A study to assess the occurrence of Sepsis and its Risk Factors and Outcome among the patients admitted to the Intensive Care Unit in a selected hospital , Kolkata ,West Bengal

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Abstract

A descriptive research study was conducted to assess the occurrence of sepsis and its risk factors and outcome among the patients admitted to the intensive care unit in a selected hospital, Kolkata, West Bengal. The objective of the study was to assess the occurrence of sepsis and its risk factors and outcome among the patients admitted to the intensive care unit. The researcher adopted a non-experimental survey research design for the study.130 patients who were admitted to the intensive care unit were selected as sample of the study using the non-probability consecutive sampling technique. Data were collected with a record analysis proforma based on SOFA (Sequential Organ Failure Assessment) criteria and some other laboratory parameters for the occurrence of sepsis, the record analysis proforma on risk factors of sepsis and on outcome of sepsis.The study result revealed that the occurrence of sepsis was 27.69% among them 61.11% were community acquired sepsis and 38.89% were hospital acquired sepsis.The most common microorganism was the gram negative microbe (Klebsiella pneumonnii) and source of microorganism growth was respiratory tract among the sepsis patients. 52.78% sepsis patients had developed septic shock and 52.78% had 28days mortality.The average length of ICU stay and hospital stay were 14.3 and 6.5 respectively among the sepsis patients. A significant association was found between the occurrence of sepsis with the comorbid conditions such as DM ($\chi^2_{(1)}$-9.604,OR-3.71), CKD/AKI ($\chi^2_{(1)}$-9.799,OR-3.47) and HF ($\chi^2_{(1)}$-5.193,OR-3.15) and the medical risk factors such as Use of immunosuppressive drugs ($\chi^2_{(1)}$-7.068,OR-7.42), Use of invasive catheters ($\chi^2_{(1)}$-9.604,OR-14.78),Use of indwelling foley's catheters ($\chi^2_{(1)}$-4.439,OR-3.22),Use of renal replacement therapy ($\chi^2_{(1)}$- 6.374,OR-3.12),Use of invasive mechanical ventilation ($\chi^2_{(1)}$-37.761,OR-13.67) and Event of hospitalization in last 6months ($\chi^2_{(1)}$-22.61,OR-8.03). The study also showed that there was a significant association between development of septic shock with the comorbid conditions such as COPD ($\chi^2_{(1)}$-4.122,OR-5.45) and also between 28days mortality with the comorbid conditions such as CKD/AKI ($\chi^2_{(1)}$-4.989,OR-5.37).The study findings could be implicated in nursing education, research, administration and the clinical practice.The study can be replicated with a large population in different hospital settings for the generalization.

Keywords: Descriptive research, microorganism, drugs, Organ Failure Assessment

Introduction

Background of the study

Sepsis is defined as the "Life threatening organ dysfunction caused by a dysregulated host response to infection" as explained in the newer definition of sepsis by SEPSIS-3 (The Third International Consensus Definition for Sepsis and Septic Shock) guideline 2016, and for the clinical ope-rationalization it can be represented by an increase in SOFA (Sequential Organ Failure Assessment) score of 2 points or more which is associated with an increase hospital mortality of greater than 10%. And Septic shock is defined as a subset of sepsis, in which particularly profound circulatory , cellular and metabolic abnormalities are associated with a greater risk of mortality than sepsis alone. Patient with septic shock can be clinically identified as a vasopressor requirement to maintain a mean arterial pressure of 65 mm Hg or greater and serum lactate level greater than 2 mmol/L in absence of hypovolemia. This combination is associated with hospital mortality rate greater than 40%.[1]

Patients with chronic comorbidities like cancer, hypertension, diabetes, kidney disease, HIV/AIDS, liver disease, alcohol dependence, and victims of burn induces the risk for the development of sepsis. In addition environmental factors like poor sanitation, limited clean water availability and social-demographic factors such as poverty, illiteracy, transportation, age, sex and race influence the course and outcome of sepsis. Along with this some other factors like use of immunosuppressive drugs, recent surgeries and medical factors like use of any invasive catheters (iv, peripheral,CVP, arterial catheter etc), use of renal replacement therapies, mechanical ventilation and any kind of medical invasive procedures also induce the risk for developing Sepsis. The sign and symptoms leading to sepsis are fever or hypothermia, arterial hypo-tension (eg systolic blood pressure < 90 mmHg, Mean arterial pressure {MAP}< 70mmHg), tachycardia (heart rate >90bpm), tachypnea (RR>20bpm), altered mental status, oliguria or anuria bleeding diathermy, skin rashes, warm flushed or cold clammy skin, and symptoms that reflect primary site of infection, Urinary tract infection, GI tract, CNS, Respiratory tract etc lead to the development of Sepsis. But the laboratory signs or features of sepsis are not specific and these are associated with the abnormalities due to mainly the underlying cause of sepsis or tissue hypoperfusion or organ dysfunction from sepsis which include leukocytosis (WBC count > 12000microl^{-1}) or leukopenia (WBC count< 4000microl^{-1}), plasma C-reactive protein more than 2 standard deviation above the normal value, arterial hypoxaemia (arterial oxygen tension i.e P/F ratio <300), acute oliguria (UO < 0.5ml/kg/hour for at least 2 hours despite adequate fluid resuscitation, creatinine level increases > 0.5 mg/dl, coagulation abnormalities (INR>1.5 or APTT> 60seconds), thrombocytopenia (platelet count <100,000 microl^{-1}), hyperbilirubinemia (elevated bilirubin level) , hyperlactetemia (Elevated serum lactate level > 2 mmol/L. Sepsis may be called as a clinical syndrome that has physiological, biological and biochemical abnormalities caused by a dysregulated inflammatory response to an infection. Sepsis and inflammatory response as a result can lead to the multiple organ dysfunction syndrome or finally death.[2]

Any infections including bacterial infections, fungal or viral can trigger the occurrence of sepsis. Although the infections leading to sepsis are usually bacterial, the most common types of infections are pneumonia, abdominal infection, kidney infection, bloodstream infection, etc. According to previous studies Gram positive bacteria were found as the primary cause of sepsis before the introduction of antibiotics in the 1950s. After the

introduction of antibiotics, gram negative bacteria became the predominant cause of sepsis from the year 1960s to 1980s. After year 1980s, again the gram positive bacteria, most commonly staphylocoocci, were thought to cause more than 50% of the cases of sepsis. Other commonly involved bacteria causing sepsis include Streptococcus pyogenes, Escherichia coli, Pseudomonas aeruginosa and klebsiella species.

According to National Institute of Sciences the number of sepsis cases in the United states increases every year, and the possible reason for this increase included an aging population as sepsis was more common among the seniors, an increase in antibiotic resistance, as an antibiotic loses its ability to resist or kill bacteria, an increase in no of population with pre-existing illness that weaken their immune system.

There are different conditions of varying severity within the sepsis patients. Sepsis may be progressed to its more complicated stages from sepsis to severe sepsis, septic shock , multiple organ dysfunctions syndrome and finally death. So, the chances of developing complications of sepsis depends on the types of infection and its site of infection. Septic patients with respiratory infections are usually at higher risk of developing respiratory organ dysfunction, including complications such as acute respiratory distress syndrome. Impaired tissue oxygenation that occurs in sepsis is caused by various factors including low blood pressure, reduced red blood cell deformability and micro vascular thrombosis. Reduced red blood cell deformability refers to the blood cell's ability to change its shape while in stress without rupturing and it contributes to the decreased stress resistance. Microvascular thrombosis refers to blood clotting, which during sepsis occurs within blood vessels and can block them. Intracellularly, there is mitochondrial damage that impaires oxygen use once oxygen arrives at tissues and cells. This is caused by the oxidative stress that the mitochondria experience during sepsis complication leading to the severe sepsis. Apart from this, again sepsis can lead to other fatal organ dysfunctions related complications such as sepsis associated encephalopathy, renal failure, DIC, liver failure etc. And as the long outcome of sepsis there may be higher burden of chronic diseases.[3]

Rhodes A, Evans LE et al proposed the 'Survival sepsis Campaign : International Guidelines for Management of Sepsis and Septic Shock' in 2016 to provide an update to "Survival Sepsis Campaign Guidelines for Management of Sepsis and Septic shock 2012" as sepsis become one of the major public health problems affecting millions of people around the world in each year and killing as many as one in four of populations.According to its report, Similar to poly-trauma, acute myocardial infarction or stroke, early identification and appropriate management in initial hours after sepsis development improves its outcome.Various recommendation statement for the effective management of sepsis and septic shock was proposed by this guidelines panel.[4]

K Annahieta et al according to the Western Journal of Emergency Medicine stated that in April 2018 Surviving Sepsis Campaign (SSC) released an updated sepsis bundle as 'One - hour sepsis Bundle' which combined directives previously listed in three-hour and six hour bundles and it included the elements like measuring lactate level and remeasure it if initial lactate level more than 2mmol/L, obtaining blood cultures prior to administration of antibiotics, administration of broad spectrum antibiotics, rapid administration of 30ml/kg crystalloid for hypotension or lactate more than equal to 4mmol/L and use of vasopressors if

patient is hypotensive despite fluid resuscitation to maintain MAP more than equal to 65 mm Hg.[5]

Despite this initiation of Survival sepsis campaign and hour one sepsis bundle, World Health Organization (WHO) reported that epidemiological burden of sepsis was difficult to ascertain. It was estimated to affect more than 30million people worldwide every year, potentially leading to 6million deaths. The burden of sepsis was most likely highest in low and middle income countries. Sepsis could be the clinical manifestation of infections acquired both in community setting or in health care facilities. Health care- associated infections were one of it and the most frequent type of adverse event to occur during care delivery and affect hundreds of millions of patients world wide every year.

