mmHg.

Fifty percent (163 patients) had Hct values less than or equal to 26.75%, while the other fifty percent (163 patients) had levels that were equal to or higher than 26.75%. Moreover, 50.9% of the patients (166) had a WBCs equal to or greater than 10.5 K/uL, whereas 49.1% of the patients (160) had a count below 10.5 K/uL.

Fifty percent (163 patients) had serum Cr levels less than or equal to 1.2 mg/dL, while the other fifty percent (163 patients) had levels more than or equal to 1.2 mg/dL. Comparably, 164 patients, or 49.7% of the total, had a CRP level below 156 mg/L, whereas 164 patients, or 50.3% of the total, had a level at or above 156 mg/L.

Moreover, BUN below 30 mg/dL were present in 49.7% (162 patients), whereas levels equal to or higher than 30 mg/dL were seen in 50.3% of the patients. Regarding serum Na, 144 patients, or 44.2%, had a level below 138 mmol/L, while 182 patients, or 55.8%, had a level equal to or higher than 138 mmol/L.

Additionally, 51.2% of the patients (167) had serum K levels equivalent to or higher than 4.1 mmol/L, whereas 48.8% of the patients (159) had levels below that threshold. Furthermore, the pH levels of 51.8% (169 patients) and 48.2% (157 patients) of the patients were equivalent to or higher than 7.37.

In terms of serum albumin, 46% of the patients (150) had a level that was less than 2.7 g/dL, and 54% of the patients (176) had a level that was equal to or higher than 2.7 g/dL. Lastly, serum lactate levels were found to be below 2 mmol/L in 46.6% of the

patients (152 patients), and equal to or higher than 2 mmol/L in 53.4% of the patients (174 patients). 62.6% of the patients, or 204, had a MEWS of 4 or above, whereas 37.4% of the patients, or 122 patients, had a score below 4, You appear to have given data on a patient sample, of which 232 had SIRS, while the remaining 94 did not. This data implies that the sample was split into two groups according to whether SIRS was present or not.

3.4 Distribution of participants according to their culture and antibiotic treatment

The study examined the features of a group of 326 patients who had been given a sepsis diagnosis in order to identify trends in the use of antibiotics and microbiological cultures. The comprehensive results, which are shown in Table , clarify a number of important clinical profile elements for the group.

When it came to microbial cultures, the blood culture study showed that, out of the entire sample, 19.3% tested positive for pathogens, while the remainder, or 81.9%, showed negative findings. A same pattern was noted in urine cultures, where 81.9% of samples produced negative results and 18.1% produced positive results. In the study's investigation of trap cultures, 11.3% showed results that were positive, indicating microbial development, whereas 87.4% showed negative results. Sputum culture negative ones. In addition, sputum cultures were examined; 12.6% of the sample showed positive findings, whereas 87.4% showed negative results.

When it came to the use of antibiotics, the group showed a variety of medication delivery patterns. Twenty-nine percent of people took piperacillin Tazobactam, whereas seventy-nine percent did not get this antibiotic. Of the patients who were administered antibiotics, 62.3% used vancomycin, whereas 37.7% did not get this medicine. Of those who received levofloxacin a medication used to treat bacterial infections 24.2% took it, and 75.8% did not.

56.7% of patients used the broad-spectrum antibiotic meropenem, whereas 43.3% did not use it. Amikacin, Trimethoprim-Sulfamethoxazole, and Tigecycline were given to 16.67%, 12.6%, and 1.5% of the patients, respectively; the other patients (83.4%, 87.4%, and 98.5%) did not get these antibiotics. 3.1%, 3.4%, 3.1%, 18.8%, and 6.1% of patients took ceftazidime, ciprofloxacin, gentamicin, colistin, and other antibiotics,

respectively. The remainder 96.9%, 96.6%, 96.6%, 81.6%, and 93.9% did not get these particular medicines.

This detailed analysis offers a thorough summary of the cohort's microbial culture findings and antibiotic use, providing insights into the range of antibiotic treatments used and the frequency of both positive and negative cultures in the sepsis group under study.

Table 2

Distribution of participants according to culture and antibiotic treatment

Culture and antibiotic treatment	Total (N=326) N (%)	Survival status		Statistical test	
		Survived (N=191)	Died (N=135)	Chi-square	P-value
Blood culture					
Negative	263 (80.7)	159 (60.46)	105 (39.92)	1.956	0.200
Positive	63 (19.3)	32 (50.79)	31 (49.21)		
Urine culture					
Negative	267 (81.9)	157 (58.8)	110 (41.2)	0.027	0.885
Positive	59 (18.1)	34 (57.63)	25 (42.37)		
Trap culture					
Negative	289 (88.7)	173 (59.85)	116 (40.14)	1.700	0.217
Positive	37 (11.3)	18 (48.65)	19 (51.35)		
Sputum culture					
Negative	285 (87.4)	166 (58.25)	119 (41.75)	0.110	0.866
Positive	41 (12.6)	25 (60.98)	16 (39.02)		
Piperacillin tazobactam					
No	258 (79.1)	147 (56.98)	111 (43.02)	1.325	0.271
Yes	68 (20.9)	44 (64.71)	24 (35.29)		
Vancomycin					
No	123 (37.7)	74 (60.16)	49 (39.84)	0.202	0.728
Yes	203 (62.3)	117 (57.64)	86 (42.36)		
Levofloxacin					
No	247 (75.8)	134 (54.25)	113 (45.75)	7.905	0.006*
Yes	79 (24.2)	57 (72.15)	22 (27.85)		
Meropenem					
No	141 (43.3)	87 (61.7)	54 (38.3)	0.993	0.364
Yes	185 (56.7)	104 (56.22)	81 (43.78)		
Tigecycline					
No	272 (83.4)	168 (61.76)	104 (38.24)	6.826	0.010*
Yes	54 (16.6)	23 (24.59)	31 (57.41)		
Amikacin					
No	285 (87.4)	164 (57.54)	121 (42.46)	1.020	0.397
Yes	41 (12.6)	27 (65.85)	14 (34.15)		
Trimethoprim sulfamethoxazole					
No	321(98.5)	188 (58.57)	133 (41.43)	0.004	1.000
Yes	5 (15)	3 (60)	2 (40)		
Ceftazidime					
No	316 (96.9)	186 (58.86)	130 (41.14)	0.314	0.746
Yes	10 (3.1)	5 (50)	5 (50)		
Ciprofloxacin					
No	315 (96.6)	185 (58.1)	130 (41.7)	0.077	0.767
Yes	11 (3.4)	6 (54.55)	5 (45.45)		
Gentamicin					
No	316 (96,9)	186 (58.86)	130(41.14)	0.314	0.746
Yes	10 (3.1)	5(50)	5(50)		
Colistin					
No	266 (81.6)	161 (60.52)	105 (39.47)	2.236	0.148
Yes	60 (18.4)	30 (50)	30 (50)		
Others					
No	306 (93.9)	174 (56.86)	132 (43.41)	6.126	0.017*
Yes	20 (6.1)	17 (85)	3 (15)		

3.5 Distribution of the participants based on their Comorbidities and pre-existing conditions

On table 3 the study examined 326 individuals who were diagnosed with sepsis in detail, revealing the complex network of comorbidities that existed within the sample. Forty-five percent of these patients had been diagnosed with hypertension (HTN), indicating a high incidence of this illness in addition to sepsis.

In contrast, the lack of HTN was seen in 59.5% of the sample, highlighting the varied health profiles within the cohort. Furthermore, diabetes mellitus (DM) was identified in 33.1% of the total subjects, demonstrating a significant correlation between sepsis and this metabolic condition.

Of the group, 66.9% did not have a diagnosis of DM, meaning that a sizable fraction was not affected by this comorbidity. The most common component was malignancy, which affected 58.6% of patients, whereas 41.4% of patients had no malignancies at all. Thirty-six percent of the population had renal illness, adding another level of complication to the sepsis patient's clinical picture. Significantly, 63.2% of participants did not have renal illness, demonstrating the complex nature of health issues associated with sepsis.

Also, 8.9% of individuals had a diagnosis of liver illness; 91.1% of cases did not have this specific comorbidity. With 73.9% of patients presenting without cardiovascular disease (CVD), the identification of CVD illness in 26.1% of patients gave another dimension to the overall health picture. This thorough investigation of comorbidities offers insightful information on the variety of illnesses linked to sepsis in the patient group under study.

Table 3

Distribution of participants according to Comorbidities and pre-existing

Distribution of participants according to Comorbidities and pre-existing	Total (N=326) N (%)	Survival status		Statistical test	
		Survived (N=191)	Died (N=135)	Chi-square	P-value
HTN					
No	194 (59.5)	102 (52.58)	92 (47.42)	7.137	0.008*
Yes	132 (40.5)	89 (67.42)	43 (25.76)		
DM					
No	218 (66.9)	120 (55.05)	98 (44.95)	3.405	0.074
Yes	108 (33.1)	71 (65.74)	37 (34.26)		
Malignancy					
No	135 (41.4)	99 (73.33)	36 (26.67)	20.646	> 0.001*
Yes	191 (58.6)	92 (48.17)	99 (51.83)		
Renal disease					
No	206 (63.2)	119 (57.77)	87 (42.23)	0.156	0.727
Yes	120 (36.8)	72 (60)	48 (40)		
Liver disease					
No	297 (91.9)	176 (59.62)	121 (40.74)	0.618	0.437
Yes	29 (8.9)	15 (51.72)	14 (48.28)		
CVD					
No	241 (73.9)	131 (54.36)	110 (45.64)	6.823	0.010*
Yes	85 (26,1)	60 (70.59)	25 (29.41)		

3.6 Distribution of participants according to Mechanical ventilation status

Results about the status of 326 patients with sepsis who were on mechanical ventilation are shown in Table 4. Out of the entire sample, 133 people, or 40.8%, were admitted to the MICU using invasive ventilation (IV), whereas 193 people, or 59.2%, were not. In addition, 186 people, or 57.1% of the total, were admitted to the MICU using noninvasive ventilation (NIV), whereas 140 people, or 42.9% of the total, did not. Subsequent investigation showed that 61% (199 individuals) had a fraction of inspired oxygen (Fio2) equal to or greater than 0.4, whereas 39% (127 individuals) had a Fio2 less than 0.4. Furthermore, precisely half of the entire sample had a Fio2/Pao2 ratio that was less than 255.4, while the other half had a ratio that was equal to or greater than 255.4. These results provide important new information on the ventilation and oxygenation characteristics of patients with sepsis in the MICU.

Table 4

Distribution of participants according to Mechanical ventilation status

Distribution of participants according to Mechanical ventilation status.	Total (N=326) N(%)	Survival status		Statistical test	
		Survived (N=191)	Died (N=135)	Chi-square	P-value
IV					
No	193 (59.2)	150 (77.72)	43 (22.28)	71.364	> 0.001*
Yes	133 (40.8)	41 (30.83)	92 (69.17)		
NIV					
No	140 (42.9)	46 (32.86)	94 (67.14)	66.964	>0.001*
Yes	186 (57.1)	145 (77.96)	41 (22.04)		
Fio2					
Less than 0.4	127 (39)	100 (78.74)	27 (21.26)	34.821	> 0.001*
0.4 ≥	199 (61)	91 (45.73)	108 (54.27)		
Pao2\Fio2 ratio					
Less then 255.5	163 (50)	75 (46.01)	88 (53.99)	21.253	> 0.001*
255.5 ≥	163 (50)	116 (71.17)	47 (28.83)		

3.7 Distribution of the participants based on their points and mortality according to, APACHE, SOFA and SAPS II

The study discovered the thorough assessment of 326 patients using exacting tools like the SOFA, APACHE, and SAPS II. Table 5 provides a detailed breakdown of the study's results.

Among the whole group of patients, 46.30% had APACHE scores that were less than 9, and 58.3% had values that were at or above this cutoff. Interestingly, within the APACHE subgroup, 26.1% had mortality rates < 0.25, which contrasted sharply with the 73.9% who scored 9 or higher.

Paying attention to the SOFA evaluations, 41.7% of respondents received a score of less than 9, and 58.3% received a score of nine or more. The detailed SOFA death statistics showed that 51.5% of deaths were less than 0.33, 19.3% were at 0.50, and 29.1% were more than 0.95. Another important scoring method, SAPS II, revealed that 50.3% of participants scored at or above this criterion, whilst 49.7% of participants scored below 47.

Additionally, SAPS II showed that 50.6% of those with scores equal to or higher than 47 had fatality rates above 0.39, compared to 49.4% of those with scores less than 47. With respect to various scoring systems, this comprehensive study offers a nuanced view of patient outcomes and offers insightful information for clinical interpretation and decision-making.

