



SUMMER INTERSHIP REPORT
AT
MAX HEALTHCARE HOSPITAL
,DEHRADUN
(MAY 01 TO JUNE 30, 2024)



A REPORT
BY
DR. NISHANT SAGAR

PGDM (HOSPITAL AND HEALTH MANAGEMENT)
(2023-2025)



INTERNATIONAL INSTITUTE OF HEALTH
MANAGEMENT REASEACH, NEW DELHI

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COMPLETION CERTIFICATE FROM MAX

HEALTHCARE

(Completion of Summer Internship from respective Organization)

The certificate is awarded to

Name **Dr. NISHANT SAGAR**

In recognition of having successfully completed his/her Internship in the department of

Title **MEDICAL ADMINISTRATION**

And has successfully completed
her Project on

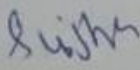
Title of the Project **REVIEW OF INPATIENT MORTALITY IN ICU USING SOFA SCORE**

Date **28-06-2024**

Organisation **MAX HEALTHCARE DEHRADUN**

He/She comes across as a committed, sincere & diligent person who has a strong drive & zeal for learning

We wish him/her all the best for future endeavors


Organization Supervisor




Head-HR/Department Head



Dr. Ashish P. Yagnik
Medical Superintendent
Max Hospital, Dehradun
Malai, Uttarakhand - 248001



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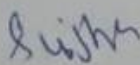
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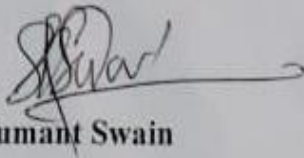
Dr. Ashish P. Yagnik 
Medical Superintendent
Max Hospital, Dehradun
Malai, Uttarakhand - 248001



CERTIFICATION OF APPROVAL

Certificate of Approval

The Summer Internship Project of titled "THE USE OF SOFA SCORE IN THE ICU OF MAX HEALTHCARE , DEHRADUN" is hereby approved as a certified study in management carried out and presented in a manner satisfactorily to warrant its acceptance as a prerequisite for the award of **Post Graduate Diploma in Health and Hospital Management** for which it has been submitted. It is understood that by this approval the undersigned do not necessarily endorse or approve any statement made, opinion expressed, or conclusion drawn therein but approve the report only for the purpose it is submitted.



Dr. Sumant Swain
Assistant Professor
IIHMR, Delhi

FEEDBACK FORM BY MENTOR

FEEDBACK FORM

(IHMR MENTOR)

Name of the Student: Dr. Nishant Sagar

Summer Internship Institution: Max Healthcare Dehradun

Area of Summer Internship: Operations Department

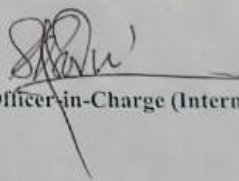
Attendance: 93.44%.

Objectives met: Internship project → So far no
Internship in operation Department

Deliverables:

Strengths: Hardworking

Suggestions for Improvement: Improve public speaking skills


Signature of the Officer-in-Charge (Internship)

11/12/2024

Date:

Place:

ACKNOWLEDGEMENTS

I would like to express my heartfelt gratitude to everyone who supported me throughout my two-month internship at Max Healthcare Hospital. This experience has been incredibly enriching, and I am deeply appreciative of the guidance and opportunities provided.

Firstly, I would like to extend my sincere thanks to my mentors Mr. Saurabh Mishra, Dr Divya khanduri, Dr Ashmita Kapoor, Dr. Sadaf Khan. Their expertise, patience, and unwavering support were instrumental in my understanding and research on the SOFA score. Their insightful feedback and encouragement have been vital to my professional growth and the successful completion of this internship.

I am also profoundly grateful to Dr. Ashish.P. Yagnik, the Medical Superintendent, for his leadership and support, which ensured a conducive learning environment. His commitment to excellence in patient care and medical education was inspiring and significantly enhanced my internship experience.