Mayr FB, Yende Sachin et al in a review on 'Epidemiology of severe sepsis' in the journal Virulence stated that severe sepsis was a leading cause of death in the United state and the most common cause of death among critically ill patients in non-coronary intensive care units. The incidence of severe sepsis was estimated to be 300 per 100000 population according to its result. A fourth of these patients would have died during their hospital stay. Septic shock was associated with highest mortality approaching 50%. The cumulative burden of organ failure was the strongest predictor of death, both in terms of the number of organs failing and the degree of organ dysfunction. In this review they had also stated that according to the point prevalence studies in the Intensive Care Unit describing the epidemiology of Severe sepsis stated that 32.8% patients in 254 Mexican ICUs had sepsis on a single day. The incidence of sepsis was found in the countries like UK (27.1%) and Brazil (27.3%). They had also stated that the prospective cohort studies conducted on sepsis, in which incidence was directly observed were more accurate. People of older age, male gender, black race and preexisting chronic health conditions were particularly prone to develop severe sepsis, hence prevention strategies should be targeted at these vulnerable populations. And the epidemiology of severe sepsis in developing countries might differ significantly from the developed country.[6]

Westphal GA et al in a retrospective cohort study which was conducted between January 2010 and December 2015 at a private hospital in Southern Brazil on 'Characteristics and outcome of patients with community acquired sepsis and hospital acquired sepsis' stated that the patients with sepsis could be divided into two different groups according to the origin of sepsis identified in the medical record as community acquired sepsis and hospital acquired sepsis. Cases of sepsis diagnosed on hospital admission or upto 48 hours thereafter were classified as community acquired sepsis and cases diagnosed 48hours after hospital admission were classified as hospital acquired.The occurrence of the hospital acquired sepsis was found 58% which exhibited more severe disease and a larger number of organ dysfunctions, with higher hospital [8(8-10)versus 23 (20-27)days; $p<0.001$] and intensive care unit [5(4-7) versus 8.5(7-10); $p<0.001$] length of stay and higher in hospital mortality (30.7% versus 15.6% $p<0.001$) than those with community acquired sepsis.[7]

Greg S, Martin ED et al in the systemic review on "Sepsis ,Severe Sepsis, and Septic Shock : changes in incidence, pathogens and outcome" stated that in general sepsis occurred approximately in 2% of all hospitalizations in the developed countries and it might occur between 6% to 30% of all ICU patients with substantial variation due to heterogeneocity of the ICU s. The incidence of sepsis was affected by variety of patient specific factors among

those and age was an important factor for someone's developing sepsis as well as comorbid medical conditions,. Male gender had a higher risk than female regardless of age, non-Caucasian race compared to Caucasian had higher risk for developing sepsis. According to this review Gram positive bacteria had been the most common cause of sepsis in the last 25years and respiratory infections remained the most common cause of Sepsis. And the patients with sepsis had higher risk of morbid complications and death.[8]

Buisson CB, Doyon F, Carlet J et al conducted a multiple centre prospective observational cohort study for a 2month prospective survey of 11,828 consecutively admitted patients to 170 adult ICU s of public hospitals in France on "Incidence, Risk factors and Outcome of Severe Sepsis and Septic shock in adults" stated that clinically suspected sepsis and severe sepsis occurred in 9% [95% Cl,8.5 to 9.5] and 6.3% [95% Cl,5.8 to 6.7) of 100 ICU admissions respectively. The 28 day mortality was 56% (95% Cl, 52% to 60%) in patients with severe sepsis and 60% (95% Cl 55% to 66%) in patients with culture negative severe sepsis. The major determinant of both early (<30days) and secondary death in this whole cohort study were the Simplified Acute Physiology Score(SAPS)-II and number of acute organ system failures. The other risk factors for early death were found as a low arterial blood pH and shock. In patients with documented sepsis , bacteremia was associated with early mortality.[9]

Jones AE, Trzeciak S and Kline JA stated the use of SOFA score for predicting outcome of patients with Severe sepsis and evidence of hypertension at the time of emergency department presentation. In this study the SOFA scores were calculated at Emergency department. The primary outcome in this study was in hospital mortality. A total of 248 subjects were aged 57±16 years among those, 48% men were enrolled over 2years. All patients were treated with standardized quantitative resuscitation protocol, the in-hospital mortality rate was 21%. The mean SOFA score at admission was 7.1±3.6 points and after 72hours it was 7.4±4.9 points. The area under the receiver operating characteristics curve of SOFA for predicting in-hospital mortality at admission was 0.75 (95%,CI 0.68-0.82) and after 72 hours was 0.84 (95% CI 0.77-0.90). So the result of this study showed that the changes in SOFA score was found to have a positive relationship with in-hospital mortality.[10]

Lambden S, Laterre PF et al on a review on 'The SOFA Score-development, utility and challenges of accurate assessment in clinical trials' in 2019 in the journal of Critical Care reported that the Sequential Organ Failure Assessment or SOFA Score was basically developed to assess the accurate morbidity of critical illness at a population level and had been widely validated as a tool for this purpose across a range of health care setting and environments. In the recent years , the SOFA score had become extensively used in a range of other applications. They also stated that a change in SOFA score of 2 or more was now a defining characteristic of sepsis (SEPSIS-3). And the European Medicines Agency had accepted that a change in the SOFA score was acceptable surrogate marker of efficiency in exploratory trials of novel therapeutic agents in sepsis.[11]

Need of the Study

Angus DC, Linde-Zwirble WT et al conducted a observational cohort study on 'Epidemiology of Severe Sepsis in the United States: Analysis of Incidence, Outcome, and Cost of Care' to determine the incidence, cost and outcome of severe sepsis in the united states stated that they had identified 192,980 cases, yielding national estimates of

751,000cases (3.0cases per 1,000 population and 2.26 cases per 100 hospital discharge),of whom 383,000(51.1%) received intensive care and an additional 130000 (17.3%) were ventilated in an Intermediate care unit or cared for in a coronary care unit. Incidence increased more than 100-fold with age (0.2/1,000 in children to 26.2/1,000 in those > 85 years old.). Mortality was 28.6%, or 215,000 deaths nationally and also increased with age, from 10% in children to 38.4% in those > 85years old.Women had lower age specific incidence and mortality, but the difference in mortality was explained by differences in the underlying diseases and the site of infection.The average cost per case were 22,100 dollars, with annual total cost of 16.7 billion dollars nationally. So, this study showed that sepsis was such a common , expensive and frequently fatal condition with as many death annually as those from acute MI. And, this study had also suggested that research based evidence on the incidence and mortality of sepsis in a developing country like India was a need.[12]

Henriksen DP, Pottegard A et al conducted a population based case control study on 'Risk Factors for Hospitalization due to Community-Acquired sepsis' in a tertiary care academic hospital of Denmark stated that age, comorbidities including a history of psychotic disorder, immunosuppression, and alcoholism-related conditions served as the independent risk factors for hospitalization with sepsis of any severity.They had also found a large difference in the risk factor's strength of association in the different age categories, where comorbid conditions displayed stronger association among young patients.[13]

Berger PB, Gumbuinger C et al conducted a retrospective observational study on 'Epidemiologic features, risk factors, and outcome of sepsis in stroke patients treated on a neurological intensive care unit in a tertiary university hospital between January 1, 2009 and December 31, 2010.The study findings stated that 12.6% of patients had developed sepsis within the first 7days from the onset of stroke. The lung was the most frequent source of infection (93.3%) and gram positive organisms were dominating the micro-biologic spectrum (52.4%). Predictors of sepsis acquisition in this study were comorbidities and severity of deterioration of physiological status, but not severity of stroke. They also suggested that a better understanding of risk factors was important for prevention and early recognition of sepsis, whereas knowledge of outcome might help in prognosis prediction.Therefore further studies are needed to clarify the optimal preventive treatment for sepsis.[14]

Kaukonen K, Bailey M et al in a retrospective observational study on 'Mortality Related to Severe Sepsis and Septic Shock Among Critically Ill Patients in Australia and New Zealand during 2000-2002 stated that severe sepsis and septic shock were the major causes of mortality in intensive care unit patients. The study was conducted to describe the changes in mortality for severe sepsis with or without shock in ICU patients.This study results showed that absolute mortality in severe sepsis decreased from 35.0% to 18.4% representing an overall decrease of 16.7%, absolute decrease of 1.3% and a relative risk reduction of 47.5%. After adjusted analysis , mortality decreased throughout the study period with an odds ratio of 0.49 in 2012, using the year 2000 as the reference (P<.001). The annual decline in mortality did not differ significantly between patients with severe sepsis and those with all other diagnoses. And in the absence of comorbidities and older age, mortality was less than 5%.[15]