Table 5

Distribution of participants based on their points and mortality according to acute physiology and chronic health, sequential organ failure assessment, simplified acute physiology score II

Distribution of participants based on APACHE scores, SOFA score and SAPS II	Total (N=326) N (%)	Survival status Survived (N=191)	Died (N=135)	Statistical test Chi-square	P-value
APACHE (points)					
Less than 19	151 (46.3)	121 (80.13)	30 (19.87)	53.809	> 0.001*
19 ≥	175 (53.7)	70 (40)	105 (60)		
APACHE (mortality)					
Less than 0.25	85 (26.1)	76 (89.41)	9 (10.59)	45.023	> 0.001*
0.25 ≥	241 (73.9)	116 (48,14)	126 (52.28)		
SOFA (points)					
Less than 9	136 (41.7)	103 (75.74)	33 (24.26)	28.276	> 0.001*
9 ≥	190 (58.3)	88 (46.32)	102 (53.68)		
SOFA (mortality)					
Less than 0.33	168 (51.5)	122 (72.62)	46 (27.38)	50.960	> 0.001*
0.50	63 (19.3)	42 (66.67)	21 (33.33)		
More than 0.95	95 (29.1)	27 (28.42)	68 (71.58)		
SAPS II (points)					
Less than 47	162 (49.7)	131 (80.86)	31 (19.14)	65.857	> 0.001*
47 ≥	164 (50.3)	60 (36.59)	104 (63.41)		
SAPS II (mortality)					
Less than 0.39	161 (49.4)	130 (80.75)	31 (19.25)	64.361	> 0.001*
0.39 ≥	165 (50.6)	61 (36.97)	104 (63.03)		

3.8 Distribution of the participants based their length of stay

Appedndix G3 shows the significant relationships that the investigation of 326 sepsis patients found with the length of stay. Of the whole cohort, 157 individuals (48.2%) were younger than 58 years old, while 169 persons (51.8%) were older than 58 years old. In addition, 192 patients, or 58.9%, were male and 134 patients, or 41.1%, were female.

When physiological parameters were examined, SBP was found to be lower in 46% (150 cases) of the cases, and higher in 54% (176 cases) of the cases. In a similar vein, 59.2% (193 cases) had DBP levels equal to or more than 60 mmHg, whilst 40.8% (133 cases) showed values less than 60 mmHg. 52.8% (172 cases) of the patients had MAP at or above 76 mmHg, whereas 47.2% (154 cases) MAP below this level.

According to HR data, 60.1% of patients (196 cases) had rates equal to or higher than 100 bpm, whereas 39.9% of patients (130 cases) had rates less than 100 bpm. In terms of Temperature, 49.4% (161 cases) recorded a reading below 37°C, while 50.6% (165 cases) recorded a reading at or above 37°C. 52.8% (172 cases) had RR equal to or above 23 bpm, whereas 47.2% (154 cases) had rates below that threshold.

According to neurological evaluations, 62% (202 cases) had a GCS score of 14 or above, whereas 38% (124 cases) had a score of less than 14. In 37.4% of instances (122), the MEWS were less than 4, and in 62.6% of cases (204), they were equal to or above 4.

In terms of comorbidities, 108 patients (33.1%) had DM and 40.5% (132 patients) had HTN. Of the patients, 58.6% (191) had a diagnosis of malignancy, while 36.8% (128) had renal illness. Heart illness was found in 26.1% of patients (85), whereas liver disease affected only 8.9% of patients (29).

According to hematological parameters, 50.3% (164 cases) of the patients had PLT equal to or higher than 134 K/uL, whereas 49.7% (162 cases) had counts below that level. Of the 160 cases, 49.1% had WBCs below 10.5 K/uL, and 166 cases, or 50.9%, had counts equal to or higher than 10.5 K/uL. In 49.7% (162 instances), CRP levels were less than 156 mg/L, and in 50.3% (164 cases), they were equivalent to or higher.

46.6% (152 cases) had lactate levels less than 2 mmol/L, and 53.4% (174 cases) had levels that were equal to or more than 2 mmol/L.

3.9 Distribution of participants based on theirs need for Mechanical ventilation.

The significant correlations found in a research including 326 sepsis patients with regard to their requirement for IV are displayed in Appendix G4 . 167 people (51.8%) were 58 years of age or older, and 157 people (48.2%) were under the age of 58 in the whole group. In addition, there were 134 patients (41.1%) and 192 patients (58.9%) who were female.

Upon examining physiological indicators, SBP was found to be lower in 46% of cases (150 persons) and higher in 54% of instances (176 cases). In a similar vein, 40.8% (133 patients) had DBP readings below 60 mmHg, whereas 59.2% (193 cases) had values at or above 60 mmHg. 52.8% (172 cases) had MAP of 76 mmHg or higher, whereas 47.2% (154 cases) had MAP that were lower.

After HR data analysis, 60.1% of patients (196 cases) had HR that were 100 bpm or higher, while 39.9% (130 cases) had HR that were lower. 50.6% (165 instances) of the Temperature measurements were at or above 37°C, whereas 49.4% (161 cases) had values below 37°C. Furthermore, of the 172 instances, 52.8% had RR at or above 23 bpm, whereas the remaining 154 cases, 47.2%, had rates below that threshold.

Neurological assessments revealed that 62% (202 cases) had a GCS score of 14 or above, whereas 38% (124 cases) had a score below 14. In 62.6% of cases (204 instances), the MEWS were at or above 4, while in 37.4% of cases (122 instances), they were below 4.

108 patients (33.1%) had DM, and 40.5% (132 patients) had HTN in terms of comorbidities. Of the patients, 58.6% (191) had a diagnosis of malignancy, while 36.8% (128) had a renal ailment. Of the patients, 26.1% (85) had heart ailment, whereas only 8.9% (29) had liver disease.

In terms of hematological parameters, PLT ranged from 134 K/uL in 50.3% (164 cases) of the patients to 162 instances, or below the threshold. 50.9% (166 cases) of the 160 cases had WBCs at or above 10.5 K/uL, whereas 49.1% of the patients had levels below 10.5 K/uL. In 49.7% (162 cases), CRP levels were less than 156 mg/L, while in 50.3%

(164 cases), they were at or above this threshold. 46.6% (152 cases) had lactate levels below 2 mmol/L, while 53.4% (174 cases) had levels at or above 2 mmol/L.

3.10 Kruskal–Wallis test with percentiles

The outcomes of continuous data collected from an electronic system for patients diagnosed with sepsis and admitted to the Medical Intensive Care Unit (MICU) are displayed in the Appendix G5. We have used the Kruskal-Wallis test to evaluate the significance of the link between different factors and mortality outcomes because dataset does not follow a normal distribution. This statistical method offers resilience when normalcy assumptions are not satisfied, making it especially appropriate for non-parametric data analysis.

Through the use of percentiles and a closer look at the p-values that follow, may conclude that there is a significant relationship between the factors under study and mortality values that are smaller than the traditional significance level of 0.05. This indicates that there are significant variations in the distribution of several parameters measured in the continuous data with regard to the mortality result for septic patients admitted to the MICU. This knowledge is essential for understanding potential correlations or predictors of mortality in this patient group, which will help guide treatment plans and clinical judgment calls that are meant to enhance patient outcomes.

3.11 Summary

326 patients were studied, and the results showed several important conclusions about various demographic and clinical parameters as well as survival outcomes. While physiological variables such as lower SBP, higher HR and poorer GCS were linked to increased mortality, age and gender did not substantially correlate with survival status. Although alertness and vocal responsiveness were associated with greater survival rates, aberrant values in laboratory measurements and higher MEWS scores also strongly corresponded with elevated mortality. Comorbidities like hypertension and cancer demonstrated noteworthy links with survival status, whereas some drugs, such tigecycline and levofloxacin, demonstrated substantial correlations with survival. Additionally, temperature, RR, GCS, MEWS, and malignancy were all strongly linked with the need for invasive ventilation, suggesting that these variables have predictive power in predicting patient outcomes. Furthermore, SAPS II, SOFA, and APACHE

scores showed strong relationships with survival, highlighting the significance of these scoring systems in determining mortality risk. Lastly, temperature, lactate levels, PLT, and sex were found to have an impact on the length of hospital stay, whereas invasive ventilation was found to be strongly correlated with temperature, RR, GCS, MEWS, and malignancy.

Chapter Four

Discussions and Conclusions

4.1 Introduction

As a severe reaction to infection, sepsis continues to be a major worldwide health problem and may be dangerous for individuals. Among the severely sick population, patients hospitalized in the MICU represent a high-risk subpopulation that is particularly susceptible. Thorough knowledge of the complex variables impacting admission, outcomes, survival, and death rates among adult sepsis patients in the MICU is essential to improving clinician treatments and patient outcomes. This retrospective study explores the complex network of factors influencing the course of sepsis patients at a tertiary care hospital's MICU. Because sepsis is a complicated illness and critical care circumstances are dynamic, a detailed investigation of all aspects of this syndrome is necessary. Finding predictors that can provide critical information to doctors involved in risk assessment, decision-making, and resource allocation is the main goal. In the sections that follow, we will examine the body of research on sepsis in critical care settings to provide context for this investigation. The objectives and research questions of the study will then be outlined, and the choice of a retrospective technique will be justified. The findings from this analysis hold the potential to give useful information for academics, policymakers, and healthcare practitioners coping with the complicated issues impacting sepsis patients in the MICU the main objectives of this research are to improve our understanding of sepsis in the particular setting of the MICU and to offer useful data that can guide the development of evidence-based practices and therapies. To improve patient care and lessen the burden of sepsis on the healthcare system, it is imperative to identify the variables linked to admission, outcomes, survival, and death rates. This research intends to contribute to a more nuanced knowledge of sepsis and aid attempts to lessen its cost on the healthcare system, because it remains a serious problem in critical care.

4.2 Age and Gender of the participant

The data showed that among sepsis patients in the MICU, neither age nor gender was shown to be a significant factor determining survival or death, these results indicate that these characteristics were not statistically significant in our research population. While in the flossing study that conduct in 2019 it came to predicting the outcomes of sepsis in the MICU (Liu et al., 2019). That conduct a significant P value for both group Age and Gender , in other study that conduct by (Mohamed et al., 2017). Demographic data and the relationship between risk variables and mortality was examined using the Chi-square test. In the study, the gender P-value was 0.06, suggesting no significance, whereas the age P-value was 0.011, showing significant. When compared our study to the most recent one, we found that the P-value for age varied. Unlike previous study, which found significance in age, ours had no significant results. On the other hand, nonsignificant P-values pertaining to gender were found in both experiments.

While in other study that conduct by (Farzanegan & Zangi, 2017). The results of the research with 187 patients diagnosed with sepsis in the MICU were substantially different from our findings. Age and gender were included in the research as demographic factors, and both had statistically significant P-values. Given that the present study's sample was smaller than ours, the surprising divergence in results might be the consequence of sample size discrepancies. The differences may also be due to different study designs; our investigation used a retrospective methodology, whereas the cited study was prospective.

In other study conduct by (Motzkus et al., 2018). Study comprised a retrospective analysis with 1762 individuals. It contained age and gender demographic data, the latter of which was broken down into categories. A significant P-value indicates that the age group of 18 to 54 years old showed significant mortality. In contrast, because their P-values were not significant in the other age groups (54–85 and older) did not exhibit any significance with regard to mortality. Furthermore, only the underweight category showed relevance in the gender analysis; the other weight categories did not significantly correlate with death. These results are somewhat consistent with own study .

In the study that conduct by (Songsangjinda & Khwannimit, 2020), which was a retrospective analysis of 2152 patients in the MICU who were diagnosed with sepsis. P-values not significant for both variables age and gender indicated that there was no significant correlation between them and mortality in the analysis, it is similar to result in this study.

was to look at how age and gender affected the outcomes, survival rate, and death of sepsis patients in the MICU. However, does not show a connection between mortality in sepsis patients and demographic characteristics. Based on the results collected, thus rejected our hypothesis that suggested a link between demographic data and length of stay, mortality and survival.

4.3 Clinical data, Mental status, Systemic inflammatory response syndrome and Modified Early Warning Score discussion

This study include this clinical variable Vital sign (BP, MAP, HR, Temperatures, RR, GCS, Mental status and UOP over 24 hours) and laboratory values (CRP, Albumin, HCO3, PLT, TSB, Pao2, Hct, WBCs, Cr, BUN, NA, K, PH, lac, blood culture and cultures and SIRS, in our study SBP, HR, GCS, HCO3, TSB, PLT, Na, PH, Alb, Lac, MEWS, Alertness, responding to Pain, Unresponsiveness and SIRS were significant to mortality and survival.

SBP is an independent factor that represent the perfusion of the organ, and it is very important to have adequate SBP for the health of the organ, in study that conduct by (Tang et al., 2017). Conclude Early SBP variability appears to be associated with mortality in patients with severe sepsis and septic shock, and this result corresponds to our study. In other study that conduct by (Pandey et al., 2014). SBP and DBP are both significant in sepsis patients, which partially corresponds with our study about SBP and disagrees with our study about DBP.

Also, HR is a significant variable that can be a predictor of ICU admission and mortality in patients with sepsis. Whenever the heart rate increased, mortality increased, and that corresponds with a study made by (Shashikumar et al., 2017), who conduct 1100 critical ill said faster heart rate can be a predictor for sepsis. Another study that conduct by (Pladys et al., 2015), said that HR can be a strategy for diagnosing sepsis. But in other study like (Na et al., 2023), said the faster heart rate can reduce hospital

mortality in patients with sepsis during their stay in the ICU. In study conduct by (Ye et al., 2023). Included 9544 patients who said that a faster heart rate can increase mortality, and this result corresponds with our study. Another predictor in our study that was significant in predicting sepsis and mortality was CGS. In study conduct by (Alalawi et al., 2017). Said that GCS can be a strong predictor for sepsis, also in another study conduct by (Gül et al., 2017). that altered mental status with GCS less than 15 in a definitional variable for sepsis, another study conduct by (Askim et al., 2017). Severe sepsis can be identified by a GCS of less than 15. All of these studies agreed with our result, which also said a lower GCS can be a predictor of sepsis and can increase the risk of mortality.