My appreciation also goes to the entire team at Max Healthcare Hospital for providing an exceptional learning environment. The resources and facilities available to me during this period greatly facilitated my research and practical training.

Special thanks to the nursing staff and administrative personnel for their cooperation and assistance, making my time at the hospital both educational and enjoyable.

Finally, I would like to acknowledge my family and friends for their continuous encouragement and support throughout this journey. Their belief in my abilities has been a source of motivation and strength.

Thank you all for making this internship an enriching and rewarding experience.

ABOUT MAX HEALTHCARE, DEHRADUN

Max Hospital in Dehradun, a state-of-the-art facility with over 200 beds, has consistently delivered top-quality healthcare to more than 3 lakh patients. This modern hospital features 63 ICU beds, 67 critical care beds, and 24 HDU beds, offering advanced medical services across 25 specialties, including Neurosciences, Cardiac Sciences, Orthopaedics, Urology, Nephrology, and Mental Health.

The hospital's Neurosciences Centre of Excellence stands out with its cutting-edge capabilities such as Neuro Navigation, Stereotaxy, Microscopic Surgery, an advanced brain tumour centre, and Endoscopic surgery. It also houses dedicated clinics for epilepsy, neuromuscular disorders, and movement-related conditions.

Staffed by a team of 130 highly skilled doctors, over 300 trained nurses, and an expert medical workforce, Max Hospital, Dehradun, leverages advanced infrastructure to address complex medical needs. The facility includes six sophisticated modular operation theatres and specialized equipment for therapies like Gait Training, TENS, Muscle Stimulation, EMG Biofeedback, Micro current pain management, Diadynamic Current therapy, and Laser treatment for migraines. It also offers innovative techniques like Kinesio Taping and Dry Needling.

Today, Max Hospital in Dehradun is recognized for its comprehensive and patient-centered approach to healthcare, ensuring holistic well-being for everyone it serves.

INTRODUCTION

The Sequential Organ Failure Assessment (SOFA) score is a tool used in intensive care units (ICUs) to monitor the condition of a patient and assess the degree of organ dysfunction or failure. It also helps estimate the likelihood of mortality during an ICU stay. The SOFA score evaluates six organ systems: respiratory, cardiovascular, hepatic, coagulation, renal, and neurological.

The parameters assessed in the SOFA score include:

- Serum creatinine (mg/dL) [$\mu\text{mol/L}$] or urine output, to evaluate kidney function.
- Serum bilirubin (mg/dL) [$\mu\text{mol/L}$], to assess liver function.
- Glasgow Coma Scale (GCS), to measure neurological status.
- Platelet count ($\times 10^3/\mu\text{L}$), for evaluating coagulation.
- Mean arterial pressure or the need for vasopressors, to assess cardiovascular stability.
- $\text{PaO}_2/\text{FiO}_2$ ratio [mmHg (kPa)], to monitor respiratory function.

These parameters collectively provide insights into the severity of organ dysfunction and guide clinical decision-making for critically ill patients.

THE USES OF SOFA SCORE IS AS FOLLOWS:

- To predict the mortality of the patients in the ICU.
- Severity assessment-It helps in determining the extent of organ dysfunction.
- Resource allocation-In resource limited settings, the sofa score can assist in prioritizing care and resources to those patients who are more likely to benefit from intensive interventions.
- Monitoring disease progression-By calculating the SOFA score daily, healthcare providers can track the patient's progress or deterioration. This ongoing assessment helps in promptly identifying any worsening of the patient's condition.

Guiding Treatment Decisions: The score informs decisions regarding the intensity and type of treatments required. For instance, significant changes in the score may indicate the need for interventions like mechanical ventilation, vasopressors, or dialysis.