Polat G, Ugan RA et al according to the The Eurasian Journal of Medicine on a review on 'Sepsis and Septic Shock : Current Treatment Strategies and New Approaches' stated that

while a relative decrease had been observed in the prevalence of sepsis in the population recently, the increase in the number of hospital-based sepsis patients had stand out. There was a gradual increase in the frequency of hospital- based sepsis. The increase was mainly in the advanced age group in the population, extension in the life cycle of patients with chronic disease, common use of immunosuppressive drugs, and common use of invasive procedures for diagnosis or treatment purposes increased the frequency of sepsis. Hospital acquired sepsis was more frequently observed in hospitals with a higher bed capacity and intensive care units and where more invasive procedures were performed. The mortality rate was between 12% to 80% and the mean mortality rate was 35% in sepsis patients. So, it showed that the mortality rate was high despite new developments in sepsis treatment. The mortality rate varied between 70% and 90% when shock, DIC, ARDS and other organ failure complications developed. Mortality rates also varied based on the causes. The highest mortality rate was in Pseudomonas aeruginosa sepsis. The highest organ damage in sepsis was seen in the lungs, liver, kidneys, heart and intestines.The most sepsis determinants were nonspecific, and they could be seen in many other circumstances. Therefore, there were delays in sepsis diagnosis and physician from different branches starting the treatment created differences in the treatment strategies. They had also stated that recent studies that focused on unclarified mechanism underlying sepsis provided the new treatment targets for clinicians. Several treatment strategies such as balanced corticosteroid usage, antiendotoxin treatment, vasoactive agents such as levosimendan, HBO treatment, fibrates and several antioxidant supplements were promising approaches for sepsis treatment.They also suggested that although there were many experimental and clinical studies on sepsis. But there was still a need for further research to develop new treatment methods.[16]

Rhee C, Jones TM et al conducted a retrospective cohort study on 'Prevalence, Underlying Causes, and Preventability of Sepsis-Associated mortality in US Acute Care Hospitals among 568 randomly selected adults admitted to 6 US academic and community hospitals from January 1, 2014 to December 31, 2015 to estimate the prevalence, underlying causes and preventability of sepsis associated mortality.This study showed that sepsis was present in 300 of hospitalizations (52.8%) and directly it caused death in 198 cases (34.9%). It also stated that most underlying causes of death were related to severe chronic comorbidities, as the suboptimal care, most commonly delays in antibiotics administration was identified in 68 of 300 sepsis associated deaths (22.7%) and only 11 sepsis associated deaths (3.7%) were judged as definitely or moderately preventable despite of the better hospital based care. They also suggested that further innovation in the prevention and care of underlying conditions might be necessary before major reduction in sepsis-associated deaths can be achieved.[17]

The mortality and morbidity associated with Sepsis is very high among the patients admitted to the intensive care unit according to various research studies. So, it is important to identify the patients who are at greater risk of developing sepsis and to implement the preventive strategies to decrease the mortality and morbidity associated with sepsis. The patients who are at risk of developing sepsis are adults older than 65years of age, male gender, black race, poor nutrition, low social-economic status and the patients with comorbidities like diabetes, CKD, cancer, CLD, HIV, use of immunosuppressive drugs, and also some medical factors like duration of hospitalization, antibiotic resistance, catheters

(urine catheter, iv catheters etc), use of renal replacement therapy and surgery related complications (wound infection, emergency or elective surgery) are the risk factors for developing sepsis.

This study will find out the occurrence and its risk factors and outcome of sepsis. This study will also find out the association between occurrence of sepsis and its possible risk factors as well as association between possible risk factors and outcome of sepsis. According to previous studies there are some comorbidities and some modifiable risk factors that lead to the development of sepsis. Therefore, the comorbidies are non-modifiable, but the medical factors contributing to the development of sepsis can be modified before it lead to Sepsis. This study will help the health care personnel to identify those modifiable medical factors and based on that, some preventive strategies can be implemented which will help to reduce hospital mortality and morbidity associated with sepsis. And at the same time the patients will also be benefited by decreasing their length of stay in ICU and hospital and preventing serious complications and death due to sepsis. Beside it, as per the existing literature review there are a lot of research studies on this similar phenomenon in the western countries, but there is still lacunae in literature in the developing countries like India.

Assumption of the study

- Sepsis may occur among the patients admitted to the Intensive Care Unit.
- There may have some risk factors which lead to the development of Sepsis.
- The patients admitted to the Intensive Care Unit will participate willingly.
- The patients with sepsis usually develops to the septic shock which increases their length of stay in the ICU.

Hypothesis

H_1 -There is an association between the occurrence of sepsis and its possible risk factors among patients admitted to the intensive care unit at 0.05 level of significance**.**

H_2 -There is an association between the possible risk factors of sepsis and its outcome among patients admitted to the intensive care unit at 0.05 level of significance

Conceptual framework

Conceptual frame work is an abstract and general system of concepts and propositions. Conceptual frame work serves as a guide to systematically identify logical, precious,definitive relationship among variables.

Sepsis is a life threatening organ dysfunction caused by a dysregulated host response to an infection as explained in the newer definition of sepsis by SEPSIS-3 guideline 2016, and clinically it can be represented by an increase in SOFA (Sequential Organ Failure Assessment) score of 2 points or more. There are some factors which are responsible for developing sepsis as included in this study. The risk factors of sepsis are demographic factors like-age, sex, comorbid disease conditions like-hypertension, diabetes, chronic–obstructive pulmonary disease, chronic liver disease, chronic kidney disease, heart failure, cancer, HIV,

use of immunosuppressive drugs, medical factors like-use of mechanical ventilation devices, use of intravenous catheters (iv peripheral, CVP, arterial catheter, etc), undergoing invasive surgeries or procedures, use of any indwelling Foley's catheters, use of renal replacement therapy, multiple trauma and event of hospitalization in the last 6 months. And the outcome of sepsis are such as development of septic shock, length of stay in the ICU, length of stay in the hospital and 28days mortality.

The conceptual framework of this study was based on three factors- predisposing factors, enabling factors and the outcome variable of sepsis.

The predisposing factors were demographic factors like-age, sex, comorbid disease factors like-hypertension, diabetes, chronic–obstructive pulmonary disease, chronic liver disease, chronic kidney disease, heart failure, cancer, HIV.

The enabling factors were the medical risk factors like - use of immunosuppressive drugs, use of mechanical ventilation devices, use of intravenous catheters (iv peripheral, CVP, arterial catheter, etc), undergoing invasive surgeries or procedures, use of any indwelling Foley's catheters, use of renal replacement therapy, multiple trauma and event of hospitalization in the last 6 months.

And the outcome of sepsis were such as development of septic shock, length of stay in the ICU, length of stay in the hospital and 28days mortality.

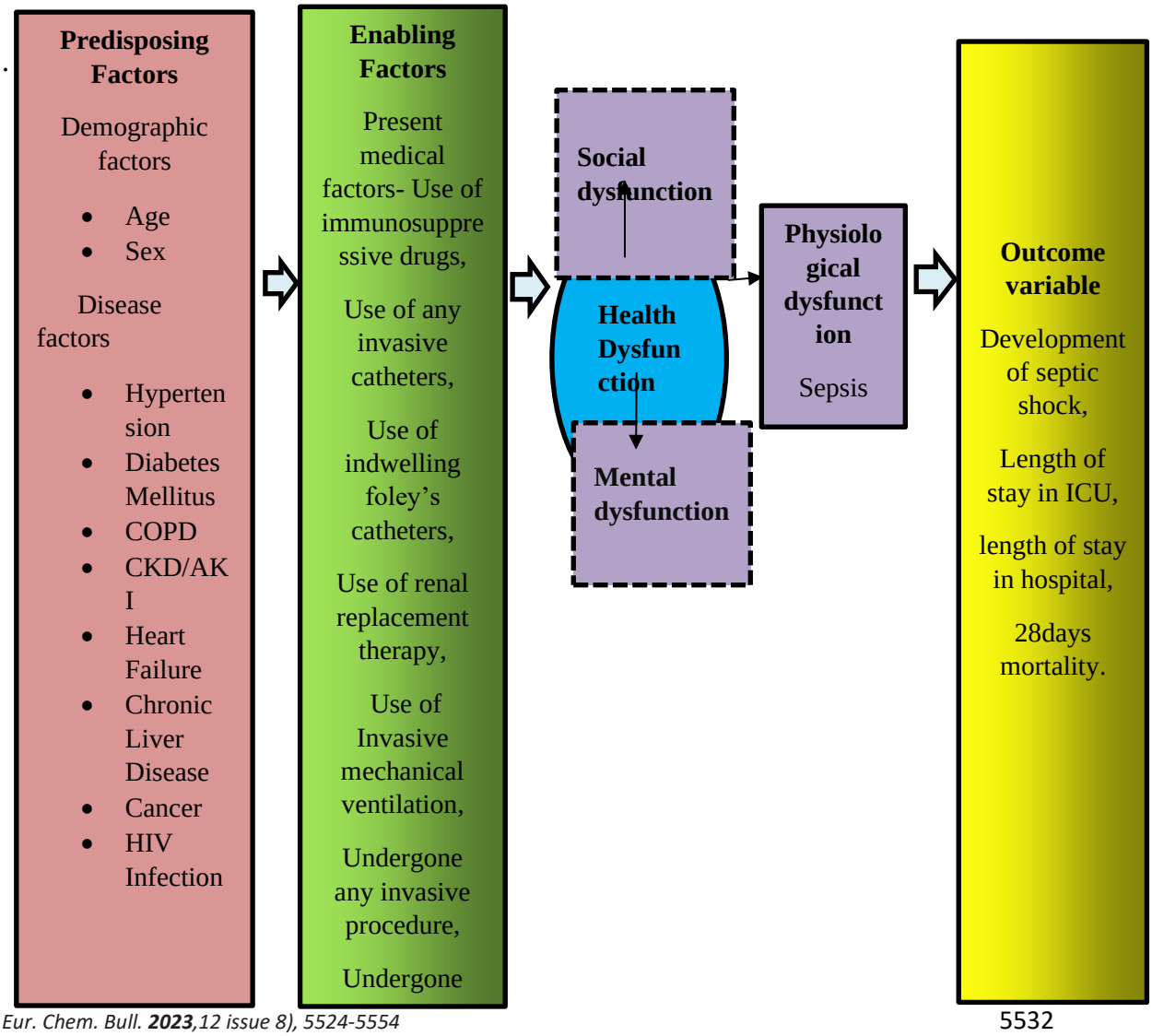
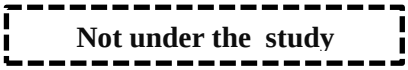


