TO CAPUTRE PREDICTABLE VERSUS ACTUAL MORTALITY FOR INTENSIVE CARE UNITS (ICU'S)

Dissertation Submitted to

The "IIHMR University, Jaipur"

(For the partial fulfillment for the award of the degree

of Master of Business Administration (MBA))

in

"Hospital and Health Management"

Naina Yadav

"Under the Supervision and Guidance of

Mr. Sandesh Kumar Sharma"

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DECLARATION BY STUDENT

I hereby declare that this dissertation titled "To Capture predictable verses actual Mortality for Intensive Care Units (ICU'S)" 'is the bonafide record of my original research work. I declare that it has not been submitted to any other university or institution for the award of any degree or diploma. Information derived from the published or unpublished work of others has been duly acknowledged in the text'.

Name of Student:

Naina Yadav

Date:1-07-22

CERTIFICATE

This is to certify that Naina Yadav in Partial fulfillment of the requirements for the award of the degree of MBA (Hospital and Health Management) from the "IIHMR University, Jaipur" has successfully completed her dissertation at BLK Max hospital during March 24, 2022 to June 23, 2022.

Place:
Date:

Preceptor/Head of the Organization
Name of the organization

<u>CERTIFICATE</u>

This is to certify that dissertation titled “To capture predictable verses actual mortality for Intensive Care Units (ICUS)” ‘is a record of the research work undertaken by Naina Yadav in partial fulfillment of the requirements for the award of the degree of MBA’ (Hospital and Health Management) from the IIHMR University, Jaipur under my guidance and supervision and ‘her approach to the research study has been sincere, scientific, and analytical’.

Faculty Guide IIHMR University, Jaipur	School Dean IIHMR University, Jaipur
Date	Date

ABSTRACT

Background: A scoring system can be used to categorise patients as critically ill, determine their prognosis, aid in clinical decision-making, direct resource allocation, and gauge the level of care received. It is still unknown if the additional information required to compute the ICU score enhances the ability to predict death in critically sick patients when compared to the ED ratings.

Method: 612 severely sick patients who were admitted to ICUs (MICU, SICU, NSICU, CTVS, CCU, PICU, NICU) over the course of two months were the subject of a prospective observational study. All of the patients' clinical and laboratory data were compiled in accordance with the APACHE II, the Sequential Organ Failure Assessment (SOFA), the Paediatric Index of Mortality (PIMS) III, the Score for Neonatal Acute Physiology (SNAPPE) II, the EUROSCORE II, and the Possum. The average mortality rate of the ICUS for two months was compared.

Results: Data from 612 patients were collected over 2 months period. In MICU sixteen patients died, Expected mortality was 19 % (SMR: 0.78) in April and ten patients died ,expected mortality was 18% (SMR: 0.70) in May. NSICU one patient died , expected mortality was 20% (SMR: 0.11) in April and Two death , expected mortality 19% (SMR:0.25) in May. In CCU death was one, expected death 12% (SMR: 0.23) in April and one patient died, expected mortality was 6% (SMR:0.23). In SICU total one patient died, expected mortality 25% (SMR: 0.12) in April and there were no death in may , expected mortality was 10 (SMR:0.00) in April. In NICU two patient died , expected mortality 11% (SMR: 0.79) in April and no patient died in May, expected death was 5% (SMR:0.00) in May. In PICU there were no death , expected death was 7% (SMR:0.00) in April and one patient died ,expected mortality was 6% (SMR:0.32) in May. So in CTVS no death were there in April, expected death was 1% (SMR :0.00) in April and one patient died , expected mortality 1% (SMR:2.78) in May.

Conclusion: All of the various ICU scores are effective predictors of morbidity and death in patients undergoing any type of surgery, including emergency, laparotomy, etc. For the purpose of identifying patient groups who pose a significant risk of lengthy ICU stays or mortality, regular and repeated scoring may be useful.

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1. INTRODUCTION:

What is mortality?

Death is sometimes referred to as mortality. A disease's mortality rate is calculated by dividing the total number of fatalities by the population. The mortality rate, also known as the death rate, is a measurement of the number of deaths (generally speaking, or those caused by a particular cause) in a given population, scaled to that population's size, per unit of time.

Actual Mortality-
Rate is calculated by dividing the number of deaths from a specified disease over a defined period of time by the number of individuals diagnosed with the disease during that time; the resulting ratio is then multiplied by 100 to yield a percentage.

$$\textbf{Actual Mortality Rate} = \frac{\textbf{Total number of Deaths}}{\textbf{Total Number of population}} \ast 100$$

Predictable Mortality-
Mortality prediction is used to compare the average severity of illness between groups of critically ill patients (for example, between patients in different ICUs, hospitals, or health care systems) and between groups of patients enrolled in clinical trials.