HCO3 is also a significant variable for predicting sepsis and affecting mortality. In study, when the HCO3 went down, that increased the mortality rate. In a study conduct by (Velissaris et al., 2015). The metabolic acidosis resulting in an increased morality rate among patients with sepsis. In other study conduct by (Mitra et al., 2020). That being present with metabolic acidosis caused by low HCO3 serum can increase the requirement for ICU and mortality for patients with sepsis, but there in a study conduct by (Libório et al., 2015). It has also been suggested that increasing HCO3 levels can increase mortality rates.

TSB is one of the significant variables that affects mortality in patients with sepsis. In study, whenever the TSB increases, the mortality increases. In study conducted by (Patel et al., 2015). and it agreed with our study and said that increasing the serum bilirubin. In other study made by (Yamano et al., 2016). Included in the study, 91 patients said that increasing the TSB in patients with sepsis can increase the risk of mortality. Also another study made by (Peng et al., 2021). said that an increase in the TSB can lead to higher mortality. It is manifested, like when the TSB is high, which means the liver is injured or hs liver dysfunction, as in the study conducted (Woźnica et al., 2018). agreed with that, another observational study also agreed that a change in bilirubin can affect mortality (Takegawa et al., 2019).

About the Na serum in this study, the cutoff was 138. The mortality increased when the result went up to 138. In study made by (Ni et al., 2016). conclude that hypernatremia is strongly associated with a worse outcome in sepsis. and the sodium can be a predictor of sepsis as in the study conduct by (De Freitas et al., 2019). Said this study

demonstrated a positive correlation between hypernatremia on admission and the presence of sepsis, but in other study conduct by (Castello et al., 2021). Said that both high sodium levels and low sodium levels can both increase mortality in patients with sepsis.

About albumin, which is a strong predictor of this study and can raise the risk of mortality, the study was conducted by (Isabel Arnau-Barrés et al., 2019). said that albumin is a very strong predictor for sepsis and increases mortality, but a study conducted by (Godinez-Vidal et al., 2019). said that albumin can be a predictor of sepsis severity but not a predictor of mortality, which is against our study that said albumin can be a predictor for mortality, but in other studies conducted by (Yin et al., 2018). Said that low serum albumin levels are associated with an increased risk of death in patients with severe sepsis, and this result is totally agreeable with our results.

In this study about lactate, the cutoff point of lactate was 2, and the mortality risk increased when the lactate level was higher. Overall, high lactate means the muscle lacks oxygen, and this in general increases the mortality, not just for sepsis patients (Bou Chebl et al., 2017). Said that high lactate levels can increase the risk of mortality in emergency department patients and critical ill patients, for patients with serum lactate can easily predict the prognosis of patients with sepsis as a study conducted by (Ryoo et al., 2018). said, in other study conduct by (Chen et al., 2019). support that lactate level can be a predictor for sepsis, and when you predict it early, you can improve the outcome and decrease the mortality in patients with sepsis. In other studies conducted by (Casserly et al., 2015). Said that high lactate levels are associated with hypoperfusion, and this increases mortality. In our study, an increase in lactate levels led to an increase in mortality.

In this study, we used MEWS to predict sepsis and mortality, and there was a relationship between MEWS and sepsis patients with high scores. Patients with high scores are at higher risk for mortality (Brink et al., 2019). Ensured the accuracy of using MEWS in assessing patients with sepsis, in other studies conducted by (Roney et al., 2015). said that there is not enough study for this score that can benefit from predicting outcome. Also, we include in our study SIRS for predicting sepsis and mortality in a study conducted by (Kaukonen et al., 2015). said that SIRS can be a predictor of sepsis, but in other studies, it was said that (Usman et al., 2019). said that there is another tool

we can use for predicting sepsis and mortality. SIRS can predict mortality, but there are other tools that are also better at predicting mortality (Raith et al., 2017).

To answer the research question, do WBCs count, albumin, C-reactive protein, platelet count, and lactate levels predict admission to the medical ICU in patients with sepsis? there is no relationship between CRP and WBCS for predicting admission to the MICU for patients with sepsis, but about albumin, lactate, and platelet count, they can predict admission to MICU for patients with sepsis, and it is the same for the hypothesis that said WBCs, CRP, albumin, platelet count, and lactate levels indicate sepsis outcomes length of ICU stay, need for mechanical ventilation, etc.) among sepsis patients in the MICU

4.4 Co morbidities and pre-existing conditions

In this study, we contain HTN, DM, malignancy, renal disease, liver disease, and cardiovascular disease (Ahlberg et al., 2023). Said that could be, and there are relationships between HTN and the incidence of sepsis in a study conducted by (Zhou et al., 2018). said the HTN can increase mortality among all patients; in other studies conducted by (Liu et al., 2020). Said that HTN can lead to AKI in patients with sepsis, and that can increase mortality.

The other pre-existing factor is malignancy. The mortality percentage in our study is 41.41%, which can be manifested by the high number of patients with malignancy; 58.59% of our total sample were diagnosed with malignancy in a study conducted by (Torres et al., 2015). Said that malignancy can worsen the outcome for patients with sepsis and can increase mortality, and this result is in agreement , conducted by (Hensley et al., 2019). said the malignancy can increase the risk of mortality and also can increase the risk of readmission among young adults, in another study conducted by (Baykara et al., 2018). And the study, which included patients with sold and non-sold cancer, said that malignancy can be a predictor of mortality. In other studies conducted by (Hawari et al., 2016). Said that one-fourth of the malignancy patients requiring ICU admission mean the malignancy disorder can be a predictor for ICU admission and also for mortality, and this is agreed with our study, and other pre-existing factors are CVD, which is known to be the leading case of mortality worldwide.

For aim in this study and the research question, Do the co-morbidities and pre-existing conditions affect the outcome, survival, and mortality in the medical ICU with sepsis? the answer is yes. In our study, HTN, CVD, and malignancy affected the survival and mortality among the patients with sepsis.

4.5 APACHE II, SOFA Score and SAPS II

In this study, the three scales were significant for predicting mortality among our participants. In stud conduct by (Sadaka et al., 2017). said that APACHE II can be a strong predictor of mortality in patients with sepsis. And in other studies, on MICU patients conducted by (A. Godinjak et al., 2016). said that APACHE II can be an excellent tool for predicting the outcome for patients.

The other tool is SOFA, and in the study conducted by (Bauer et al., 2020). said that the increase in the average SOFA score can increase the average mortality, and also in other studies conducted by (Liu et al., 2019). said that SOFA is a good tool for predicting mortality among hospital patients with sepsis, and these results agreed with our result of using the SOFA tool for predicting mortality in patients with sepsis upon their admission to the MICU, and about the SAPA II, it was also an acceptable tool for predicting mortality. In study conduct by (Czajka et al., 2020). Said that SAPS II is an acceptable tool for predicting mortality.

In a comparative study conducted by (Saleh et al., 2015). Said that the APACHE II score was better for predicting the outcome in ICU patients, as well as in other comparative studies conducted by (Naqvi et al., 2016). Said all three tested scoring models (APACHE II, SAPS II, and SOFA) would be accurate enough for a general description of our ICU patients. APACHE II has shown better calibration and discrimination power than SAPS II and SOFA. Also, among other comparative studies conducted by (FURQAN et al.). Said the APACHE II scoring system has the highest sensitivity, specificity, and accuracy in mortality prediction in ICU patients as compared to the SAPS II and SOFA scoring systems, with SAPS II being the least sensitive and accurate. Another comparative study conducted by (Zaidi et al., 2019). said All three scoring systems estimated significantly different mortality rates among the survivors and non-survivors. However, the APACHE II scoring system was much superior to the

SAPS II and SOFA scoring systems as a significant predictor of mortality among the ICU patients.

4.6 Conclusion

This thorough analysis of 326 hospitalized individuals provides insight into a number of variables affecting survival rates. The lack of a substantial correlation between age and gender and survival emphasizes the significance of other factors. Clinical parameters such as the GCS and laboratory results, in addition to physiological markers including body temperature, heart rate, and standard blood pressure, showed a substantial correlation with death. Levofloxacin and tigecycline, two particular antibiotics, were linked to survival, indicating that focused antibiotic treatments may enhance results. The influence of comorbidities including hypertension and cancer on survival rates was substantial. In order to improve patient outcomes, respiratory support techniques like mechanical ventilation were essential. Scores such as APACHE, SOFA, and SAPS II have demonstrated their ability to predict mortality risk. In addition, the length of hospital stay was influenced by variables such as gender, PLT, temperature, and lactate levels. Interestingly, a number of clinical variables showed a strong correlation with the requirement for invasive breathing, suggesting their potential for patient outcome prediction. All things considered, this study offers insightful information about the intricate interactions between variables influencing hospitalized patients' survival, which will inform future clinical judgments and improvements in patient care.

4.7 Limitations

Acknowledging that no study is perfect, and every research project has its limitations:

- The study's sample size may be fairly small. This constraint implies that the study's sample size may be restricted, thereby impacting the extent to which the results may be generalized. A small sample size reduces the statistical power of the study, making it more challenging to detect significant differences or associations accurately. It may also increase the risk of sampling bias and limit the ability to draw robust conclusions. To address this limitation, future studies could aim for larger sample sizes to improve the representativeness and reliability of the findings.

- The existence of unexamined factors that were left out of the research design is a prominent study limitation. While the goal of the study was to thoroughly examine the factors that could potentially affect the outcomes—such as survival and mortality rates certain factors or variables that could affect admission, outcomes, survival, and adult sepsis patients in a tertiary care hospital were not taken into account. The absence of these unexamined factors might make it more difficult for the research to have a comprehensive knowledge of the phenomena it is trying to comprehend. While it is important to recognize that the omission of these factors was a conscious decision based on the goals and emphasis of the study, an accurate interpretation of the results depends on identifying these undiscovered features. In order to offer a more thorough and nuanced view on the factors that predict admission, outcomes, survival, and mortality rates in medical intensive care units, future research projects might investigate these unknown variables. Patients with Adult Sepsis at a Tertiary Care Facility.

4.8 Recommendations

- Numerous causes in our study show statistically significant associations with the prediction of sepsis in patients prior to ICU admission. These remarkable results point to the possibility of a example change in clinical practice by allowing the discovered factors to be included into standard pre-admission evaluations. The objective is to improve the early detection of sepsis patients, which will facilitate prompt care and ultimately lead to a significant decrease in hospital death rates.

- Create a mechanism for chasing and evaluating the predictive model's implementation. Examine its effects on survival rates, patient outcomes, and admission choices on a regular basis. The prediction model will be able to be unceasingly improved and refined over time thanks to this continuing check.

- Examine the costs associated with putting the prediction model into practice. Take into account the outlays related to staff training, and maybe changing current procedures. Look for possible financing sources or ways to save costs.

- Over time, it is expected that the predictive model's use would help to continuously improve patient results. Early detection of high risk individuals with sepsis helps prompt therapies that may diminish the severity of problems connected to sepsis and improve overall recovery rates.

- Impact over time also affects the greater medical community. The results of this study can act as a basis for next surveys, impacting the creation of original procedures, recommendations, and progressions in the treatment of sepsis. The quality of treatment provided to sepsis patients in hospitals might be improved by this iterative research approach.

List of Abbreviations

Abbreviation	Meaning
AKI	Acute kidney injury
ARDS	Acute respiratory distress syndrome
SIMD	Sepsis-induced myocardial dysfunction
ICU	Intensive care unit
EDs	Emergency departments
SOFA	Sequential Organ Failure Assessment
APACHE II	Acute Physiology and Chronic Health Evaluation II
SAPS II	Simplified Acute Physiology Score II
SIRS	Systemic inflammatory response syndrome
MEWS	Modified early warning system
MICU	medical intensive care unit
CRP	C-reactive protein
AI	Artificial intelligence
RDW	Red cell distribution
BP	Blood pressure
HR	Heart rate
SBP	systolic blood pressure
DBP	diastolic blood pressure
MAP	mean arterial pressure
RR	respiratory rate
GCS	Glasgow coma scale
HCO3	bicarbonate
PLT	platelet count
TSB	total serum bilirubin
Pao2	partial pressure of oxygen
Hct	hematocrit
WBC	white blood cells
Cr	serum creatinine
BUN	blood urea nitrogen
Na	serum sodium

K	serum potassium
PH	potential of hydrogen
Alb	serum albumin
Lac	serum lactate
Fio2	Fraction of inspired oxygen
Pao2/Fio2	oxygen/fraction of inspired oxygen ratio
LOS	length of stay
HTN	hypertension
DM	diabetes mellitus
CVD	cardiovascular disease
IV	invasive ventilation
NIV	non-invasive ventilation

References

Ahlberg, C. D., Wallam, S., Tirba, L. A., Itumba, S. N., Gorman, L., & Galiatsatos, P. (2023). Linking Sepsis with chronic arterial hypertension, diabetes mellitus, and socioeconomic factors in the United States: A scoping review. *J Crit Care*, *77*, 154324. https://doi.org/10.1016/j.jcrc.2023.154324

Alalawi, M. S. M., Aljabran, H. A. M., Alkhamri, A. M., Alwahbi, A. M., AlQarrash, Z. I., Iraqi, H. A. M., Alonazi, M. S. M., Alotaibi, A. R. N., Alahmari, M. A. M., & Alnuwaiser, A. A. A. (2017). Glasgow Coma Scale in Anticipation of Sepsis and Septic Shock. *The Egyptian Journal of Hospital Medicine*, *69*(6), 2663-2666.