Fig-1: Conceptual framework of the study



Delimitation of the study

This study was delimited to-

a) Data collection to be performed in a single setting.

b) Data collection that was only confined to the patients who are admitted in intensive care unit.

c) Participants who were present during the study period.

Research Approach

In this present study Non Experimental approach was adopted as the researcher intended to assess the occurrence of sepsis and its risk factors and outcome among the patients admitted to the intensive care unit and to determine the association between the occurrence of sepsis and the possible risk factors of sepsis and also the association between the possible risk factors of sepsis and the outcome of the sepsis.

Research Design

Keeping the objectives of the study in view, the researcher adopted the descriptive survey research design to study the research variables, as the researcher intended to assess the occurrence of sepsis and its risk factors and the outcome of sepsis among the patients admitted in the intensive care unit.

Study population :

Population is any group of individual that has one or more characteristics in common that was the of interest to the research. The target population of the present study are the patients admitted to the Intensive Care Unit (ITU-4,5,6) of NH- Rabindranath Tagore International Institute of Cardiac Sciences, Kolkata.

Sample and Sampling Technique:

Sample is the portion of population. In this study sample were all patients of intensive care unit of a selected hospital, Kolkata, West Bengal.

Here in this present study the Non-probability Consecutive sampling technique was adopted.

Sample Size : Around 130 participants

Sampling Criteria

Inclusion Criteria :

- Patients who stayed in the intensive care unit more than 48hours.
- The patient who were diagnosed as having sepsis before the entry to intensive care unit as well as after the entry to intensive care unit.

Exclusion Criteria:

- The patients whose age were less than 18 years.

- The patients who were not willing to participate in the study.

Data collection Tools and Techniques:

Types of tool	**Method of Data collection tool**	**Varaiables to be measured**	**Data collection Technique**
1)Self developed tool	Record analysis proforma based on the SOFA criteria and other laboratory parameters for occurrence of sepsis .	Occurrence of Sepsis • Serum Creatinine level. • Urine output. • GCS score. • Serum Bilirubin level. • Platelet count. • Use of vesopressors. • MAP value. • Pao2/Fio2 • Total count • CRP	Record analysis
2)Self developed tool	Record analysis proforma on risk factors of sepsis **Part-a**	Risk factors of sepsis; Demographic variables and comorbid disease conditions	Record analysis

	Part-b	Illness variables- Present medical factors- Patients undergone any surgery or invasive procedure during intensive care unit stay, use of invasive mechanical ventilation ,use of any invasive catheters, use of indwelling foley's catheters, use of any immunosuppressive drugs, use of renal replacement therapies, multiple trauma and event of hospitalization in past 6months.	
3)Self developed tool	Record analysis proforma on outcome of sepsis	Outcome of Sepsis- i) Development of Septic shock ii) Length of stay in ICU. iii) Length of stay in hospital. iv) 28days Mortality	Record analysis

Steps of data collection:

- Ethical permission was taken from the EC of NH-Rabindranath Tagore International Institute of Cardiac Sciences, 124-Mukundapur, E M Bypass, Kolkata-700099.
- Permission was taken from Principal, College of Nursing, Asia Heart Foundation and Senior General Manager, Nursing and Academic coordinator of NH-RTIICS, Kolkata.
- Permission was taken from the Incharge of ICU (ITU-4,5,6) and Nursing Supervisor of the Intensive care unit, NH-RTIICS, Kolkata.
- On the very first day, a formal introduction with the respective consultants of the patients, Incharge of the respective ICU, resident doctors, Nursing manager and other health workers (Nursing in-charges , staffs) was done and the purpose of the study was explained.
- The sample were selected using the non-probability consecutive sampling technique.
- On the first day the patients were visited on the bed side, and the purpose of the study was explained to the patients or their legally accepted representatives. The patient's information sheets were explained to them and then Informed written consent was taken .
- Data were collected according to the objectives using validated and reliable record analysis tools.

- Data were collected for all the participants in tool-1 for the assessment of occurrence of sepsis after the patient's entry to intensive care unit and those patients were followed up until patients develop sepsis during ICU stay or up to the exit of those patients from the ICU (discharge,Transfer out or death) or up to at least for 28days in the ICU stay.
- Data were collected for all the participants in tool-2 for the assessment of risk factors on the first day after entry to the ICU and those patients were followed up for adding any new medical risk factors during their ICU stay up to the exit of those patients from the ICU (discharge,Transfer out or death) or up to at least for 28days in the ICU stay.
- Data were collected in tool-3 for the assessment of outcome of sepsis on the first day of entry to ICU those patient diagnosed as having sepsis during admission and were followed up, up to the exit of those patients from the ICU as well as exit from hospital (discharge,Transfer out or death) or up to at least for 28days in the ICU stay.
- For the the remaining patients once the patients developed sepsis, data were collected in tool-3 to assess the outcome of sepsis and followed up in the same way like other sepsis patients.

Section-I: Findings related to the occurrence of sepsis among the patients admitted to the intensive care unit .

This section describes the occurrence of sepsis among the patients admitted to the intensive care unit.

N=130

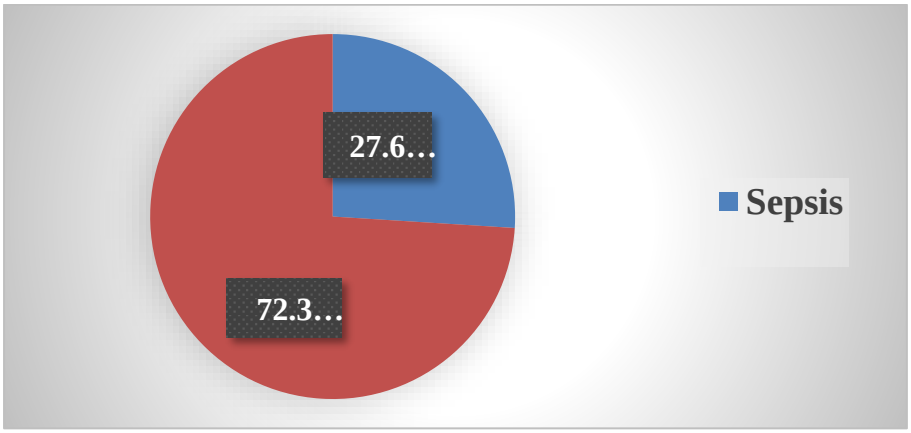


Figure-2: Pie diagram showing the percentage distribution of occurrence of sepsis among the patients admitted to the intensive care unit.

Pie diagram is showing the percentage distribution of occurrence of sepsis. The data presented in this figure-2 showed that 27.69% patients were diagnosed as having sepsis and 72.31% patients did not have sepsis.

Table-1: Frequency and percentage distribution of occurrence of sepsis based on its origin of sepsis and culture reports among the patients admitted to the intensive care unit.

N = 36

Criteria	Frequency	Percentage

A) Based on origin of sepsis –		
Community acquired sepsis	22	61.11%
Hospital acquired sepsis	14	38.89%
B) Based on culture report-		
Culture negative sepsis	12	33.33%
Culture positive sepsis	24	66.67%

Data presented in this table-1 of occurrence of sepsis based on origin of sepsis and culture report showed that among the patients diagnosed as having sepsis, community acquired sepsis was 61.11%, hospital acquired sepsis was 38.89% and culture positive sepsis was 66.67% and culture negative sepsis was 33.33%.