SOFA score	1	2	3	4
<i>Respiration</i> PaO ₂ /FiO ₂ (mm Hg)	<400	<300	<200 (with respiratory support)	<100 (with respiratory support)
<i>Coagulation</i> 10 ⁻³ /platelets/mm	<150	<100	<50	<50
<i>Liver</i> Bilirubin mg/dL (μM)	1.2–1.9 (20–32)	2–5.9 (33–101)	6–11.9 (102–204)	>12 (>204)
<i>Cardiovascular</i> Hypotension	MAp < 70 mm Hg	Dopamine ≤ 5 ^b or dobutamine (any dose)	Dopamine > 5 or epinephrine ≤ 0.1 or norepinephrine ≤ 0.1	Dopamine > 15 or epinephrine > 0.1 or norepinephrine > 0.1
<i>CNS</i> Glasgow Coma Score	13–14	10–12	6–9	<6
<i>Renal</i> Creatinine, mg/dL (μM) or urine output	1.2–1.9 (110–170)	2–3.4 (171–299)	3.5–4.9 (300–440) Or <500 mL/d	>5 (>440) or <200 mL/d

Abbreviations: CNS, central nervous system; SOFA, Sequential (Sepsis-Related) Organ Failure Assessment.

^aBased on Vincent et al⁵³ and shows the potential values that contribute to the SOFA score.

^bCatecholamine and adrenergic agents administered for at least 1 hour; doses in μg/kg/min.

OBJECTIVES

- Calculate the SOFA score for patients admitted to the ICU.
- Assess the mortality rate of ICU patients based on their SOFA scores.
- Analyze the correlation between SOFA scores and the average length of stay in the ICU.
- Utilize the SOFA score to forecast resource allocation requirements.

Type of Study

This is a prospective observational study, where data is gathered by monitoring patients over time.

Location

The study is conducted at Max Healthcare, Dehradun, covering the following ICUs: MICU-1, MICU-2, MICU-4, and NSICU.

Inclusion Criteria

Patients admitted to MICU-1, MICU-2, MICU-4, and NSICU are included in this study.

Exclusion Criteria

Patients from the Cardiothoracic and Vascular Surgery (CTVS) unit, general wards, and the emergency department are excluded.

Sample Size

Data from approximately 100 patients is collected for this study.

Data Collection

Both primary and secondary sources of information are utilized for this study. The details are as follows:

- a) **Primary Sources** - Information is obtained through interviews with nurses, doctors, and other medical staff.
- b) **Secondary Sources** - Secondary data is collected from various sources, including electronic health records (EHRs), Clinical Patient Record Systems (CPRS), and medical charts.

Method of Data Collection

Data is gathered through chart reviews, electronic health records, CPRS, laboratory tests, bedside monitoring devices, and diagnostic imaging.

Tools for Data Collection

The tools used include electronic health records and CPRS.

Study Timeline

The study spans from May 18, 2024, to June 24, 2024.

Sofa score distribution

Sofa score ranges in patients: ranges from 0 to 12 in the study.

Daily sofa scores: study show patients who shows decrease in sofa score has better outcomes.

Highest sofa score in the report-12

Lowest sofa score in the report-0

Range=12-0=12

Mean sofa score=1.68

Correlations analysis

Ventilator patients-10%

Non ventilator patients-40%

Non invasive ventilator patients-50%

Gender distribution:

Male: 55%

Female:45%

Outcomes analysis

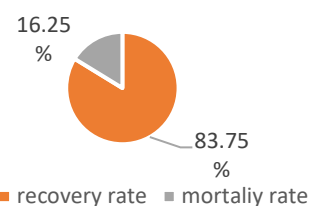
Recovery rate: 83.75%

Mortality rate: 16.25%

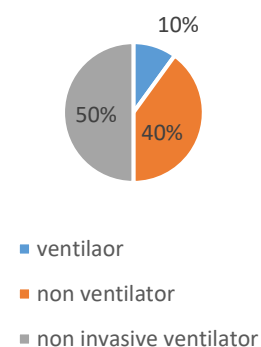
Key findings

- 1.predictive value : High initial sofa scores are predictive of Increased mortality and longer patients stay.
- 2.organ specific impact : respiratory and neurological has bad outcomes.
- 3.trend analysis : decreasing sofa scores over time are indicative of better prognosis and recovery.