Arnau-Barrés, I., Güerri-Fernández, R., Luque, S., Sorli, L., Vázquez, O., & Miralles, R. (2019). Serum albumin is a strong predictor of sepsis outcome in elderly patients. *Eur J Clin Microbiol Infect Dis*, *38*(4), 743-746. https://doi.org/10.1007/s10096-019-03478-2

Arnau-Barrés, I., Güerri-Fernández, R., Luque, S., Sorli, L., Vázquez, O., & Miralles, R. (2019). Serum albumin is a strong predictor of sepsis outcome in elderly patients. *European Journal of Clinical Microbiology & Infectious Diseases*, *38*, 743-746.

Arora, S., Singh, P., Singh, P. M., & Trikha, A. (2015). Procalcitonin levels in survivors and nonsurvivors of sepsis: systematic review and meta-analysis. *Shock*, *43*(3), 212-221.

Askim, Å., Moser, F., Gustad, L. T., Stene, H., Gundersen, M., Åsvold, B. O., Dale, J., Bjørnsen, L. P., Damås, J. K., & Solligård, E. (2017). Poor performance of quick-SOFA (qSOFA) score in predicting severe sepsis and mortality–a prospective study of patients admitted with infection to the emergency department. *Scandinavian journal of trauma, resuscitation and emergency medicine*, *25*(1), 1-9.

Bauer, M., Gerlach, H., Vogelmann, T., Preissing, F., Stiefel, J., & Adam, D. (2020). Mortality in sepsis and septic shock in Europe, North America and Australia between 2009 and 2019- results from a systematic review and meta-analysis. *Crit Care*, *24*(1), 239. https://doi.org/10.1186/s13054-020-02950-2

Baykara, N., Akalın, H., Arslantaş, M. K., Hancı, V., Çağlayan, Ç., Kahveci, F., Demirağ, K., Baydemir, C., & Ünal, N. (2018). Epidemiology of sepsis in intensive care units in Turkey: a multicenter, point-prevalence study. *Critical Care*, *22*, 1-14.

Bou Chebl, R., El Khuri, C., Shami, A., Rajha, E., Faris, N., Bachir, R., & Abou Dagher, G. (2017). Serum lactate is an independent predictor of hospital mortality in critically ill patients in the emergency department: a retrospective study. *Scandinavian journal of trauma, resuscitation and emergency medicine*, *25*(1), 1-7.

Brink, A., Alsma, J., Verdonschot, R. J. C. G., Rood, P. P. M., Zietse, R., Lingsma, H. F., & Schuit, S. C. E. (2019). Predicting mortality in patients with suspected sepsis at the Emergency Department; A retrospective cohort study comparing qSOFA, SIRS and National Early Warning Score. *PloS one*, *14*(1), e0211133.

Casserly, B., Phillips, G. S., Schorr, C., Dellinger, R. P., Townsend, S. R., Osborn, T. M., Reinhart, K., Selvakumar, N., & Levy, M. M. (2015). Lactate measurements in sepsis-induced tissue hypoperfusion: results from the Surviving Sepsis Campaign database. *Critical care medicine*, *43*(3), 567-573.

Castello, L. M., Gavelli, F., Baldrighi, M., Salmi, L., Mearelli, F., Fiotti, N., Patrucco, F., Bellan, M., Sainaghi, P. P., & Ronzoni, G. (2021). Hypernatremia and moderate-to-severe hyponatremia are independent predictors of mortality in septic patients at emergency department presentation: A sub-group analysis of the need-speed trial. *European Journal of Internal Medicine*, *83*, 21-27.

Chen, H., Zhao, C., Wei, Y., & Jin, J. (2019). Early lactate measurement is associated with better outcomes in septic patients with an elevated serum lactate level. *Critical Care*, *23*, 1-11.

Czajka, S., Ziębińska, K., Marczenko, K., Posmyk, B., Szczepańska, A. J., & Krzych, Ł. J. (2020). Validation of APACHE II, APACHE III and SAPS II scores in in-hospital and one year mortality prediction in a mixed intensive care unit in Poland: a cohort study. *BMC anesthesiology*, *20*, 1-8.

De Freitas, G., Gudur, A., Vela-Ortiz, M., Jodelka, J., Livert, D., & Krishnamurthy, M. (2019). Where there is sodium there may be sepsis. *Journal of community hospital internal medicine perspectives*, *9*(4), 296-299.

Drăgoescu, A. N., Pădureanu, V., Stănculescu, A. D., Chiuțu, L. C., Tomescu, P., Geormăneanu, C., Pădureanu, R., Iovănescu, V. F., Ungureanu, B. S., & Pănuș, A. (2021). Neutrophil to lymphocyte ratio (NLR)—a useful tool for the prognosis of sepsis in the ICU. *Biomedicines*, *10*(1), 75.

Farzanegan, B., & Zangi, M. (2017). Predictor factors for sepsis diagnosis, length of ICU stay and mortality in ICU. *Journal of Cellular & Molecular Anesthesia*, *2*(2), 55-62.

Fathi, M., Markazi-Moghaddam, N., & Ramezankhani, A. (2019). A systematic review on risk factors associated with sepsis in patients admitted to intensive care units. *Australian Critical Care*, *32*(2), 155-164.

Fleischmann, C., Scherag, A., Adhikari, N. K., Hartog, C. S., Tsaganos, T., Schlattmann, P., Angus, D. C., & Reinhart, K. (2016). Assessment of global incidence and mortality of hospital-treated sepsis. Current estimates and limitations. *American journal of respiratory and critical care medicine*, *193*(3), 259-272.

FURQAN, A., NASEER, M., & TABASSUM, R. Comparison of Sensitivity, Specificity and Accuracy of APACHE II, SAPS II and SOFA Scoring Systems as Predictors of Mortality in ICU Patients.

Godinez-Vidal, A. R., Correa-Montoya, A., Enríquez-Santos, D., Pérez-Escobedo, S. U., López-Romero, S. C., & Gracida-Mancilla, N. I. (2019). Is albumin a predictor of severity and mortality in patients with abdominal sepsis? *Cirugía y cirujanos*, *87*(5), 485-489.

Godinjak, A., Iglica, A., Rama, A., Tančica, I., Jusufović, S., Ajanović, A., & Kukuljac, A. (2016). Predictive value of SAPS II and APACHE II scoring systems for patient outcome in a medical intensive care unit. *Acta Med Acad*, *45*(2), 97-103. https://doi.org/10.5644/ama2006-124.165

Godinjak, A., Iglica, A., Rama, A., Tančica, I., Jusufović, S., Ajanović, A., & Kukuljac, A. (2016). Predictive value of SAPS II and APACHE II scoring systems for

patient outcome in a medical intensive care unit. *Acta medica academica*, *45* (2).

Gül, F., Arslantaş, M. K., Cinel, İ., & Kumar, A. (2017). Changing Definitions of Sepsis. *Turk J Anaesthesiol Reanim*, *45*(3), 129-138. https://doi.org/10.5152/tjar.2017.93753

Hawari, F. I., Nazer, L. H., Addassi, A., Rimawi, D., & Jamal, K. (2016). Predictors of ICU admission in patients with cancer and the related characteristics and outcomes: a 5-year registry-based study. *Critical care medicine*, *44*(3), 548-553.

Hensley, M. K., Donnelly, J. P., Carlton, E. F., & Prescott, H. C. (2019). Epidemiology and outcomes of cancer-related versus non-cancer-related sepsis hospitalizations. *Critical care medicine*, *47*(10), 1310.

Islam, M. M., Nasrin, T., Walther, B. A., Wu, C.-C., Yang, H.-C., & Li, Y.-C. (2019). Prediction of sepsis patients using machine learning approach: a meta-analysis. *Computer methods and programs in biomedicine*, *170*, 1-9.

Islam, M. M., Nasrin, T., Walther, B. A., Wu, C. C., Yang, H. C., & Li, Y. C. (2019). Prediction of sepsis patients using machine learning approach: A meta-analysis. *Comput Methods Programs Biomed*, *170*, 1-9. https://doi.org/10.1016/j.cmpb.2018.12.027

Javed, A., Guirgis, F. W., Sterling, S. A., Puskarich, M. A., Bowman, J., Robinson, T., & Jones, A. E. (2017). Clinical predictors of early death from sepsis. *Journal of Critical Care*, *42*, 30-34.

Kaukonen, K.-M., Bailey, M., Pilcher, D., Cooper, D. J., & Bellomo, R. (2015). Systemic inflammatory response syndrome criteria in defining severe sepsis. *New England Journal of Medicine*, *372*(17), 1629-1638.

Kim, H., Hur, M., Moon, H.-W., Yun, Y.-M., Di Somma, S., & Network, G. (2017). Multi-marker approach using procalcitonin, presepsin, galectin-3, and soluble suppression of tumorigenicity 2 for the prediction of mortality in sepsis. *Annals of intensive care*, *7*, 1-9.

Kim, M. H., Ahn, J. Y., Song, J. E., Choi, H., Ann, H. W., Kim, J. K., Kim, J. H., Jeon, Y. D., Kim, S. B., & Jeong, S. J. (2015). The C-reactive protein/albumin ratio

as an independent predictor of mortality in patients with severe sepsis or septic shock treated with early goal-directed therapy. *PloS one*, *10*(7), e0132109.

Knaus, W. A., Draper, E. A., Wagner, D. P., & Zimmerman, J. E. (1985). APACHE II: a severity of disease classification system. *Critical care medicine*, *13*(10), 818-829.

Knaus, W. A., Wagner, D. P., Draper, E. A., Zimmerman, J. E., Bergner, M., Bastos, P. G., Sirio, C. A., Murphy, D. J., Lotring, T., & Damiano, A. (1991). The APACHE III prognostic system: risk prediction of hospital mortality for critically III hospitalized adults. *Chest*, *100*(6), 1619-1636.

Libório, A. B., Noritomi, D. T., Leite, T. T., de Melo Bezerra, C. T., de Faria, E. R., & Kellum, J. A. (2015). Increased serum bicarbonate in critically ill patients: a retrospective analysis. *Intensive care medicine*, *41*, 479-486.

Liu, J., Xie, H., Ye, Z., Li, F., & Wang, L. (2020). Rates, predictors, and mortality of sepsis-associated acute kidney injury: a systematic review and meta-analysis. *BMC nephrology*, *21*, 1-16.

Liu, Z., Meng, Z., Li, Y., Zhao, J., Wu, S., Gou, S., & Wu, H. (2019). Prognostic accuracy of the serum lactate level, the SOFA score and the qSOFA score for mortality among adults with Sepsis. *Scand J Trauma Resusc Emerg Med*, *27*(1), 51. https://doi.org/10.1186/s13049-019-0609-3

Manjappachar, N. K., Cuenca, J. A., Ramírez, C. M., Hernandez, M., Martin, P., Reyes, M. P., Heatter, A. J., Gutierrez, C., Rathi, N., & Sprung, C. L. (2022). Outcomes and predictors of 28-day mortality in patients with hematologic malignancies and septic shock defined by sepsis-3 criteria. *Journal of the National Comprehensive Cancer Network*, *20*(1), 45-53.

Martin-Loeches, I., Guia, M. C., Vallecoccia, M. S., Suarez, D., Ibarz, M., Irazabal, M., Ferrer, R., & Artigas, A. (2019). Risk factors for mortality in elderly and very elderly critically ill patients with sepsis: a prospective, observational, multicenter cohort study. *Annals of intensive care*, *9*(1), 1-9.

Minasyan, H. (2022). Oxygen therapy for sepsis and prevention of complications. *Acute and Critical Care*, *37*(2), 137-150.

Mitra, B., Roman, C., Charters, K. E., O'reilly, G., Gantner, D., & Cameron, P. A. (2020). Lactate, bicarbonate and anion gap for evaluation of patients presenting with sepsis to the emergency department: a prospective cohort study. *Emergency Medicine Australasia*, *32*(1), 20-24.

Mohamed, A. K. S., Mehta, A. A., & James, P. (2017). Predictors of mortality of severe sepsis among adult patients in the medical Intensive Care Unit. *Lung India*, *34*(4), 330-335. https://doi.org/10.4103/lungindia.lungindia_54_16

Motzkus, C. A., Chrysanthopoulou, S. A., Luckmann, R., Rincon, T. A., Lapane, K. L., & Lilly, C. M. (2018). ICU admission source as a predictor of mortality for patients with sepsis. *Journal of intensive care medicine*, *33*(9), 510-516.

Na, S. J., Oh, D. K., Park, S., Lee, Y. J., Hong, S. B., Park, M. H., Ko, R. E., Lim, C. M., & Jeon, K. (2023). The Association Between Tachycardia and Mortality in Septic Shock Patients According to Serum Lactate Level: A Nationwide Multicenter Cohort Study. *J Korean Med Sci*, *38*(40), e313. https://doi.org/10.3346/jkms.2023.38.e313

Naqvi, I. H., Mahmood, K., Ziaullaha, S., Kashif, S. M., & Sharif, A. (2016). Better prognostic marker in ICU - APACHE II, SOFA or SAP II! *Pak J Med Sci*, *32*(5), 1146-1151. https://doi.org/10.12669/pjms.325.10080

Nemati, S., Holder, A., Razmi, F., Stanley, M. D., Clifford, G. D., & Buchman, T. G. (2018). An Interpretable Machine Learning Model for Accurate Prediction of Sepsis in the ICU. *Crit Care Med*, *46*(4), 547-553. https://doi.org/10.1097/ccm.0000000000002936

Ni, H.-b., Hu, X.-x., Huang, X.-f., Liu, K.-q., Yu, C.-b., Wang, X.-m., & Ke, L. (2016). Risk factors and outcomes in patients with hypernatremia and sepsis. *The American journal of the medical sciences*, *351*(6), 601-605.