N= 36

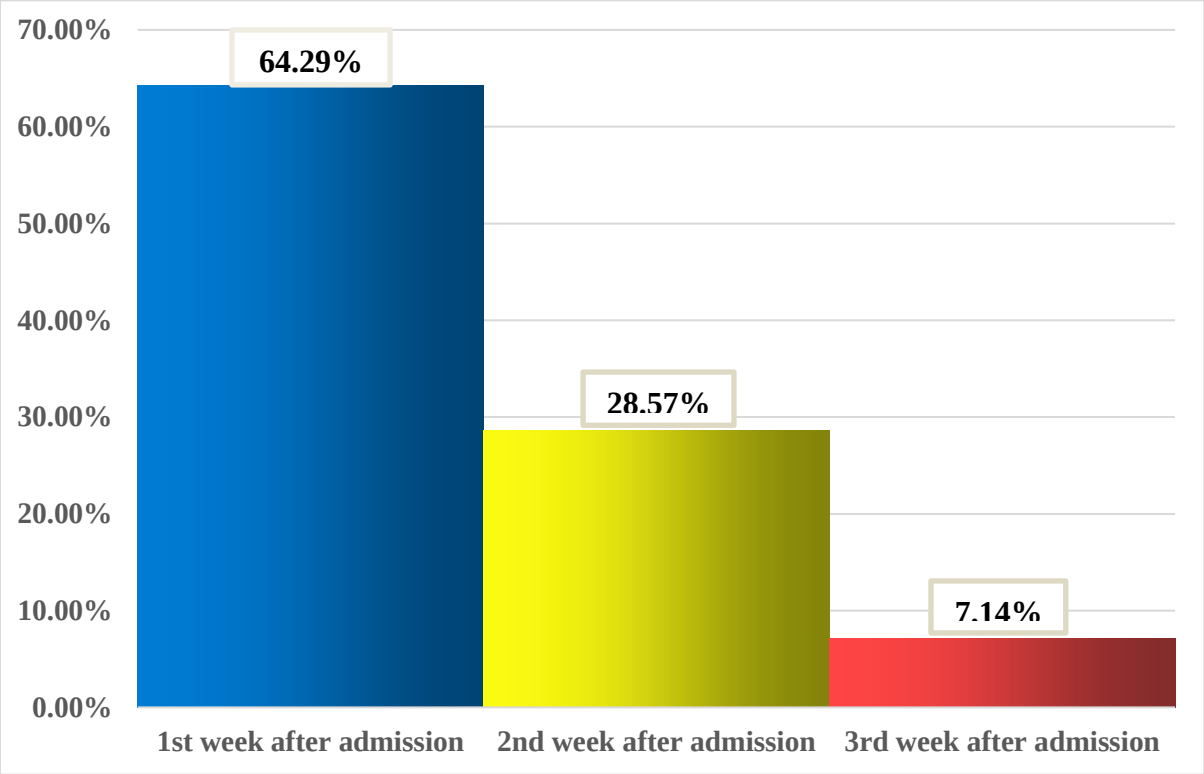


Figure3: Histogram showing the percentage distribution of Hospital acquired sepsis patients based on its time of onset among the patients admitted to the intensive care unit.

Data presented in this figure-3 revealed that among the hospital acquired sepsis patients, 64.29% patients developed sepsis during 1st week after admission, 28.57% patients developed sepsis during 2nd week after ICU admission and 7.14% patients developed sepsis during 3rd week after ICU admission.

Table-2: Frequency and percentage distribution of different microorganism positive reports and source of microorganism growth among the patients having sepsis.

N = 24

Criteria	Frequency	Percentage
A) Name of microorganism		

a) Klebsiella pneumoniae	10	71.43%
b) Acinetobacter baumonnii	8	57.14%
c) Escherichia coli	4	28.57%
d) Staphylococcus aureus	3	21.42%
e) Staphylococcushaemolyticus	3	21.42%
f) Pseudomonas aerioginosa	2	14.29%
g) Pseudomonas stutzari	1	7.14%
B)Source of microorganism growth		
a) Respiratory tract	14	58.33
b) Blood	10	41.67%
c) Urinary tract	3	12.5%

Data presented in this table-2 showed that among the culture positive sepsis patients the growth of microorganisms were such as the most common growth of organism was Klebsiella pneumoniae 71.43% (rank-1), Acinetobacter baumonnii 57.14% (rank-2), Escherichia coli 28.57% (rank-3), Staphylococcus aureus 21.42% (rank-4.5), Staphylococcus haemolyticus 21.42% (rank-4.5), Pseudomonas aerioginosa 14.29% (6) and lowest was Pseudomonas stutzari 7.14% (rank-7). The most common source of infection is the respiratory tact 58.33% (rank-1) and blood stream 41.67% (rank-2) and urinary tract 12.5% (rank-3).

Section-II : Finding related to the risk factors of sepsis among the patients admitted to the intensive care unit.

This section describes the demographic risk factors (age,sex), co morbid disease conditions and present medical factors of the sepsis patients

Table-3: Frequency and percentage distribution of age , sex among the patients admitted to the intensive care unit.

N = 130

Demographic factors	**Frequency**	**Percentage**
1) Age in years -		
71 and above	50	38.46%
61 – 70	39	30.0%
51 – 60	19	14.62%
41 – 50	12	9.23%
31 – 40	6	3.08%
21 – 30	4	4.61%
2) Sex –		
Male	94	72.31%
Female	36	27.69%

Data presented in this table-3 showed that, the majority of patients i.e 38.46% patients were belongs to age above 71 years, 30.0% patients were belongs to age between 61-70 years,

14.62% patients were belongs to age between 51-60 years, 9.23% patients were belongs to age between 41-50 years, 3.08% patients were belongs to age between 31-40 years and only 4.61% patients were belongs to age between 21-30 years. The data also presented that majority of patients were male 72.31% and 27.69% patients were female.

Table-4: Frequency and percentage distribution of co-morbid disease factors among the patients admitted to the intensive care unit.

N = 130

Co-morbid disease factors	Frequency	Percentage
1) HTN	95	73.08%
2) DM	69	53.08%
3) CKD/AKI	46	35.38%
4) COPD	40	30.77%
5) HF	18	13.85%
6) Cancer	2	1.54%
7) CLD	1	0.76%
8) HIV	-	-

The data presented in this table-4 showed that majority of patients 73.08% had HTN, 53.08% patients had DM, 35.38% patients had CKD/AKI, 30.77% patients had COPD, 13.85% patients had HF, 1.54% patients had cancer, 0.76% patients had CLD and there was no HIV patients.

Table-5: Frequency and percentage distribution of the present medical factors among the patients admitted to the intensive care unit.

N = 130

Present Medical factors	Frequency	Percentage
1) Use of indwelling foley's Catheters	99	76.15%
2) Use of invasive catheters	46	35.38%
3) Use of invasive mechanical ventilation	36	27.69%
4) Use of renal replacement therapy	26	20.0%
5) Undergone any invasive procedure	15	11.54%
6) Use of immunosuppressive drugs	7	5.38%
7) Multiple trauma	3	2.31%

8) Event of hospitalization in last 6 months	61	46.92%
9) Undergone any surgery	14	10.77%

Data presented in this table-5 of present medical factors showed that majority of patients 76.15% had indwelling Foley's catheters, 46.92% patients had event of hospitalization in last 6months, 35.38% patients had invasive catheters, 27.69% patients had invasive mechanical ventilation, 20.0% patients had renal replacement therapy, 11.54% patients had undergone invasive procedure, 10.77% patients had undergone surgery, 5.38% patients had use of immunosuppressive drugs and only 2.31% patients had multiple trauma.

Section-III: Findings related to the outcome of sepsis among the patients admitted to the intensive care unit.

This section describes about the outcome of sepsis as the items are length of stay in ICU, length of stay in hospital, development of septic shock, and 28days mortality among the patients having sepsis.

Table-6: Mean and standard deviation of the length of stay in ICU and length stay in Hospital among the patients having sepsis admitted to the intensive care unit.

N = 36

Sl No	Criteria	Frequency	Mean	SD
(1)	**Length of stay in ICU**			
	(1-5)days	11		
	(6-10)days	16		
	(11-15)days	4	9.4	6.6
	(16-20)days	3		
	(21-25)days	1		
	Above 25days	2		
(2)	**Length of stay in hospital**			
	(1-10)days	18		
	(11-12)days	9		
	(21-30)days	4	14.3	6.5
	(31-40)days	3		
	Above 40days	1		

Data presented in this table-6 revealed that the mean score and the standard deviation of length of stay in ICU were 9.4 and 6.6 and the mean score and the standard deviation of length of stay in hospital were 14.3 and 6.5 respectively among the sepsis patients.

N = 36

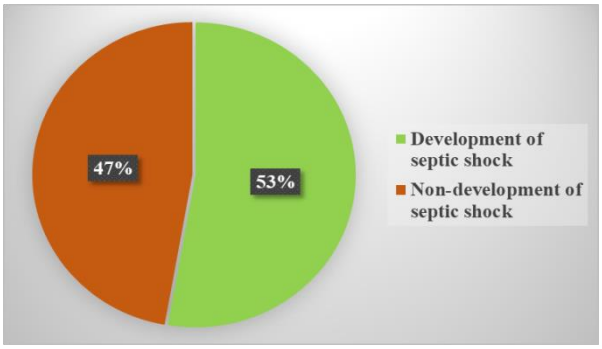


Figure-4: Pie diagram showing the percentage distribution of the development of septic shock and non-development of septic shock among the patients having sepsis admitted to the intensive care unit.

Data presented in this figure-4, the pie diagram showed that among the sepsis patients, majority of patients i,e 52.78% patients had developed septic shock and 47.22% patients had not developed septic shock.

Table-7: Frequency and percentage distribution of the development of septic shock based on its onset of time among the sepsis patient admitted to the intensive care unit.