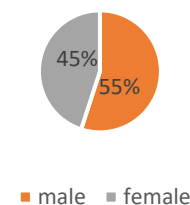
MORTALITY RATE



PATIENT STATUS ON VENTILATOR



PATIENTS RATIO

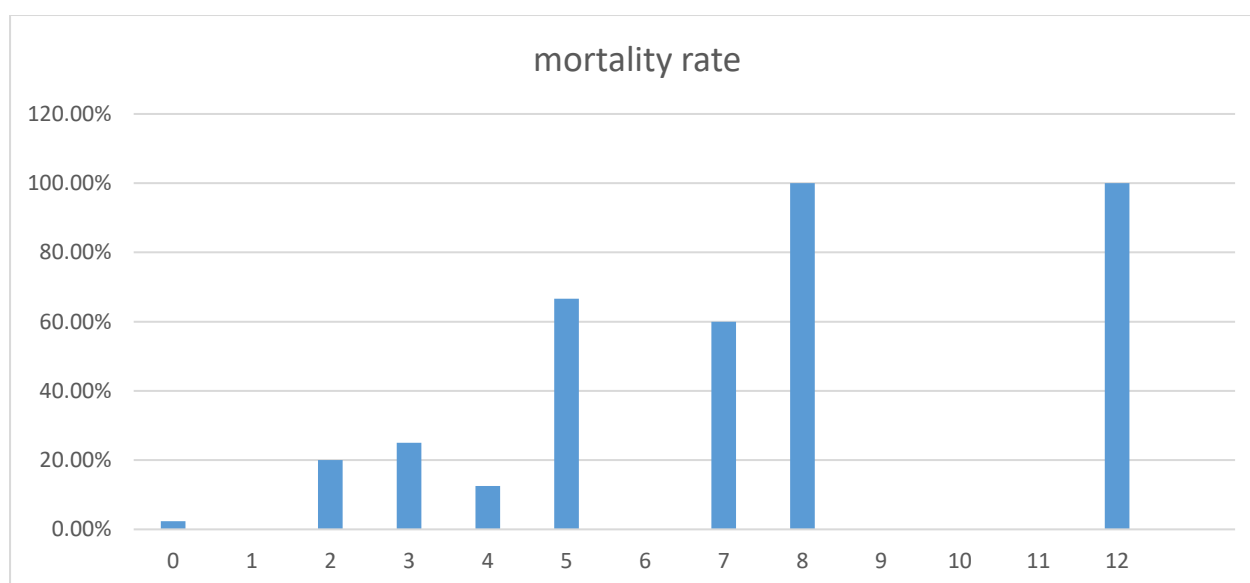


SPECIFIC FINDINGS NO. 1

Among the total of 80 patients, the distribution of outcomes based on SOFA scores is as follows:

- **SOFA Score 0:** 31 patients had this score, with 1 patient succumbing and the rest surviving.
- **SOFA Score 1:** Of the 5 patients, 4 were discharged, and 1 left the hospital against medical advice.
- **SOFA Score 2:** This score was observed in 5 patients, with 1 patient passing away.
- **SOFA Score 3:** Among 4 patients, 1 died, while the remaining 3 were discharged.
- **SOFA Score 4:** Out of 8 patients, 1 patient did not survive.
- **SOFA Score 5:** There were 3 patients in this category, and 1 of them died.
- **SOFA Score 7:** This group included 4 patients, with 3 deaths recorded.
- **SOFA Score 8:** Both patients with this score passed away.
- **SOFA Score 12:** Similarly, both patients with this score did not survive.

This data highlights the relationship between higher SOFA scores and increased mortality.