Ning, L., Rong, J., Zhang, Z., & Xu, Y. (2021). Therapeutic approaches targeting renin-angiotensin system in sepsis and its complications. *Pharmacological Research*, *167*, 105409.

Pandey, N. R., Bian, Y.-y., & Shou, S.-t. (2014). Significance of blood pressure variability in patients with sepsis. *World journal of emergency medicine*, *5*(1), 42.

Park, J. E., Chung, K. S., Song, J. H., Kim, S. Y., Kim, E. Y., Jung, J. Y., Kang, Y. A., Park, M. S., Kim, Y. S., & Chang, J. (2018). The C-reactive protein/albumin ratio as a predictor of mortality in critically ill patients. *Journal of Clinical Medicine, 7*(10), 333.

Patel, J. J., Taneja, A., Niccum, D., Kumar, G., Jacobs, E., & Nanchal, R. (2015). The association of serum bilirubin levels on the outcomes of severe sepsis. *Journal of intensive care medicine*, *30*(1), 23-29.

Peng, M., Deng, F., Qi, D., Hu, Z., & Zhang, L. (2021). The hyperbilirubinemia and potential predictors influence on long-term outcomes in sepsis: a population-based propensity score-matched study. *Frontiers in Medicine*, *8*, 713917.

Pladys, P., Vandenbroucke, L., Hernandez, A., & Beuchée, A. (2015). The benefits of measuring heart rate variability in sepsis. *Réanimation*, *24*, 315-321.

Pradhan, S., Ghimire, A., Bhattarai, B., Khanal, B., Pokharel, K., Lamsal, M., & Koirala, S. (2016). The role of C-reactive protein as a diagnostic predictor of sepsis in a multidisciplinary Intensive Care Unit of a tertiary care center in Nepal. *Indian journal of critical care medicine: peer-reviewed, official publication of Indian Society of Critical Care Medicine*, *20*(7), 417.

Raith, E. P., Udy, A. A., Bailey, M., McGloughlin, S., MacIsaac, C., Bellomo, R., & Pilcher, D. V. (2017). Prognostic Accuracy of the SOFA Score, SIRS Criteria, and qSOFA Score for In-Hospital Mortality Among Adults With Suspected Infection Admitted to the Intensive Care Unit. *Jama*, *317*(3), 290-300. https://doi.org/10.1001/jama.2016.20328

Roney, J. K., Whitley, B. E., Maples, J. C., Futrell, L. S., Stunkard, K. A., & Long, J. D. (2015). Modified early warning scoring (MEWS): evaluating the evidence for tool inclusion of sepsis screening criteria and impact on mortality and failure to rescue. *Journal of clinical nursing*, *24*(23-24), 3343-3354.

Rowe, T., Araujo, K. L., Van Ness, P. H., Pisani, M. A., & Juthani-Mehta, M. (2016). Outcomes of older adults with sepsis at admission to an intensive care unit. Open Forum Infectious Diseases,

Ryoo, S. M., Lee, J., Lee, Y.-S., Lee, J. H., Lim, K. S., Huh, J. W., Hong, S.-B., Lim, C.-M., Koh, Y., & Kim, W. Y. (2018). Lactate level versus lactate clearance

for predicting mortality in patients with septic shock defined by sepsis-3. *Critical care medicine*, *46*(6), e489-e495.

Ryu, J.-A., Yang, J. H., Lee, D., Park, C.-M., Suh, G. Y., Jeon, K., Cho, J., Baek, S. Y., C. Carriere, K., & Chung, C. R. (2015). Clinical usefulness of procalcitonin and C-reactive protein as outcome predictors in critically ill patients with severe sepsis and septic shock. *PloS one*, *10*(9), e0138150.

Sadaka, F., EthmaneAbouElMaali, C., Cytron, M. A., Fowler, K., Javaux, V. M., & O'Brien, J. (2017). Predicting Mortality of Patients With Sepsis: A Comparison of APACHE II and APACHE III Scoring Systems. *J Clin Med Res*, *9*(11), 907-910. https://doi.org/10.14740/jocmr3083w

Sakr, Y., Jaschinski, U., Wittebole, X., Szakmany, T., Lipman, J., Ñamendys-Silva, S. A., Martin-Loeches, I., Leone, M., Lupu, M.-N., & Vincent, J.-L. (2018). Sepsis in intensive care unit patients: worldwide data from the intensive care over nations audit. Open forum infectious diseases,

Saleh, A., Ahmed, M., Sultan, I., & Abdel-Lateif, A. (2015). Comparison of the mortality prediction of different ICU scoring systems (APACHE II and III, SAPS II, and SOFA) in a single-center ICU subpopulation with acute respiratory distress syndrome. *Egyptian journal of chest diseases and tuberculosis*, *64*(4), 843-848.

Sanderson, M., Chikhani, M., Blyth, E., Wood, S., Moppett, I. K., McKeever, T., & Simmonds, M. J. (2018). Predicting 30-day mortality in patients with sepsis: An exploratory analysis of process of care and patient characteristics. *Journal of the Intensive Care Society*, *19*(4), 299-304.

Schoenberg, M., Weiss, M., & Radermacher, P. (1998). Outcome of patients with sepsis and septic shock after ICU treatment. *Langenbeck's archives of surgery*, *383*, 44-48.

Shashikumar, S. P., Stanley, M. D., Sadiq, I., Li, Q., Holder, A., Clifford, G. D., & Nemati, S. (2017). Early sepsis detection in critical care patients using multiscale blood pressure and heart rate dynamics. *Journal of electrocardiology*, *50*(6), 739-743.

Shen, Y., Huang, X., & Zhang, W. (2019). Platelet-to-lymphocyte ratio as a prognostic predictor of mortality for sepsis: interaction effect with disease severity—a retrospective study. *BMJ open*, *9*(1), e022896.

Sheyin, O., Davies, O., Duan, W., & Perez, X. (2015). The prognostic significance of troponin elevation in patients with sepsis: a meta-analysis. *Heart & Lung*, *44*(1), 75-81.

Songsangjinda, T., & Khwannimit, B. (2020). Comparison of severity score models based on different sepsis definitions to predict in-hospital mortality among sepsis patients in the Intensive Care Unit. *Medicina Intensiva (English Edition)*, *44*(4), 226-232.

Subbe, C. P., Kruger, M., Rutherford, P., & Gemmel, L. (2001). Validation of a modified Early Warning Score in medical admissions. *Qjm*, *94*(10), 521-526. https://doi.org/10.1093/qjmed/94.10.521

Takegawa, R., Kabata, D., Shimizu, K., Hisano, S., Ogura, H., Shintani, A., & Shimazu, T. (2019). Serum albumin as a risk factor for death in patients with prolonged sepsis: an observational study. *Journal of Critical Care*, *51*, 139-144.

Tang, Y., Sorenson, J., Lanspa, M., Grissom, C. K., Mathews, V., & Brown, S. M. (2017). Systolic blood pressure variability in patients with early severe sepsis or septic shock: a prospective cohort study. *BMC anesthesiology*, *17*(1), 1-6.

Teng, A. K., & Wilcox, A. B. (2020). A review of predictive analytics solutions for sepsis patients. *Applied clinical informatics*, *11*(03), 387-398.

Thiel, S. W., Rosini, J. M., Shannon, W., Doherty, J. A., Micek, S. T., & Kollef, M. H. (2010). Early prediction of septic shock in hospitalized patients. *Journal of hospital medicine: an official publication of the Society of Hospital Medicine*, *5*(1), 19-25.

Torres, V. B., Azevedo, L. C., Silva, U. V., Caruso, P., Torelly, A. P., Silva, E., Carvalho, F. B., Vianna, A., Souza, P. C., & Godoy, M. M. (2015). Sepsis-associated outcomes in critically ill patients with malignancies. *Annals of the American Thoracic Society*, *12*(8), 1185-1192.

Ullah, A. R., Hussain, A., Ali, I., Samad, A., Ali Shah, S. T., Yousef, M., & Khan, T. M. (2016). A prospective observational study assessing the outcome of Sepsis

in intensive care unit of a tertiary care hospital, Peshawar. *Pak J Med Sci*, *32*(3), 688-693. https://doi.org/10.12669/pjms.323.9978

Usman, O. A., Usman, A. A., & Ward, M. A. (2019). Comparison of SIRS, qSOFA, and NEWS for the early identification of sepsis in the Emergency Department. *The American journal of emergency medicine*, *37*(8), 1490-1497.

van der Poll, T., Shankar-Hari, M., & Wiersinga, W. J. (2021). The immunology of sepsis. *Immunity*, *54*(11), 2450-2464.

Velissaris, D., Karamouzos, V., Ktenopoulos, N., Pierrakos, C., & Karanikolas, M. (2015). The use of sodium bicarbonate in the treatment of acidosis in sepsis: a literature update on a long term debate. *Critical care research and practice*, *2015*.

Vincent, J.-L., Moreno, R., Takala, J., Willatts, S., De Mendonça, A., Bruining, H., Reinhart, C., Suter, P., & Thijs, L. G. (1996). The SOFA (Sepsis-related Organ Failure Assessment) score to describe organ dysfunction/failure: On behalf of the Working Group on Sepsis-Related Problems of the European Society of Intensive Care Medicine (see contributors to the project in the appendix). In: Springer-Verlag.

Wang, D., Li, J., Sun, Y., Ding, X., Zhang, X., Liu, S., Han, B., Wang, H., Duan, X., & Sun, T. (2021). A Machine Learning Model for Accurate Prediction of Sepsis in ICU Patients. *Front Public Health*, *9*, 754348. https://doi.org/10.3389/fpubh.2021.754348

Wang, J., Sun, Y., Teng, S., & Li, K. (2020). Prediction of sepsis mortality using metabolite biomarkers in the blood: a meta-analysis of death-related pathways and prospective validation. *BMC medicine*, *18*(1), 1-15.

Wiersinga, W. J., & van der Poll, T. (2022). Immunopathophysiology of human sepsis. *EBioMedicine*, *86*.

Woźnica, E. A., Inglot, M., Woźnica, R. K., & Łysenko, L. (2018). Liver dysfunction in sepsis. *Advances in Clinical & Experimental Medicine*, *27*(4).

Yamano, S., Shimizu, K., Ogura, H., Hirose, T., Hamasaki, T., Shimazu, T., & Tasaki, O. (2016). Low total cholesterol and high total bilirubin are associated with

prognosis in patients with prolonged sepsis. *Journal of Critical Care*, *31*(1), 36-40.

Yan, M. Y., Gustad, L. T., & Nytrø, Ø. (2022). Sepsis prediction, early detection, and identification using clinical text for machine learning: a systematic review. *J Am Med Inform Assoc*, *29*(3), 559-575. https://doi.org/10.1093/jamia/ocab236

Ye, L., Feng, M., Lin, Q., Li, F., & Lyu, J. (2023). Analysis of pathogenic factors on the death rate of sepsis patients. *PloS one*, *18*(12), e0287254.

Yin, M., Si, L., Qin, W., Li, C., Zhang, J., Yang, H., Han, H., Zhang, F., Ding, S., & Zhou, M. (2018). Predictive value of serum albumin level for the prognosis of severe sepsis without exogenous human albumin administration: a prospective cohort study. *Journal of intensive care medicine*, *33*(12), 687-694.

Zabihi, M., Kiranyaz, S., & Gabbouj, M. (2019). Sepsis prediction in intensive care unit using ensemble of xgboost models. 2019 Computing in Cardiology (CinC),

Zaidi, S. F. B., Raouf, M. A., & Tariq, T. (2019). Comparison of APACHE II SAPS II and SOFA scoring systems as predictors of mortality in ICU patients. *Pervaiz Ellahi Inst. Cardiol., Multan, Pakistan, Tech. Rep*, *53*.

Zhang, H., Feng, Y.-w., & Yao, Y.-m. (2018). Potential therapy strategy: targeting mitochondrial dysfunction in sepsis. *Military Medical Research*, *5*(1), 1-11.

Zhang, Y., Khalid, S., & Jiang, L. (2019). Diagnostic and predictive performance of biomarkers in patients with sepsis in an intensive care unit. *Journal of International Medical Research*, *47*(1), 44-58.

Zhang, Y., Khalid, S., & Jiang, L. (2019). Diagnostic and predictive performance of biomarkers in patients with sepsis in an intensive care unit. *J Int Med Res*, *47*(1), 44-58. https://doi.org/10.1177/0300060518793791

Zhou, D., Xi, B., Zhao, M., Wang, L., & Veeranki, S. P. (2018). Uncontrolled hypertension increases risk of all-cause and cardiovascular disease mortality in US adults: the NHANES III Linked Mortality Study. *Scientific reports*, *8*(1), 9418.