N = 36

Development of septic shock	**Frequency**	**Percentage**
1st 24 hours after diagnosis of sepsis	10	27.78%
2nd 24hours after diagnosis of sepsis	6	16.66%
5th 24hours after diagnosis of sepsis	1	2.78%
6th 24hours after diagnosis of sepsis	1	2.78%
7th 24hours after diagnosis of sepsis	1	2,78%
No septic shock	17	47.22%

Data presented in this table-7 showed that among those sepsis patients developing septic shock majority of patients 27.78% had developed septic shock within 1st 24hours after diagnosis of sepsis, 16.66% patients had developed septic shock during 2nd 24hours, 2.78% patients had developed septic shock during 5th 24hours, 2.78% patients had developed septic shock during 6th 24hours, 2.78% patients had developed septic shock during 7th 24hours after diagnosis of sepsis. And 47.22% had not developed septic shock.

N = 36

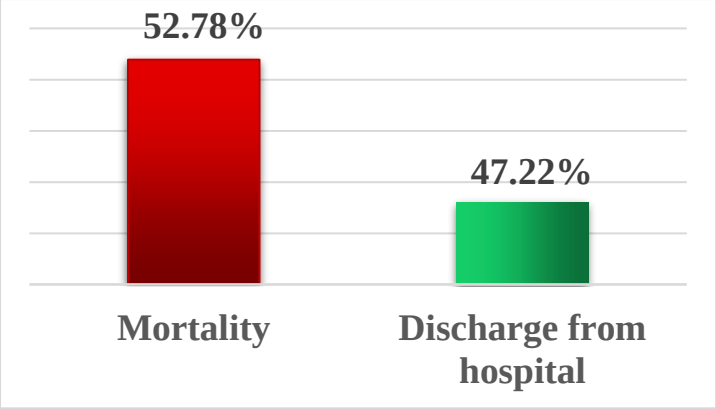


Figure-5: Bar diagram showing the percentage distribution of the 28days mortality and discharge from hospital among the patients having sepsis admitted to the intensive care unit.

The data presented in this figure-5, the bar diagram showed that among the sepsis patients majority of patients 52.78% had 28 days mortality and 47.22% patients had got discharged from the hospital after recovery.

N = 19

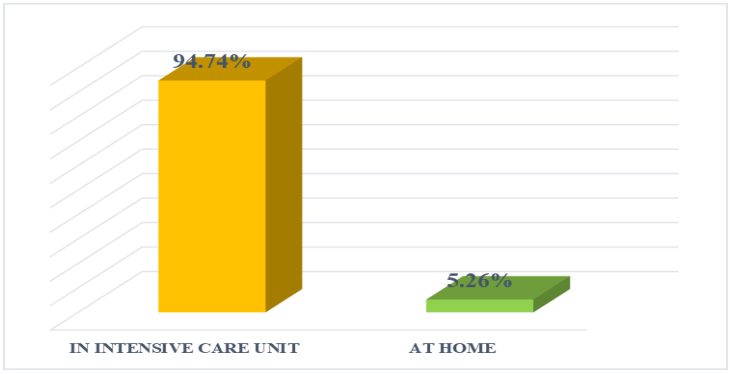


Figure-6: Figure showing the percentage distribution of the 28days mortality based on its place of mortality among the sepsis patients admitted to the intensive care unit.

Data presented in this figure-6, the bar diagram showed that among the sepsis patients those had 28days mortality , majority of patients i.e 94.74% had mortality in the intensive care unit itself and only 5.26% patients had mortality at home. No patients had mortality in the hospital ward, in other hospital and mortality after readmission.

Section-IV : Findings Related to the association between the occurrence of sepsis and its possible risk factors.

This chapter describes the analysis and the interpretation regarding the association between the the occurrence of sepsis and its possible risk factors.

Table-8: Chi square computed between the occurrence of sepsis with the selected demographic risk factors(age,sex.)

N = 130

Sl No	Demographic risk	Occurrence of Sepsis	Obtained chi-

	factors			**square value**
		Sepsis	**Non-sepsis**	
1.	Age in year			
	21-60	28	13	0.745
	61 and above	66	23	
2.	Sex			
	Male	66	28	0.484
	Female	28	8	

Here, table value of $\chi^2_{(1)} = 3.841$, $p \geq 0.05$

Data presented in this table-8 showed that the obtained chi square value between the occurrence of sepsis and age and between the occurrence of sepsis and sex were 0.745 and 0.484 respectively which were lower than the table value of chi-square i.e 3.841 at df-1 and level of significance 0.05. Hence null hypothesis was accepted and research hypothesis was rejected which indicated that there was no association between the demographic factors and occurrence of sepsis.

Table-9: Chi square and odd ratio computed between the occurrence of sepsis with the selected Comorbid disease factors

N=130

Sl No	**Comorbid disease conditions**	**Occurrence of sepsis**		**Obtained chi-square value**	**Odd ratio**
		Sepsis	**Non-sepsis**		
1.	HTN				
	Yes	24	71	1.04	-
	No	12	23		
2.	DM				
	Yes	27	42	9.604**	3.71
	No	9	52		
3.	COPD				
	Yes	10	27	0.0117	-
	No	26	67		
4.	CKD/AKI				
	Yes	21	27	9.799**	3.47
	No	15	67		
5.	HF				
	Yes	9	9	5.193**	3.15
	No	27	85		
6.	CLD				
	Yes	0	2	0.384	-
	No	36	92		
7.	Cancer				

	Yes No	0 36	2 92	0.782	-

Here, table value of $\chi^2_{(1)} = 3.841$, $p \geq 0.05$

Data presented in this table-9 revealed that the obtained chi square value between the occurrence of sepsis and the comorbid disease condition like diabetes mellitus showed a significant association and the calculated odd ratio between them was 3.71 which indicated that a patient with diabetes mellitus had 3.71 times more risk of developing sepsis compared to the patients without diabetes mellitus.

The obtained chi square value between the occurrence of sepsis and the comorbid disease condition like CKD/AKI showed a significant association and the calculated odd ratio between them was 3.47 which indicated that a patient with CKD/AKI had 3.47 times more risk of developing sepsis compared to the patients without having CKD/AKI.

The obtained chi square value between the occurrence of sepsis and the comorbid disease condition like HF showed a significant association and the calculated odd ratio between them was 3.15 which indicated that a patient with HF had 3.15 times more risk of developing sepsis compared to the patients without having HF.

Hence, DM, CKD/AKI and the HF are the contributing risk factors of sepsis. Rest of the comorbid disease conditions did not show any association with the occurrence of sepsis.

Table-10: Chi square and odd ratio computed between the occurrence of sepsis with the selected present Medical risk factors.

N=130

Sl No	**Comorbid disease conditions**	**Occurrence of sepsis**		**Obtained chi-square value**	**Odd ratio**
		Sepsis	**Non-sepsis**		
1.	Use of immunosuppressive drugs Yes No	 5 31	 2 92	7.068**	7.42
2.	Use of invasive catheters Yes No	 28 8	 18 76	9.604**	14.78
3.	Use of indwelling foley's catheters Yes No	 32 4	 67 27	4.439**	3.22
4.	Use of Renal replacement therapy Yes No	12 24	13 81	6.374**	3.12
5.	Use of invasive mechanical ventilation	24	12	37.761**	13.67

	Yes No	12	82		
6.	Undergone any of invasive procedures Yes No	7 29	8 86	3.048	-
Sl No	**Comorbid disease conditions**	**Occurrence of sepsis**		**Obtained chi-square value**	**Odd ratio**
		Sepsis	**Non-sepsis**		
7.	Undergone any surgery Yes No	4 32	10 84	0.0064	-
8.	Multiple trauma Yes No	0 36	3 91	1.175	-
9.	Event of hospitalization in last 6months Yes No	29 7	32 62	22.61**	8.03

Here, table value of $\chi^2_{(1)} = 3.841$, $p \geq 0.05$

Data presented in this table-10 revealed that the obtained chi square value between the occurrence of sepsis and the medical risk factor like use of immunosuppressive drugs showed a significant association and the calculated odd ratio between them was 7.42 which indicated that a patient with use of immunosuppressive drugs had 7.42 times higher risk of developing sepsis compared to the patients without use of immunosuppressive drugs.

The obtained chi square value between the occurrence of sepsis and the medical risk factor like use of invasive catheters showed a significant association and the calculated odd ratio between them was 14.78 which indicated that a patient with use of invasive catheters had 14.78 times higher risk of developing sepsis compared to the patients without use of invasive catheters.

The obtained chi square value between the occurrence of sepsis and the medical risk factor like use of indwelling foley's catheters showed a significant association and the calculated odd ratio between them was 3.22 which indicated that a patient with use of indwelling foley's catheters had 3.22 times higher risk of developing sepsis compared to the patients without use of indwelling foley's catheters.

The obtained chi square value between the occurrence of sepsis and the medical risk factor like use of renal replacement therapy showed a significant association and the calculated odd ratio between them was 3.12 which indicated that a patient with use of renal replacement

therapy had 3.12 times higher risk of developing sepsis compared to the patients without use of renal replacement therapy.

The obtained chi square value between the occurrence of sepsis and the medical risk factor like use of invasive mechanical ventilation showed a significant association and the calculated odd ratio between them was 13.67 which indicated that a patient with use of invasive mechanical ventilation had 13.67 times higher risk of developing sepsis compared to the patients without use of invasive mechanical ventilation.