The mortality rates associated with different SOFA scores are as follows: Patients with a SOFA score of 0 have a mortality rate of 2.4%. A SOFA score of 2 corresponds to a mortality rate of 20%, while a score of 3 is associated with a 25% mortality rate. Patients with a score of 5 exhibit a mortality rate of 66.6%, and those with a score of 7 have a mortality rate of 75%. For SOFA scores of 8 and 12, the mortality rate reaches 100%.

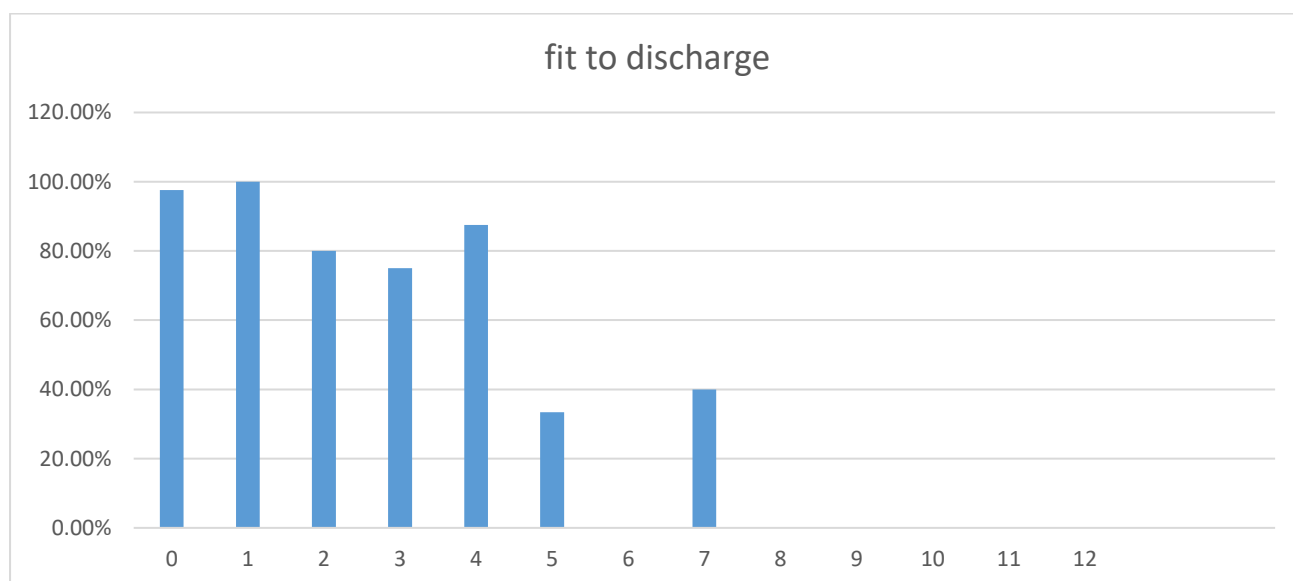
Although the graph is not regular, it shows an increasing trend from a SOFA score of 0 to a SOFA score of 12, clearly indicating that the mortality rate rises with the increase in SOFA score.

SPECIFIC FINDING NO. 2

Among the 40 patients evaluated, the survival rates based on SOFA scores are as follows:

- **SOFA Score 0:** Out of this group, 1 patient died, yielding a survival rate of 97.5%.
- **SOFA Score 1:** All 5 patients were discharged, resulting in a 100% survival rate.
- **SOFA Score 2:** Among 5 patients, 1 patient died while 4 were discharged, leading to an 80% survival rate.
- **SOFA Score 3:** Of the 4 patients in this category, 1 died, giving a survival rate of 75%.
- **SOFA Score 4:** This group of 8 patients experienced 1 death, resulting in a survival rate of 87.5%.
- **SOFA Score 5:** Out of 3 patients, 1 died, translating to a survival rate of 66.7%.
- **SOFA Score 7:** Among 4 patients, 3 deaths were recorded, with a survival rate of 25%.
- **SOFA Score 8:** Both patients in this group died, leading to a 0% survival rate.
- **SOFA Score 12:** Similarly, all 2 patients in this category died, also resulting in a 0% survival rate.