Appendices

Appendix A

Datasheet form

Predictors of Admission, Outcomes, Survival, and Mortality Rates in Medical ICU Adult Sepsis Patients in a Tertiary Care Hospital: A Retrospective Study

Code:

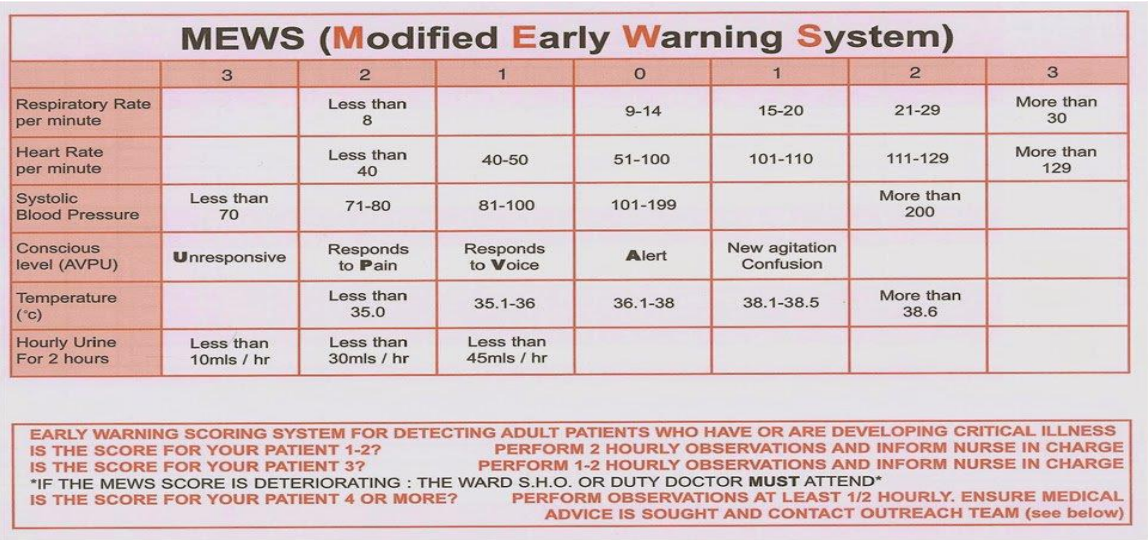
Part one: Demographic data.

- Age:
- Sex: ☐ male ☐ female

Part two: Clinical variable using The Modified Early Warning Score (MEWS).

Clinical variable

- Blood pressure…….
- Mean arterial pressure: ……
- Heart rate:
- Respiratory rate:……..
- Glasgow Coma Scale: ……..
- mental status:……..
- urine output:……..
- The early warning score ……



MEWS (Modified Early Warning System)

	3	2	1	0	1	2	3
Respiratory Rate per minute		Less than 8		9-14	15-20	21-29	More than 30
Heart Rate per minute		Less than 40	40-50	51-100	101-110	111-129	More than 129
Systolic Blood Pressure	Less than 70	71-80	81-100	101-199		More than 200	
Conscious level (AVPU)	**U**nresponsive	Responds to **P**ain	Responds to **V**oice	**A**lert	New agitation Confusion		
Temperature (°c)		Less than 35.0	35.1-36	36.1-38	38.1-38.5	More than 38.6	
Hourly Urine For 2 hours	Less than 10mls / hr	Less than 30mls / hr	Less than 45mls / hr				

EARLY WARNING SCORING SYSTEM FOR DETECTING ADULT PATIENTS WHO HAVE OR ARE DEVELOPING CRITICAL ILLNESS
IS THE SCORE FOR YOUR PATIENT 1-2? PERFORM 2 HOURLY OBSERVATIONS AND INFORM NURSE IN CHARGE
IS THE SCORE FOR YOUR PATIENT 3? PERFORM 1-2 HOURLY OBSERVATIONS AND INFORM NURSE IN CHARGE
*IF THE MEWS SCORE IS DETERIORATING : THE WARD S.H.O. OR DUTY DOCTOR **MUST** ATTEND*
IS THE SCORE FOR YOUR PATIENT 4 OR MORE? PERFORM OBSERVATIONS AT LEAST 1/2 HOURLY. ENSURE MEDICAL ADVICE IS SOUGHT AND CONTACT OUTREACH TEAM (see below)

laboratory values

- CRP: …
- Bicarbonate:….
- Platelets count:……..
- Albumin ……
- Bilirubin:……..
- Pao2 ……
- Hematocrit:……..
- WBCs ……..
- Serum creatinine:-……
- blood urea nitrogen ……
- serum sodium ……..
- serum potassium……..
- PH ……..
- Lactate ……
- blood culture and cultures ……
- Systemic inflammatory response syndrome (SIRS) ……..

Part three: Comorbidities and pre-existing conditions.

- Hypertension……
- Diabetes Mellitus…….
- Malignancy…….
- Renal Disease…….
- Liver Disease…….
- Cardiac Disease……..
- Others……..

Part four: Mechanical ventilation.

- Invasive ventilation
- Non invasive ventilation
- Fio2%
- Pao2/Fio2 ratio

Part five: APACHE II Score (Acute Physiology and Chronic Health Evaluation).

- APACHE II Score …….

Part six: Sequential Organ Failure Assessment (SOFA) Score.

- (SOFA) Score …….

Part seven: Simplified Acute Physiology Score (SAPS II).

- (SAPS II)…….

Appendix B

Regression according to Kruskal–Wallis test

	Unstandardized Coefficients	SE	Standardized Coefficients	t	p-value
Systolic blood pressure	-0.01	0.00	-0.29	-2.90	0.004*
Mean arterial pressure	0.01	0.00	0.24	2.62	0.009*
Heart rate	0.00	0.00	0.11	1.69	0.091
Glasgow coma scale	-0.01	0.01	-0.07	-0.81	0.421
Urine output (Over 24 Hours)	0.00	0.00	-0.07	-1.38	0.168
C-reactive protein	0.00	0.00	-0.05	-1.02	0.310
Platelet count	0.00	0.00	-0.12	-2.19	0.029*
Total serum bilirubin	0.01	0.01	0.07	1.32	0.186
Serum sodium	0.01	0.00	0.07	1.41	0.161
Potential of hydrogen	0.00	0.07	0.00	0.01	0.990
Serum albumin	-0.09	0.04	-0.12	-2.40	0.017*
Serum lactate	0.01	0.01	0.04	0.79	0.428
Modified early warning score	0.00	0.02	-0.01	-0.13	0.898
Norepinephrine	0.00	0.00	0.09	1.55	0.122
Fraction of inspired oxygen	0.01	0.01	0.06	1.20	0.229
Ventilator (Days)	0.00	0.00	0.11	2.01	0.045*
Partial pressure of oxygen / Fraction of inspired oxygen ratio	0.00	0.00	-0.07	-1.41	0.161
Acute physiology and chronic health (Points)	0.01	0.01	0.15	1.61	0.108
Acute physiology and chronic health (Mortality)	0.00	0.00	0.04	0.91	0.361
Sequential organ failure assessment (Points)	0.00	0.01	-0.03	-0.41	0.685
Simplified acute physiology score II (Points)	0.00	0.00	0.12	1.08	0.282
simplified acute physiology score II (Mortality)	0.00	0.00	0.02	0.48	0.631

Appendix C

IRB Approval letter

An-Najah National University
Faculty of Medicine & Health Sciences
Institutional Review Board

جامعة النجاح الوطنية
كلية الطب وعلوم الصحة
لجنة اخلاقيات البحث العلمي

Ref: Mas. Nov. 2023/17

IRB Approval Letter

Title of Research:

Predictors of Admission, Outcomes, Survival, and Mortality Rates in Medical ICU Adult Sepsis Patients in a Tertiary Care Hospital: A Retrospective Study

Submitted by:
Elias Ashqar

Supervisor
Aidah Alkaissi , Ramzi Shawahna

Aproved:
7th Nov. 2023

Your Study "**Predictors of Admission, Outcomes, Survival, and Mortality Rates in Medical ICU Adult Sepsis Patients in a Tertiary Care Hospital: A Retrospective Study. .**" reviewed by An-Najah National University IRB committee and was approved on 7th Nov. 2023

Hasan Fitian, MD

IRB Committee Chairman

IRB Institutional Review Board

Nablus - P.O Box :7 or 707 | Tel (970) (09) 2342902/4/7/8/14 | Faximile (970) (09) 2342910| E-mail : IRB@najah.edu

Appendix D

Regression analysis of variables and scores based on their association with mortality

						95% CI for OR	
	B	S.E.	Wald	p-value	OR	Lower	Upper
Alert	-0.29	2.92	0.01	0.920	0.75	0.00	229.13
Verbal	-1.38	1.46	0.90	0.343	0.25	0.01	4.38
Unresponsive	0.29	1.28	0.05	0.822	1.33	0.11	16.28
Levofloxacin	0.37	0.43	0.76	0.384	1.45	0.63	3.37
Tigecycline	-0.43	0.46	0.86	0.354	0.65	0.27	1.61
Others	1.79	0.93	3.69	0.055	5.97	0.97	36.88
SIRS	0.04	0.47	0.01	0.932	1.04	0.42	2.60
HTN	0.20	0.40	0.26	0.613	1.23	0.56	2.69
Malignancy	-0.53	0.40	1.74	0.188	0.59	0.27	1.30
CVD	0.28	0.48	0.35	0.555	1.33	0.52	3.38
IV(1)	-2.20	1.24	3.14	0.076	0.11	0.01	1.26
NIV	0.06	1.19	0.00	0.958	1.07	0.10	11.08
SOFA Mortality			5.93	0.052			
SOFA Mortality	0.39	0.64	0.38	0.539	1.48	0.43	5.13
SOFA Mortality	-0.98	0.51	3.66	0.056	0.38	0.14	1.02
SBP_Median.	1.44	0.40	13.34	< 0.001*	4.24	1.95	9.21
HR_Median	-0.99	0.42	5.63	0.018*	0.37	0.16	0.84
GCS_Median	0.34	2.89	0.01	0.905	1.41	0.00	403.44
HCO3_Median	-0.02	0.41	0.00	0.970	0.99	0.45	2.18
PLT_Median	0.51	0.41	1.54	0.214	1.66	0.75	3.69
TSB_Median	-0.51	0.38	1.81	0.179	0.60	0.28	1.26
Na_Median	-0.80	0.37	4.84	0.028*	0.45	0.22	0.92
Ph_Median	-0.12	0.42	0.09	0.770	0.89	0.39	2.01
Alb_Median	0.33	0.36	0.83	0.362	1.39	0.68	2.85
Lac_Median	-0.50	0.38	1.75	0.185	0.61	0.29	1.27
MEWS_Median	1.36	0.51	7.16	0.007	3.89	1.44	10.53
Norepinephrine_Median	-0.46	0.38	1.48	0.224	0.63	0.30	1.33
Fio2_median	-0.41	0.44	0.85	0.356	0.66	0.28	1.58
Pao2Fio2_Median	0.92	0.42	4.79	0.029*	2.51	1.10	5.73
APACHE_Points_Median	-0.47	0.58	0.65	0.420	0.63	0.20	1.96
APACHE_Mortality_Median	-0.80	0.59	1.82	0.177	0.45	0.14	1.43
SOFA_Points_Median	0.33	0.58	0.32	0.574	1.39	0.44	4.35
SAPS_Points_Median	-0.90	1.89	0.23	0.633	0.41	0.01	16.40
SAPS_Mortality_Median	0.27	1.91	0.02	0.887	1.31	0.03	54.86

Appendix E

Regression analysis of variables according to LOS

	B	S.E.	Wald	p-value	OR	95% CI for OR	Upper
Blood_Culture	0.69	0.30	5.17	0.023*	1.99	1.10	3.59
Temp_Median	0.65	0.24	7.53	0.006*	1.91	1.20	3.02
PLT_Median(1)	-0.69	0.24	8.68	0.003*	0.50	0.31	0.79
Lac_Median(1)	0.57	0.23	5.98	0.014*	1.77	1.12	2.79
Constant	-0.97	0.39	6.19	0.013*	0.38		

Appendix F

Regression analysis of variables according to Invasive ventilation status

						95% CI for OR	
	B	S.E.	Wald	p-value	OR	Lower	Upper
Alert	4.472	1.969	5.159	**<0.023***	87.518	1.846	4148.816
Unresponsive	-4.417	0.978	20.387	**< 0.001***	0.012	0.002	0.082
Trap_Culture	-4.321	1.039	17.295	**< 0.001***	0.013	0.002	0.102
Malignancy	-0.564	0.523	1.165	0.280	0.569	0.204	1.584
SOFA_Mortality			7.349	**< 0.025***			
SOFA_Mortality	-1.352	0.802	2.845	0.092	0.259	0.054	1.245
SOFA_Mortality	-1.805	0.701	6.622	**< 0.010***	0.165	0.042	0.650
Temp_Median	-0.313	0.472	0.441	0.507	0.731	0.290	1.843
RR_Median	-0.677	0.615	1.214	0.271	0.508	0.152	1.695
GCS_Median	-3.414	2.051	2.771	0.096	0.033	0.001	1.833
Pao2_Median	-0.411	0.575	0.511	0.475	0.663	0.215	2.047
Na_Median	0.295	0.491	0.361	0.548	1.343	0.513	3.519
Ph_Median	-0.429	0.551	0.606	0.436	0.651	0.221	1.917
Lac_Median	0.095	0.529	0.033	0.857	1.100	0.390	3.102
MEWS_Median	0.051	0.589	0.007	0.932	1.052	0.331	3.339
Norepinephrine_Median	0.132	0.480	0.076	0.783	1.141	0.445	2.925
Fio2_median	-0.625	0.656	0.908	0.341	0.535	0.148	1.937
Pao2Fio2_Median	0.268	0.664	0.163	0.686	1.308	0.356	4.810
APACHE_Points_Median	-0.418	0.615	0.461	0.497	0.659	0.197	2.199
APACHE_Mortality_Median	-2.876	1.044	7.587	**<0.006***	0.056	0.007	0.436
SOFA_Points_Median	0.042	0.755	0.003	0.955	1.043	0.237	4.585
SAPS_Points_Median	2.644	2.033	1.692	0.193	14.065	0.262	755.757
SAPS_Mortality_Median	-1.873	2.013	0.866	0.352	0.154	0.003	7.940