The obtained chi square value between the occurrence of sepsis and the medical risk factor like the event of hospitalization in last 6months showed a significant association and the calculated odd ratio between them was 8.08 which indicated that a patient with event of hospitalization in last 6months had 8.08 times higher risk of developing sepsis compared to the patients without having the event of hospitalization in last 6months

And the rest of the medical risk factors did not show any association with the occurrence of sepsis.

Section-V: Findings related to the association between risk factors of sepsis and its outcome.

Section-V(a): Findings related to the association between risk factors of sepsis and development of septic shock.

Table-11: Chi square computed between the development of septic shock with the selected demographic risk factors.

N=36

Sl No	Demographic risk factors	Development of Septic shock		Obtained chi-square value
		Yes	No	
1.	Age in years 21- 60 61 and above	 6 13	 8 9	0.905
2.	Sex Male Female	 17 2	 11 6	3.191

Here, table value of $\chi^2_{(1)} = 3.841$, $p \geq 0.05$

Data presented in this table-11 showed that the obtained chi square value between the development of septic shock and age and between the development of septic shock and sex were 0.905 and 3.191 respectively which were lower than the table value of chi square i.e 3.841 at df-1 and level of significance 0.05. Hence null hypothesis was accepted and research hypothesis was rejected which indicated that there was no association between the demographic factors and development of septic shock

Table-12: Chi square and odd ratio computed between the Development of septic shock with the selected past Comorbid disease factors.

N=36

Sl No	Comorbid disease	Development of Septic shock	Obtained chi-square value	Odd ratio

	conditions				
		Yes	**No**		
1.	HTN				-
	Yes	12	13	0.749	
	No	7	4		
2.	DM				
	Yes	7	10	1.733	-
	No	12	7		
3.	COPD				
	Yes	8	2	4.122**	5.45
	No	11	15		
4.	CKD/AKI				
	Yes	10	10	1.114	-
	No	9	7		
5.	HF				
	Yes	3	4	0.342	-
	No	16	13		

Here, table value of $\chi^2_{(1)} = 3.841$, $p \geq 0.05$

Data presented in this table-12 revealed that the obtained chi square value between the development of septic shock and the comorbid disease condition like COPD showed a significant association and the calculated odd ratio between them was 5.45 which indicated that a patient with COPD had 5.45 times higher risk of developing septic shock compared to the patients without having COPD.

Table-13: Chi square computed between the Development of septic shock with the selected Medical risk factors.

N=36

Sl No	**Present medical factors**	**Development of Septic shock**		**Obtained chi-square value**
		Yes	**No**	
1.	Use of immunosuppressive drugs			
	Yes	2	3	0.607
	No	17	14	
2.	Use of invasive catheters			
	Yes	17	11	3.178
	No	2	6	
3.	Use of Indwelling Foley's catheters			
	Yes	17	15	0.0137
	No	2	2	
4.	Use of Renal replacement therapy			

	Yes No	8 11	4 13	1.398
5.	Use of invasive mechanical ventilation Yes No	 15 4	 9 8	 2.722
6.	Event of hospitalization in last 6months Yes No	 16 3	 13 4	 0.652

Here, table value of $\chi^2_{(1)} = 3.841$, $p \geq 0.05$

Data presented in this table-13 showed that the obtained chi-square values between the development of septic shock and all the present medical factors were lower than the table value of chi-square at df-1 and level of significance 0.05. Hence the null hypothesis was accepted and the research hypothesis was rejected which indicated that there was no association between the development of septic shock and present medical factors.

Section-V(b): Findings related to the association between risk factors of sepsis and 28days mortality.

Table-14: Chi square computed between the 28days mortality with the selected demographic risk factors.

N=36

Sl No	**Demographic risk factors**	**28days Mortality**		**Obtained chi-square value**
		Yes	**No**	
1.	Age in years 21-60 61 and above	 6 13	 7 10	 0.358
2.	Sex Male Female	 16 3	 12 5	 0.958

Here, table value of $\chi^2_{(1)} = 3.841$, $p \geq 0.05$

Data presented in this table-14 showed that the obtained chi square value between the 28days mortality and age and between the 28days of mortality and sex were 0.358 and 0.958 respectively which were lower than the table value of chi square i.e 3.841 at df-1 and level of significance 0.05. Hence null hypothesis was accepted and research hypothesis was rejected which indicated that there was no association between the demographic factors and 28days mortality.

Table-15: Chi square and odd ratio computed between the 28days mortality with the selected Comorbid disease factors.

N=36

Sl No	**Comorbid disease conditions**	**28days mortality**		**Obtained chi-square value**	**Odd ratio**
		Yes	**No**		
1.	HTN				-
	Yes	14	11	0.341	
	No	5	6		
2.	DM				
	Yes	9	8	0.0003	-
	No	10	9		
3.	COPD				
	Yes	6	4	0.289	-
	No	13	13		
4.	CKD/AKI				
	Yes	15	7	4.989**	5.37
	No	4	10		
5.	HF				
	Yes	4	5	0.334	-
	No	15	12		

Here, table value of $\chi^2_{(1)} = 3.841$, $p \geq 0.05$

Data presented in this table-15 revealed that the obtained chi square value between the 28days mortality and the comorbid disease condition like CKD/AKI showed a significant association and the calculated odd ratio between them was 5.37 which indicated that a patient with CKD/AKI had 5.37 times higher risk of having 28days mortality compared to the patients without having COPD.

Table-16: Chi square computed between the 28days mortality with the selected present Medical risk factors. N=36

Sl No	**Present medical factors**	**28days mortality**		**Obtained chi-square value**
		Yes	**No**	
1.	Use of immunosuppressive drugs			
	Yes	4	1	1.726
	No	15	16	
2.	Use of invasive catheters			
	Yes	16	12	0.959
	No	3	5	
3.	Use of indwelling foley's catheters			
	Yes	16	16	0.893
	No	3	1	
4.	Use of Renal replacement			

	therapy Yes No	 9 10	 3 14	 3.571
5.	Use of invasive mechanical ventilation Yes No	 13 6	 11 6	 0.055
9.	Event of hospitalization in last 6months Yes No	 16 3	 14 3	 0.023

Here, table value of $\chi^2_{(1)} = 3.841$, $p \geq 0.05$

Data presented in this table-16 revealed that the obtained chi-square values between the 28days mortality and all of the present medical factors were lower than the table value of chi-square at df-1 and level of significance 0.05. Hence the null hypothesis was accepted and the research hypothesis was rejected which indicated that there was no association between the 28days mortality and present medical factors.

Conclusion

On the basis of the findings of the study conducted the following conclusions are made…..the occurrence of sepsis among the patients admitted in the intensive care were 27.69%. Among those patients having sepsis, some of them developed sepsis in the community setting and some developed after admitting to the intensive care unit.

Tho most predominant microorganism found positive was gram negative microbes (Klebsiella Pneumonniae) and the most common site of infection was the respiratory tract. 52.78 % sepsis patients developed septic shock and 52.78% had 28days mortality, among them ICU mortality was highest. The average length of ICU stay among the sepsis patients was 9.4 days and average length of hospital stay was 14.3 days. This study showed that DM and CKD/AKI and HF were the contributing risk factors among the comorbid disease conditions for the development of sepsis and patients with DM had the highest chances for developing sepsis. The present medical factors like Use of immunosuppressive drugs, Use of invasive catheters,Use of Renal replacement therapy and Use of Mechanical ventilation and event of hospitalization in the last 6months had contributed for the development of sepsis. So, based on this study findings it can be suggested that we should be aware about the limited use of these interventions in the intensive care unit. The study also showed that patients with COPD had higher chances of developing septic shock and patients with CKD/AKI had highest 28days mortality after occurrence of sepsis.

Limitation of the study

1) The sample size selected for this study was very small (130) which may preclude generalizibility.

2) The study was conducted in a single centre only.

3) The study was conducted in a tertiary care teaching private hospital located in a metro city, occurrence of sepsis may differ in public hospital, primary and secondary care and community setting hospitals.

4) The time taken to conduct the study was very limited time period.

5) This study included only patients in adult ICU, occurrence of sepsis may differ for pediatric and neonates.

Implication of the study

Nursing Research:

There is a need for promoting research based clinical practices and proper assessment of SOFA score by the critical care nurses and identification of sepsis patients, and to find out what are those ICU interventions which are predisposing for developing sepsis at the earlier stage of the disease progression among the critically ill patients. So the findings of this present study can be implemented as a source of literature for further research studies with the similar problem as there is very limited source of literature on this phenomena in the field of nursing. The findings of the present study can be utilized for extensive and intensive study for development of professional knowledge related to sepsis.

Nursing Administration

The Nurse administrator can conduct some in-service education programs to aware the hospital nursing staffs on the assessment of sepsis, its risk factors, outcome and also on its preventive aspects based on the findings of this study. The nurse administrator can implement this study findings to modify the hospital infection control protocols regarding the ICU interventions so that hospital acquired Sepsis can be prevented; hence in hospital mortality with sepsis can be reduced.