This data reflects how survival rates decline as SOFA scores increase.

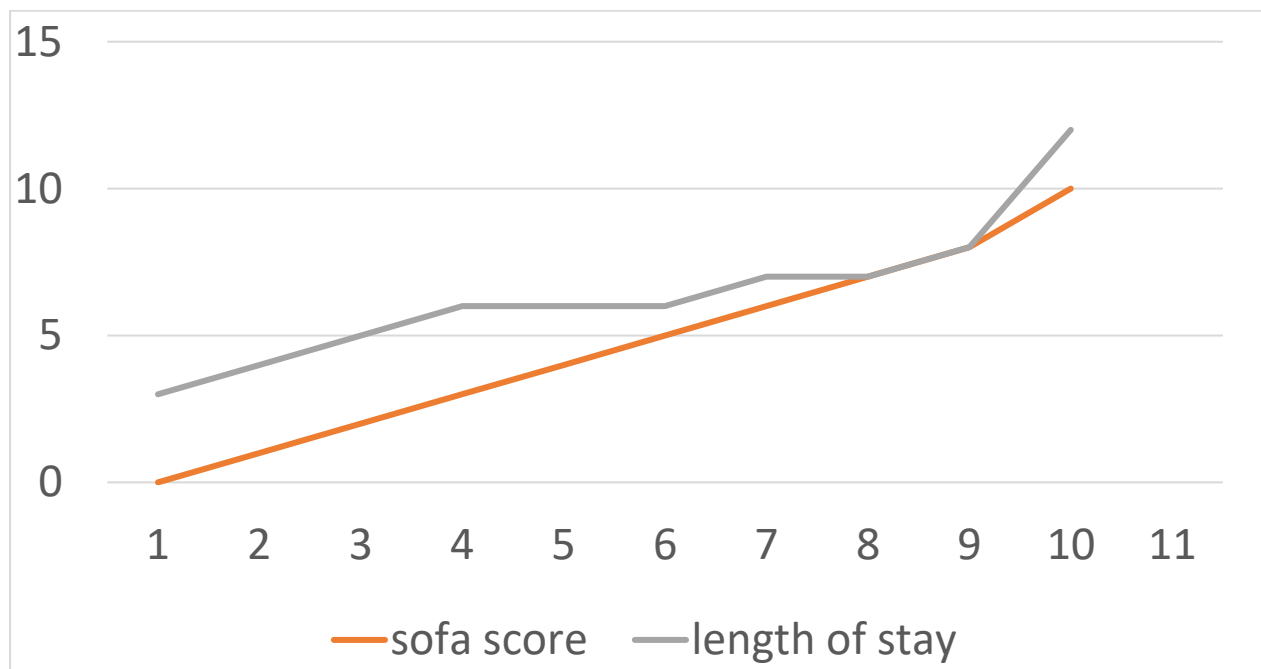


The graph illustrates the survival rates for patients based on their SOFA scores as follows: Patients with a SOFA score of 0 have a survival rate of 97.5%, while those with a score of 1 achieve a 100% survival rate. Patients with a SOFA score of 2 show an 80% survival rate, and those with a score of 3 have a 75% survival rate. For patients with a score of 4, the survival rate is 87.5%, and for a score of 5, it drops to 66.7%. Patients with a SOFA score of 7 exhibit a survival rate of 25%, while those with scores of 8 and 12 have a survival rate of 0%.

Although the trend is not perfectly linear, the graph demonstrates a clear pattern: survival rates decrease progressively as SOFA scores rise from 0 to 12.

SPECIFIC FINDINGS NO.3

Higher sofa score is linked with more length of stay.



From the report, it is a general finding that patients with higher SOFA scores show more resource utilization, as some of these patients are likely to be on mechanical ventilation, some need dialysis, and vasopressors and other critical medications are allocated based on the cardiovascular components of the SOFA score. Higher SOFA scores necessitate more intensive monitoring and staffing.