Appendix G

Tables of Study

Table G1

Descriptive statistics for study data

N = 326	Range	Minimum	Maximum	Mean	Std. Deviation	Variance	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
Age (Years)	64.00	18.00	80.00	54.9049	16.34983	267.317	-0.542	0.135	-0.669	0.269
SBP	113.00	57.00	170.00	109.2209	19.03293	362.253	0.129	0.135	.0258	0.269
DBP	65.00	30.00	95.00	60.5491	12.74106	162.335	0.180	0.135	-0.211	0.269
MAP	77.00	39.00	116.00	76.3190	13.48102	181.738	0.169	0.135	0.230	0.269
HR	120.00	40.00	160.00	102.2577	22.34460	499.281	-0.093	0.135	-0.328	0.269
Temperature	10.00	30.00	40.00	37.0923	1.06544	1.135	-0.373	0.135	5.778	0.269
RR	44.00	7.00	51.00	23.1411	5.53854	30.675	0.529	0.135	1.495	0.269
GCS	15.00	3.00	15.00	10.7761	5.40901	29.257	-0.729	0.135	-1.417	0.269
UOP over 24 hr	7750.00	0.00	7750.00	1461.5828	1420.84	201880	1.479	0.135	3.288	0.269
CRP	586.00	1.00	587.00	176.8126	124.0068	15377.69	0.610	0.135	-0.300	0.269
HCO3	28.60	9.00	37.60	21.4156	4.86126	23.632	0.076	0.135	0.277	0.269
PLT	843.80	0.20	844.00	175.0929	161.0871	25949.05	1.426	0.135	2.690	0.269
TSB	32.90	0.10	33.00	2.3443	4.13684	17.113	3.772	0.135	17.339	0.269
Pao2	246.00	34.00	280.00	104.3362	36.12347	1304.905	1.724	0.135	4.903	0.269
Hct	44.60	12.70	57.30	27.5589	6.49952	42.244	1.078	0.135	1.877	0.269
WBCS	280.00	0.00	280.00	15.2385	22.07257	487.198	6.793	0.135	68.202	0.269
Cr	14.90	0.10	15.00	2.3087	2.56410	6.575	1.925	0.135	3.746	0.269
BUN	127.70	0.30	128.00	38.7500	28.02967	785.662	0.969	0.135	0.163	0.269
Na	39.00	120.00	159.00	138.7822	6.30495	39.752	0.234	0.135	0.721	0.269
K	4.60	2.60	7.20	4.2345	0.75855	0.575	1.051	0.135	1.668	0.269
PH	4.30	3.38	7.68	7.3337	0.32547	0.106	-11.054	0.135	132.823	0.269
Alb	4.60	0.00	4.6	2.7408	0.61428	0.377	-0.237	0.135	2.096	0.269

Lac		27.70	0.30	28.00	3.0745	3.57015	12.746	4.135	0.135	21.229	0.269
MEWS		12.00	0.00	12.00	4.4877	2.49026	6.201	0.524	0.135	-0.189	0.269
Epinephrine		30.00	0.00	30.00	0.4387	2.84052	8.069	8.291	0.135	76.453	0.269
Norepinephrine		50.00	0.00	50.00	9.3267	9.98845	99.769	1.055	0.135	0.271	0.269
Dopamine		10.00	0.00	10.00	0.0307	0.55385	0.307	18.055	0.135	326.000	0.269
Dobutamin		5.00	0.00	5.00	0.0307	0.39103	0.153	12.708	0.135	160.475	0.269
Fio2		52.00	0.00	52.00	0.5955	2.86175	8.190	17.943	0.135	323.270	0.269
Ventilator (Day)		90.00	0.00	90.00	5.9509	12.01118	144.268	3.076	0.135	11.917	0.269
Pao2\Fio2		881.00	11.00	892.00	271.0828	127.5789	16276.38	1.017	0.135	2.213	0.269
APACHE II (Points)		41.00	3.00	44.00	20.5552	8.2433	67.952	0.200	0.135	-0.625	0.269
APACHE II (Mortality)		84.96	0.04	85.00	0.7570	5.17402	26.771	14.713	0.135	227.615	0.269
SOFA (Points)		21.00	0.00	21.00	9.1871	4.41870	19.525	0.156	0.135	-0.173	0.269
SAPS II (Points)		99.00	6.00	105.00	47.7347	20.14992	406.019	0.358	0.135	-0.515	0.269
SAPS II (Mortality)		90.99	0.01	91.00	0.8319	5.51064	30.367	14.806	0.135	230.936	0.269
LOS (Day)		162.00	1.00	163.00	13.0184	15.83452	250.732	4.144	0.135	28.251	0.269

Table G2

Distribution of participants according to Clinical data, Mental status, SIRS and MEWS

Clinical data and Modified Early Warning Score.	Total (N=326) N (%)	Survival status		Statistical test	
		Survived (N=191)	Died (N=135)	Chi-square	P-value
SBP					
Less than 110	150 (46)	67 (44.67)	83 (55.33)	2	> 0.001*
110 ≥	176 (54)	124 (70.45)	52 (29.55)	2.197	
DBP					
Less than 60	133 (40.8)	80 (60.15)	53 (39.85)	0.226	0.649
60 ≥	193 (59.2)	111	82		
MAP					
Less than 76	154 (47.2)	83 (53.9)	71 (46.1)	2.649	0.115
76 ≥	172 (52.8)	108 (62.79)	64 (37.21)		
HR					
Less than 100	130 (39.9)	99 (76.15)	31 (23.85)	27.496	> 0.001*
100 ≥	196 (60.1)	92 (46.94)	104 (53.06)		
Temperature					
Less than 37	161 (49.4)	102 (63.35)	59 (36.65)	2.977	0.092
37 ≥	165 (50.6)	89 (53.94)	76 (46.06)		
RR					
Less than 23	154 (47.2)	92 (59.74)	62 (40,26)	0.159	0.736
23 ≥	172 (52.8)	99 (57.56)	73 (42.44)		
GCS					
Less than 14	124 (38)	40 (32.26)	84 (67.74)	57.186	> 0.001*
14 ≥	202 (62)	151 (74.75)	51 (25.25)		
UOP over 24hr					
Less than 1200	162 (49.7)	102 (62.96)	60 (37.04)	2.539	0.117
1200 ≥	164 (50.3)	89 (54.27)	75 (45.73)		
HCO3					
Less than 21.5	162 (49.7)	84 (51.85)	78 (48.15)	6.024	0.018*
21.5 ≥	164 (50.3)	107	57		
Plt					
Less than 134	162 (49,7)	78 (48.15)	84 (51.85)	14.469	> 0.001*
134 ≥	164 (50.3)	113 (68.9)	51 (31.1)		
TSB					
Less than 0.8	155 (47.5)	109 (70.32)	46 (29.68)	16.768	> 0.001*
0.8 ≥	171 (52.5)	82 (47.95)	98 (57.31)		
Pao2					
Less than 98.5	163 (50)	101 (61.96)	62 (38.04)	1.530	0.261
98.5 ≥	163(50)	90 (55.21)	73 (44.79)		
Hct					
Less than 26.75	163 (50)	90 (55.21)	73 (44.79)	1.530	0.261
26.75 ≥	163 (50)	101 (61.96)	62 (38.04)		
WBCs					
Less than 10.5	160 (49.1)	93 (58.13)	67 (41.88)	0.028	0.911
10.5 ≥	166 (50.9)	98 (50.04)	68 (40.96)		
Cr					
Less than 1.245	163 (50)	97 (59.51)	66 (40.49)	0.114	0.822
1.245 ≥	163 (50)	98 (60.12)	68 (41.72)		
CRP					
Less than 156	162 (49.7)	102 (62.96)	60 (37.04)	2.539	0.117

156 ≥	164 (50.3)	89 (54.27)	75 (45.73)		
BUN					
Less than 30	162 (49.7)	101 (62.35)	61 (37,65)	1.873	0.179
30 ≥	164(50.3)	90 (54.88)	74 (45.12)		
Na					
Less than 138	144 (44.2)	100 (69.44)	44 (30.56)	12.528	> 0.001*
138 ≥	182 (55.8)	91 (50)	91 (50)		
K					
Less than 4.1	159 (48.8)	95 (59.75)	64 (40.25)0	.172	0.736
4.1 ≥	167 (51.2)	96 (57.49)	71 (42.51)		
PH					
Less than 7.37	157 (48.2)	81 (51.59)	76 (48.41)	6.110	0.018*
7.37 ≥	169 (51.8)	110 (65.09)	59 (34.91)		
Alb					
Less than 2.7	150 (46)	78 (52)	72(48)	4.972	0.032*
2.7 ≥	176 (54)	113 (64.2)	63 (35.8)		
Lac					
Less than 2	152 (46.6)	109 (71.710	43 (28,29)	20.209	> 0.001*
2 ≥	174 (53.4)	82 (47.13)	92 (52.87)		
MEWS					
Less than 4	122 (37.4)	95 (77.87)	27 (22.13)	29.869	> 0.001*
4 ≥	204 (62.6)	96 (47.06)	108 (52.94)		
Alert					
Yes	200 (61.3)	150 (75)	50 (25)	57.440	> 0.001*
No	126 (38.7)	41 (32.54)	85 (67.46)		
Verbal					
Yes	15 (4.6)	2 (13.33)	13 (86.67)	13.273	> 0.001*
No	311 (95.4)	189 (60.77)	122 (39.23)		
Pain					
Yes	6 (1.8)	3	3	0.186	0.695
No	320 (98.2)	188	132		
Unresponsive					
Yes	105 (32.2)	36 (34.29)	69 (65.71)	37.706	> 0.001*
No	221 (67.8)	155 (70.14)	66 (29.86)		
SIRS					
Yes	232 (71.2)	127 (54.74)	105 (45.26)	4.909	0.035*
No	94 (28.8)	64 (68.09)	30 (31.91)		

Table G3

Distribution of participants based on their length of stay

Distribution of participants based on their length of stay	Total (N=326) N (%)	Length of stay (days)		Statistical test	
		Less than 8 days	More than 8 days	Chi-square	P-value
Age (years)					
Less than 58	157 (48.2)	72 (45.86)	85 (54.14)	1.029	0.320
58 ≥	169 (51.8)	87 (51.48)	82 (48.52)		
Sex					
Male	192 (58.9)	94 (48.96)	98 (51.04)	0.006	1.000
Female	134 (41.1)	65 (48.51)	69 (51.49)		
SBP					
Less than 110	150 (46)	78 (52)	72 (48)	1.158	0.317
110 ≥	176 (54)	81 (46.02)	95 (53.98)		
DBP					
Less than 60	133(40.8)	64 (47.12)	69 (51.88)	0.038	0.910
60 ≥	193 (59.2)	95 (49.22)	98 (52.3)		
MAP					
Less than 76	154 (47.2)	78 (50.65)	76 (49.35)	0.411	0.579
76 ≥	172 (52.8)	81 (47.09)	91 (52.91)		
HR					
Less than 100	130 (39.9)	58 (44.62)	72 (55.38)	1.496	0.258
100 ≥	196 (60.1)	101 (51.53)	95 (48.47)		
Temp					
Less than 37	161 (49.4)	90 (55.9)	71 (44.1)	6.468	0.015*
37 ≥	165(50.6)	69 (41.82)	96 (58.18)		
RR					
Less than 23	154 (47.2)	71 (46.1)	83 (53.9)	0.832	0.376
23 ≥	172 (52.8)	88 (51.16)	84 (48.84)		
GCS					
Less than 14	124 (38)	62 (50)	62 (50)	0.121	0.734
14 ≥	202 (62)	97 (48.02)	105 (51.98)		
UOP					
Less than 1200	162 (49.7)	74 (45.68)	88 (54.32)	1.234	0.271
1200 ≥	164 (50.3)	85 (51.83)	79 (48.17)		
MEWS					
Less than 4	122 (37.4)	57 (46.72)	65 (53.28)	0.328	0.570
4 ≥	204 (62.6)	102 (50)	102 (50)		
HTN					
No	194 (59.5)	93 (47.94)	101 (52.06)	0.134	0.736
Yes	132 (40.5)	66 (50)	66 (50)		
DM					
No	218 (66.9)	106 (48.62)	112 (51.38)	0.006	1.000
Yes	108 (33.1)	53 (49.07)	55 (50.93)		
Malignancy					
No	135 (41.4)	60 (44.44)	75 (55.56)	1.728	0.216
Yes	191 (58.6)	99 (51.83)	93 (48.69)		
Renal disease					
No	206 (63.2)	101 (49.03)	105 (50.97)	0.015	0.909
Yes	120 (36.8)	58 (48.33)	62 (51.67)		
Liver disease					