Clinical practice:

Safety plays a key role when patients are introduced to a new and ever changing environment like intensive care unit. The nurses are staying round the clock with the patients in intensive care unit and monitoring the vital signs, GCS and all the laboratory investigations and they are also finding out any changes in the patients health status during the ICU stay. So it is the nurses responsibility to assess the patients for developing sepsis by utilizing SOFA score and other laboratory findings at the earliest stage and to ensure weather patient had the community acquired sepsis during the admission to the intensive care unit. Sepsis is associated with various co-morbid disease conditions like diabetes mellitus, chronic kidney disease or acute kidney injury and heart failure and the medical factors such as use of immunosuppressive drugs, use of foley's catheters, use of invasive catheters, use of invasive mechanical ventilation, use of renal replacement therapy etc. So,it is the nurses responsibility to give special emphasis on taking care of patients with such co-morbid disease conditions, proper control of the blood sugar and to strict adherence the infection control care bundles regarding CAUTI, VAP, CLABSI and maintaining the barrier nursing protocol for patients with use of immunosuppressive drugs. So that the occurrence of hospital acquired sepsis can be prevented.

Nursing Education:

Sepsis is the most prevalent cause of mortality among the critically ill patients, so this study findings can be utilized by the critical care nurses as well as the critical care nurse practitioners to improve the care and therapeutic modelities of those patients. A nurse educator can utilize the findings of this study to implement teaching modelities for the critical care nursing students. The study highlights on assessment of GCS,vital signs, assessment of all vital organ functions by utilizing SOFA score. So, the students should be oriented about the Survival sepsis guidelines and sepsis-3 definition as well as assessment of SOFA(Sequential Organ Failure Assessment) score.

References

1) Singer M, Dutchman CS,Seymour CW,et al; The Third International Consensus Definitions for Sepsis and Septic Shock (Sepsis-3); *JAMA.2016;(8):801-810.doi:10.1001/jama.2016.0287.*

2) Neviere R, Parsons PS, Finlay G; Sepsis syndrome in adults: Epidemiology, definitions, clinical presentation, diagnosis, and prognosis; *https://www. uptodate.com.*

3) Ryding S, Zoppi L; Sepsis Complications and Prevention; *https//www.news-medical.net.*

4) Rhodes A, Evans LE, et al; Surviving Sepsis Campaign: International Guidelines for Management of Sepsis and Septic Shock ; *Critical Care Medicine 45(1); Jan 2017: doi:10.1097/CCM.0000000000002255.*

5) K Annahieta et al: Challenging the One our Sepsis Bundle;*Western Journal of Emergency Medicine.,2019 ;20(2):185-190:* doi :10.5811/westjem.2018.11.39290.

6) Mayr FB, Yende S et al ; Epidemiology of Severe Sepsis; *Journal Virulence 5:1,4-11; January 2014.*

7) Westphalb GB , Pereira AB et al ; Characteristics and outcome of patients with community-acquired and hospital-acquired sepsis ; *Journal Rev Bras Intensiva.2019;31:71-78:* doi:10.5935/0103-507X.20190013.

8) Greg S, Martin ED, Sepsis, severe sepsis and Septic shock: changes in incidence, pathogens and outcomes; *Expert Rev. Anti infect, Ther* 2012,Jan:10(^):701-706,doi:10,1586/eri.12.50 available in PMC2013.

9) Buisson CB, ,Doyon F, Carlet J, et al; Incidence, risk factors and outcome of severe sepsis and septic shock;*JAMA*,1995;274(12):968-974: doi:10.1001/jama 1995,0353012006042.

10) Jones AE, Trzeiak S, Akline J; The sequential organ failure assessment score for predicting outcome in patients with severe sepsis and evidence of hypoperfusion at the time of emergency department presentation; *Journal of Critical Care Medicine*, 2009 May; 37(%); 1649-1654; doi:10.1097/CCM-0b013e31819def97.

11) Lambden S, Laterre PF et al; The SOFA score- development, utility and challenges of accurate assessment in clinical trials; *Journal of Critical Care (2019) 23:374* : https://doi.org/10.1186/s13054-019-2663-7.

12) Angus DC, Linde-Zwirble WT et al ; Epidemiology of Severe Sepsis in the United States :Analysis of Incidence, Outcome, and Associated Costs of Care ; *Journal of Critical Care Medicine, 2001 Jul;29 (7): 1303-10* : doi :10.1097/00003246-200107000-00002.

13) Henriksen DP, Pottegard A et al ; Risk Factors for Hospitalization Due to Community-Acquired Sepsis - A Population - Based Case- Control Study ; *Public Library of Science One 10 (4),2015*: doi:10.1371/journal.pone.0124838.

14) Berger PB, Gumbuinger C et al ; Epidemiologic features, risk factors, and outcome of sepsis in stroke patients treated on a neurologic intensive care unit ; *Journal of Critical Care* : https://doi.org/10.1016/j.jcrc.2013.11.001

15) Kaukonen K, Bailey M et al ; Mortality Related to Severe Sepsis and Septic Shock Among Critically ill Patients in Australia and New Zealand, 2000-2012 ; *JAMA* : doi:10.1001/jama.2014.2637.

16) Polat G, Ugan RA et al ; Sepsis and Septic Shock : Current Treatment Strategies and New Approaches ; *The Eurasian Journal of Medicine.2017 Feb; 49 (1):53-58* : doi : 10.5152/eurasianjmed.2017.17062.

17) Rhee C, Jones TM et al ; Prevalence, Underlying Cause, and Preventability of Sepsis-Associated Mortality in US Acute Care Hospitals ; *JAMA Network Open.2019;2(2):e187571.* doi:10.1001/jamanetworkopen.2018.7571.
18) Chatterjee S, Bhattacharya M and Todi SK ; Epidemiology of Adult -Population Sepsis in India : A Single Centre 5 Year experience; *Indian Journal of Critical Care Medicine,September 14,2017;21:573-7* : doi:10.4103/ijccm.IJCCM…240…17.
19) Vincent JL, Sakr Y et al ; Sepsis in European Intensive Care Units: Results of the Soap study ; *Journal of Critical Care Medicine, 2006 Feb; 34 (2): 344-53* : doi:10.1097/01.ccm.0000194725.48928.3a.
20) Rhee C, Dante R et al ; Incidence and Trends of Sepsis in US Hospitals Using Clinical vs Claims Data, 2009-2014*; JAMA, 2017;318(13)* : 1241-1249. doi:10.1001/jama.2017.13836.
21) Blanco J, Muriel-Bombin A et al ; Incidence, Organ Dysfunction and Mortality in Severe Sepsis : A Spanish Multicentre Study ; Journal of Critical Care 2008,12:R158 :doi:10.1186/cc7157.
22) Jhao GJ, Li D et al ; Incidence., risk factors and impact on outcome of secondary infection in patients with septic shock : an 8 - year retrospective study ; Scientific reports, 6:38361: doi:10.1038/srep38361.
23) Mestanza CL, Ojeda DA, Lopez J.R.G, Martin J.I.B ; Clinical factors influencing mortality risk in hospital acquired Sepsis*: Journal of Hospital Infection*: 98(2018);194-201 : http:/idx.doi.org/10.1016/jhin,2017.08.022.
24) Fathi M, Markazi MN, Ramezankhani A; A systemic review on risk factors associated with sepsis in patients admitted in intensive care units; *Official Journal of the Australian College of Critical* Care,March 22,2018 : https://doi.org/10.1016/j.aucc.2018,02,005.
25) Kang CI, Song JH et al ; Risk factors and pathogenic significance of severe sepsis and septic shock in 2286 patients with gram-negative bacteremia ; Journal of Infection Control, 62 (1),26-33.2011: doi:https://doi.org/10.1016/j.jinf.2010.10.010
26) Vught L A V et al ; Incidence, Risk Factors ,and Attributable Mortality of Secondary Infections in the Intensive Care Unit After Admission for Sepsis ; JAMA,2016 Apr 12;315 (14): 1469-79 : doi:10.1001/jama.2016.2691.
27) Asghar A, Hashmi M, Rashid S, Khan FH ; Incidence, outcome and risk factors of sepsis-a two year retrospective study at surgical intensive care unit of a teaching hospital; *Journal of Ayub Medical College Abbotthaba*; 28(1),79-83, 2016,
28) Esteban et al ; Sepsis incidence and outcome: contrasting the intensive care unit with the hospital ward ;*Journal of Critical Care Medicine* ; May2007,Volume-35, issue5-p1284-1289, availabl at doi:10.1097/01CCM.0000260960.94300.DE
29) Babu M, Vidya P et al ; Epidemiology and outcome among severe sepsis and septic shock patient in a South Indian Tertiary Care Hospital; International Journal of Pharmacy and Pharmaceutical Sciences, 9(5),2017 : doi:http//dx.doi.org/10.22159/ijpps. 2017v9i5.17102.
30) Paary T T S, Kalaiselvan et al ; Clinical profile and outcome of patients with severe sepsis treated in an intensive care unit in India ; Ceylon Medical Journal 2016;61:181-187 : http://doi.org/10.4038/cmj.v61i4.8386.
31) Chatterjee S, Chattopadhyay A et al ; Outcomes of Severe Sepsis among adults in a Tertiary Care Hospital in Kolkata - A Preliminary Study ; Journal of Anesthesia & Intensive Care Medicine,6 (2): JAICM.MS.ID.555684(2018).

32) Artero A, Zaragoza R et al ; Prognostic factors of mortality in patients with community -acquired bloodstream infection with severe sepsis and septic shock Journal of Critical Care (2010) 25,276-281 :doi:10.1016/j.jcrc.2009.12.004.