KEY FINDINGS

HELPS IN PREDICTION

sofa score value helps to predict the mortality rate of the patients in the icu, chances to fit to discharge and length of stay.

Dynamic Monitoring:

The change in SOFA scores over time, rather than a single measurement, provides valuable prognostic information. An increasing SOFA score indicates worsening organ function and a higher risk of death, while a decreasing score suggests improving organ function and a better prognosis.

Application in Various Conditions:

Beyond sepsis, the SOFA score can be used in various conditions, including trauma, respiratory failure, and post-surgical complications and various health conditions. It helps in understanding the extent of organ failure and tailoring interventions accordingly.

Comparison with other scoring systems:

The SOFA score is often compared with other scoring systems like the APACHE II, SAPS II, and LODS. Studies show that while SOFA is excellent for assessing organ dysfunction and predicting mortality, it should be used alongside other scores for comprehensive patient evaluation.

Similar Studies Available

1. **"SOFA Score and Mortality Prediction in ICU Patients with Sepsis"**
 - This research examines the effectiveness of the SOFA score in predicting mortality specifically in patients with sepsis. It also compares the SOFA score's predictive ability with other scoring systems such as APACHE II.
2. **"Dynamic Changes in SOFA Score and Outcome in Critically Ill Patients"**
 - This study explores the relationship between changes in SOFA scores during the first week of ICU admission and patient outcomes. It highlights the significance of daily monitoring and scoring.
3. **"Comparison of SOFA Score and Simplified Acute Physiology Score (SAPS II) in Predicting Mortality in the ICU"**
 - The study compares the accuracy of SOFA and SAPS II scores in predicting ICU mortality, focusing on the advantages and limitations of each scoring method.
4. **"Validation of SOFA Score in a Mixed ICU Population"**
 - This research validates the application of the SOFA score in a heterogeneous ICU patient population, analyzing its reliability and accuracy across various clinical conditions.
5. **"SOFA Score in Trauma Patients: An Effective Tool for Prognosis"**
 - The study investigates the applicability of the SOFA score in trauma cases, evaluating its utility in predicting outcomes for patients with traumatic injuries.

Sample Size

The study includes a limited sample of 80 patients, which may restrict the generalizability of the findings to broader populations or various ICU settings. Additionally, the small sample size could reduce the reliability of statistical analyses conducted.

Time limit-This internship report is solely based on the short time period from May 18, 2024, to June 18, 2024. The brevity of this study period may have an impact on the findings related to Sofa Score.

Single-Center Study

Conducting the study in a single ICU limits its applicability to other ICUs that may have distinct patient demographics, care protocols, or resource levels.

Generalizability

The results of the study might not be relevant to ICUs in other regions, with diverse patient populations, or differing healthcare resource availability.

Complexity: Calculating the SOFA score requires various laboratory tests and clinical data, which might not be readily available in all settings.

Inter-Observer Variability: Although designed to be objective, some components of the SOFA score, such as the Glasgow Coma Scale, can be subject to inter-observer variability.
available in all settings.

CONCLUSIONS

The study demonstrates that the SOFA score is an effective tool for forecasting outcomes in critically ill patients. It shows that higher SOFA scores are typically linked to increased mortality rates. This predictive ability makes the SOFA score a valuable asset in both clinical decision-making and research applications.

- Conversely, lower sofa scores are linked to increased chances of patient survival. In the study it is clearly shown that the lower sofa score is linked with better patients outcome. As out of 46 patients with the sofa score of 0 only 1 patient got dead and rest discharged.

- Disease progression-

The SOFA score is useful for monitoring the progression or improvement of a patient's condition over time. Regular assessment allows healthcare providers to observe trends and make timely interventions, potentially improving patient outcomes.

- Resource allocation

In settings with limited resources, the SOFA score can help prioritize care for patients most likely to benefit from intensive treatments. This triage function is particularly important in mass casualty situations or pandemics

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