No	297 (91.1)	144 (48.48)	153 (51.52)	0.111	0.846
Yes	29 (8.9)	15 (51.72)	14 (48.28)		
CVD					
No	241 (73.9)	119 (49.38)	122 (50.62)	0.135	0.801
Yes	85 (26.1)	40 (47.06)	45 (52.94)		
Plt					
Less than 134	162 (49.7)	90 (55.56)	72 (44.44)	5.929	0.020*
134 ≥	164 (50.3)	69 (42.07)	95 (57.93)		
WBCs					
Less than 10.5	160 (49.1)	81 (59.63)	79 (49.38)	.431	0.580
10.5 ≥	166 (50.9)	78 (46.99)	88 (53.01)		
CRP					
Less than 156	162 (49.7)	74 (45.68)	88 (54.32)	1.234	0.271
156 ≥	164 (50.3)	85 (51.83)	79 (48.17)		
Lac					
Less than 2	152 (46.6)	64 (42.11)	88 (57.89)	5.067	0.027*
2 ≥	174 (53.4)	95 (54.6)	79 (45.4)		

Table G4

Distribution of participants based on their need for invasive Mechanical ventilation

Distribution of participants based on their Mechanical ventilation status	Total (N=326) N (%)	Invasive ventilation		Statistical test	
		No	Yes	Chi-square	P-value
Age (years)					
Less than 58	157 (48.2)	94 (61.78)	63 (40.13)	0.056	0.823
58 ≥	169 (51.8)	99 (58.58)	70 (41.42)		
Sex					
Male	192 (58.9)	112 (58.33)	80 (41.67)	. 0.146	0.732
Female	134 (41.1)	81 (60.45)	53 (39.55)		
SBP					
Less than 110	150 (46)	88 (58.67)	62 (41.33)	0.033	0.910
110 ≥	176 (54)	105 (59.66)	71 (40.34)		
DBP					
Less than 60	133(40.8)	86 (64.66)	47 (35.34)	2.772	0.109
60 ≥	193 (59.2)	107	86		
MAP					
Less than 76	154 (47.2)	95 (61.69)	59 (38.31)	0.747	0.430
76 ≥	172 (52.8)	98 (56.98)	78 (45.35)		
HR					
Less than 100	130 (39.9)	84 (64.62)	46 (35.38)	2.623	0.109
100 ≥	196 (60.1)	109 (55.61)	87 (44.39)		
Temp					
Less than 37	161 (49.4)	105 (65.22)	56 (34.78)	4.765	0.033*
37 ≥	165(50.6)	88 (53.33)	77 (46.67)		
RR					
Less than 23	154 (47.2)	78 (50.65)	76 (49.35)	8.841	0.003*
23 ≥	172 (52.8)	115 (66.86)	57 (33.14)		
GCS					
Less than 14	124 (38)	14 (11.29)	110 (88.71)	190.198	> 0.001*
14 ≥	202 (62)	179 (88.61)	23 (11.39)		
UOP					
Less than 1200	162 (49.7)	99 (61.11)	63 (38.98)	0.486	0.501
1200 ≥	164 (50.3)	94 (57.32)	70 (42.68)		
MEWS					
Less than 4	122 (37.4)	108 (88.52)	14 (11.48)	69.401	> 0.001*
4 ≥	204 (62.6)	85 (41.67)	119 (58.33)		
HTN					
No	194 (59.5)	108 (55.67)	86 (44.33)	2.475	0.136
Yes	132 (40.5)	85 (64.39)	47 (35.61)		
DM					
No	218 (66.9)	124 (56.88)	94 (43.12)	1.469	0.234
Yes	108 (33.1)	69 (63.89)	39 (36.11)		
Malignancy					
No	135 (41.4)	90 (66.67)	45 (33.33)	5.315	0.023*
Yes	191 (58.6)	103 (53.93)	88 (46.07)		
Renal disease					
No	206 (63.2)	120 (58.25)	86 (41.75)	0.209	0.726

Yes	120 (36.8)	73 (60.83)	47 (39.17)		
Liver disease					
No	297 (91.1)	174 (58.59)	123 (41.41)	0.526	0.555
Yes	29 (8.9)	19 (65.52)	10 (34.48)		
CVD					
No	241 (73.9)	138 (57.26)	103 (42.74)	1.442	0.250
Yes	85 (26.1)	55 (64.71)	30 (35.29)		
Plt					
Less than 134	162 (49.7)	94 (58.02)	68 (41.98)	0.185	0.735
134 ≥	164 (50.3)	99 (60.37)	65 (39.63)		
WBCs					
Less than 10.5	160 (49.1)	98 (61.25)	62 (38.75)	0.545	0.499
10.5 ≥	166 (50.9)	95 (57.23)	71 (42.77)		
CRP					
Less than 156	162 (49.7)	99 (61.11)	63 (38.89)	0.486	0.501
156 ≥	164 (50.3)	94 (57.32)	70 (42.68)		
Lac					
Less than 2	152 (46.6)	101 (66.45)	51 (33.55)	6.189	0.013*
2 ≥	174 (53.4)	92 (52.87)	82 (47.13)		

Table G5

Kruskal–Wallis test

	Death	25	50	75	P-value
Age	No	45.5	57.0	68.0	0.389
	Yes	45.0	59.0	68.0	
SBP	No	100.0	110.0	110.0	>0.001*
	Yes	90.0	103.0	115.0	
DBP	No	50.0	60.0	70.0	0.637
	Yes	50.0	60.0	70.0	
MAP	No	69.5	76.0	86.0	0.039
	Yes	66.0	74.0	83.0	
HR	No	80.0	96.0	111.0	>0.001*
	Yes	100.0	110.0	120.0	
Temperature	No	36.5	36.9	37.7	0.473
	Yes	36.5	37.0	37.9	
RR	No	19.0	23.0	25.0	0.081
	Yes	20.0	24.0	28.0	
GCS	No	14.0	15.0	15.0	>0.001*
	Yes	3.0	3.0	14.0	
UOP over 24 hr	No	415.0	1430.0	2385.0	0.013
	Yes	5.0	960.0	1920.0	
CRP	No	64.5	136.0	253.0	0.035
	Yes	96.5	187.0	265.5	
HCO3	No	19.0	22.0	25.0	0.073
	Yes	17.0	20.6	25.0	
PLT	No	67.5	179.0	263.0	0.004
	Yes	26.0	94.0	256.5	
TSB	No	0.4	0.7	1.6	>0.001*
	Yes	0.5	1.1	3.3	
Pao2	No	80.5	97.0	119.0	0.916
	Yes	80.5	99.0	120.0	
Hct	No	23.3	27.2	31.6	0.091
	Yes	22.9	26.2	29.3	
WBCs	No	6.3	10.6	17.0	0.862
	Yes	5.2	10.5	18.9	
Cr	No	0.7	1.1	3.5	0.650
	Yes	0.6	1.3	2.7	
BUN	No	16.0	28.0	57.6	0.366
	Yes	19.0	32.0	54.0	
Na	No	134.5	137.0	141.0	>0.001*
	Yes	136.0	140.0	144.0	
K	No	3.7	4.1	4.6	0.270
	Yes	3.8	4.1	4.7	
PH	No	7.3	7.4	7.4	0.003*
	Yes	7.3	7.3	7.4	
Alb	No	2.5	2.8	3.1	>0.001*
	Yes	2.2	2.6	3.0	
Lac	No	1.1	1.6	2.9	>0.001*
	Yes	1.7	2.8	4.6	
MEWS	No	2.0	4.0	5.0	>0.001*
	Yes	4.0	6.0	7.0	
Epinephrine	No	0.0	0.0	0.0	0.197

	Yes	0.0	0.0	0.0	
Norepinephrine	No	0.0	3.0	10.0	>0.001*
	Yes	4.0	10.0	23.5	
Dopamine	Yes	0.0	0.0	0.0	0.234
Dobutamin	No	0.0	0.0	0.0	0.805
	Yes	0.0	0.0	0.0	
Fio2	No	0.3	0.4	0.5	>0.001*
	Yes	0.4	0.5	0.6	
Ventilator days	No	0.0	0.0	0.0	>0.001*
	Yes	0.0	4.0	14.0	
Pao2\Fio2 ratio	No	212.5	296.0	360.5	>0.001*
	Yes	151.0	216.0	284.3	
APACHE II (Points)	No	12.5	16.0	23.0	> 0.001*
	Yes	19.0	26.0	31.0	
APACHE II (Mortality)	No	0.2	0.3	0.4	> 0.001*
	Yes	0.3	0.6	0.7	
SOFA (Points)	No	5.0	8.0	10.0	> 0.001*
	Yes	9.0	12.0	14.0	
SAPS II (Points)	No	27.0	36.0	51.0	> 0.001*
	Yes	48.0	60.0	72.5	
SAPS II (Mortality)	No	0.1	0.2	0.5	> 0.001*
	Yes	0.4	0.7	0.9	
LOS (Day)	No	4.0	8.0	14.0	0.936
	Yes	3.0	8.0	19.5	

جـامعـــة النجاح الوطنية

كليـــة الدراســـات العليـــا

عوامل التنبؤ بالقبول، النتائج، معدلات البقاء، ومعدلات الوفاة لدى مرضى تسمم الدم البالغين في وحدة العناية المركزة الطبية بالمستشفى الجامعي: دراسة استرجاعية

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قدمت هذه الرسالة استكمالا لمتطلبات الحصول على درجة الماجستير في تمريض العناية المكثفة، من كلية الدراسات العليا، في جامعة النجاح الوطنية، نابلس– فلسطين.

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الملخص

الخلفية: الإنتان هو مرض خطير ينتج عن رد فعل الجسم المفرط تجاه العدوى. بسبب ارتفاع معدل الوفيات، وارتفاع تكاليف العلاج، وتأثيراتها طويلة الأمد على الناجين. تعد تقنيات العلاج بالإجماع والكشف المبكر والوعي أمرًا بالغ الأهمية بسبب تشخيص التحديات والحاجة إلى العلاج في الوقت المناسب.

الهدف: تقييم قدرة التنبؤ بالإدخال، والنتائج، والبقاء على قيد الحياة، والوفيات في مرضى البالغين المُقبلين على وحدة العناية المركزة الطبية الذين يعانون من التهاب الدم في مستشفى رعاية ثالثية.

المنهجية: تمت هذه الدراسة من عام 2018 إلى عام 2023، باستخدام تصميم استرجاعي. كان حجم العينة يتكون من 326 مريضًا. كان التركيز في هذه الدراسة على المرضى الذين تم تحديدهم كمصابين بالتهاب الدم والذين يراجعون مستشفى الجامعة الوطنية النجاح .(NNUH) كانت الأداة المستخدمة لجمع البيانات في هذه الدراسة هي بيانات ديموغرافية وسريرية ومختبرية عند الالتحاق بأدوات التنبؤ من نظام سجل الصحة الإلكتروني وبقاء المريض.

النتائج: تم تحليل بيانات عينة تضم 326 مريضاً مصاباً بالتهاب الدم، وأظهرت النتائج أن 135 مريضاً (41.41%) لم يبقوا على قيد الحياة، بينما بقي 191 مريضاً (58.59%) على قيد الحياة. تبين أن وفاة هؤلاء المرضى لم تتأثر بشكل كبير ببياناتهم الديموغرافية. ومع ذلك، كانت العديد من المتغيرات السريرية مرتبطة بشكل معنوي بالوفاة، مما يشير إلى إمكانية استخدامها كعوامل تنبؤ بنتائج التهاب الدم. وتشمل هذه المتغيرات ضغط الدم الانبساطي، معدل ضربات القلب، مقياس غلاسكو للوعي، HCO3، PH، مجموع بيليروبين الدم، صوديوم الدم، الألبومين، لاكتات الدم، ومتلازمة الاستجابة الالتهابية النظامية. علاوة على ذلك، كان هنالك ترابط قوي بين الوفاة ووجود السرطان لدى مرضى الالتهاب الدموي، ووجد ان التدابير التنبؤية فعالة APACHE II, SOFA, SAPS II. للغاية في تنبؤ الوفاة لدى مرضى التهاب الدم تدابير مثل

الاستنتاج: تم اكتشاف أن بين مرضى التهاب الدم، العمر والجنس لم تكنا عوامل تنبؤ مهمة بالدخول إلى وحدة الرعاية المركزة الطبية. ومن ناحية أخرى، أظهرت عدة معايير وعلامات وعوامل واعدة كعوامل تنبؤ بالدخول إلى وحدة الرعاية المركزة في حالات التهاب الدم، بما في ذلك ضغط الدم الانبساطي، معدل ضربات القلب، مقياس غلاسكو للوعي، HCO3، الحموضة (pH)، مجموع بيليروبين الدم، صوديوم الدم، الألبومين، لاكتات الدم، ومتلازمة الاستجابة الالتهابية النظامية. علاوة على ذلك، كان هناك ترابط بين وجود السرطان وزيادة خطر الإصابة بالتهاب الدم.

الكلمات المفتاحية: التهاب الدم، وحدة الرعاية المركزة الطبية، علامات التحذير المبكر المعدلة، APACHE II.، SOFA، SAPS II، التنبؤ بالإقامة في المستشفى، مستشفى النجاح الوطني الجامعي.