Standardised Mortality Rate-
Standardized Mortality Ratio is the ratio of the observed or actual mortality and the predicted mortality for specified time period. It requires an estimate of predicted mortality rate using a scoring system (APACHE, SOFA, SNAPPE, EUROSCORE II, PIMS III, POSSUM etc.)

$$\textbf{Standardized Mortality Rate-} \frac{\textbf{Actual Mortality}}{\textbf{Predicted Mortality}}$$

When the ratio is more than 1.0, it means that more deaths have occurred than would have been predicted, and when it is lower than 1.0, it means that fewer deaths have happened.

Compared to regular wards, patients in Intensive Care Units (ICU) had higher baseline severity at the time of admission, and hospital-associated infections happen more frequently. In order to forecast a patient's prognosis, a number of scoring systems have been utilised due to the high mortality rate of ICU patients. The Sequential Oran Failure Assessment (SOFA), Paediatric Index of Mortality (PIMS) III, Score for Neonatal Acute Physiology (SNAPPE) II, EUROSCORE II, and POSSUM are some examples of traditional scoring systems that are only slightly accurate at predicting individual mortality.

These scoring systems have the benefit of standardising studies and facilitating ICU-to-ICU comparisons of care quality. However, depending on the features of the hospitals where they are to be used, such as the demographic makeup of inpatients, underlying comorbidities, and the percentage of surgical or medical admissions, the prognostic predictive value of traditional models may change. In addition, because conventional scoring systems were developed and validated at particular times, social and temporal changes such as an increase in life expectancy, advancements in public health, and the appearance of new diseases might cause a decline in predicting ability over time.

A fresh approach that can be quickly updated on a regular basis to incorporate the most recent clinical data and take into account the unique characteristics of each institution is required to enhance the predictive model for ICU inpatients. The development of automated (EHRs) made it possible to get a significant amount of data to enhance functionality of existing models. In the realm of clinical medicine, especially machine learning (ML) techniques are also being used in a variety of ways for diagnosis and prognosis prediction. To avoid overfitting and make it easier to create regularly updated prediction models, comprehensive data analysis using machine learning can take advantage of the enormous number of variables currently entered into EHRs.

1.1 Importance of Scoring in ICUS

- Because of the excellent discrimination demonstrated by the score and the fact that mortality depends not only on the entry score but also on the length of the ICU stay, it may be useful as a substitute end point for clinical trials involving critically sick patients.

- To assess the efficacy of therapeutic interventions, intensive care units (ICUs) quickly developed, necessitating the creation of quantitative and clinically pertinent surrogate outcome measures.

- The outcome of patients in intensive care depends on a number of variables that are present on the patient's first day in the ICU and later on during their stay there. Numerous grading systems have been devised for such populations.

- Scoring System typically consists of 2 components: a score and probability.

- Improves how well scores or scales may be used to compare different patient groups for purposes of care, triage, or comparative analysis, which aids in decision-making.

- They also support the creation of treatment standards by enabling a better knowledge of treatment efficacy and maximising the utilisation of hospital resources.

1.2 Scoring System for mortality prediction-

ICU’s	Scoring System
MICU	Apache II
NSICU	Apache II
SICU	Possum
CCU	Sofa
CTVS	Euro Score II
PICU	PIMS III
NICU	SNAPPE II

APACHE II-(Acute Physiology and Chronic Health Evaluation) The most well-known and often used score, with strong calibration and discrimination, is the APACHE score. The APACHE II score is a broad indicator of disease severity based on age, prior health problems, and current physiological parameters. The score can aid in the evaluation of patients to establish the scope and intensity of therapeutic and diagnostic intervention. Minimum 0 and maximum 71 are the values for APACHE II; a higher score indicates a higher risk of hospital death. The benefit of the APACHE is that it may be used to track the patient's reaction to therapy during their stay in the hospital. Apache II score is sum of Acute Physiology Score-age, temperature, MAP, pH, Pulse, respiratory rate, sodium, potassium, creatinine, hematocrit, white blood cell count, GCS, FiO2 and Chronic Health Score- History of severe organ failure, Acute renal Failure. The worst physiological variables were collected within the first 24 hours of ICU admission.

POSSUM (Physiological and Operative Severity Score for the enUmeration of Mortality and Morbidity) A grading system called the POSSUM scale (Physiological and Operative Severity Score for the enUmeration of Mortality and Morbidity) is used to forecast risk-adjusted mortality and morbidity rates in a wide range of surgical procedures. All patients undergoing elective and emergency laparotomies in a hospital's general surgery department were prospectively evaluated using the POSSUM scale. The POSSUM scale was used to compute predicted death rates. So, the least score is 12 and the highest score is 88**.**The POSSUM system is a 2-part scoring system that includes **Physiological parameters-** Age (years), Cardiac, Systolic BP (mm Hg), Heart Rate, GCS, Hemoglobin, WBC, Urea, Sodium, Potassium, ECG. **Operative Parameters-** Severity Score, Multiple Procedures, Blood Loss, Contamination, Presence of Ca, Mode of Surgery. Setting up a P-POSSUM Score Choose a value from the drop-down menus in the physiological and operating parameter tables below for each category that corresponds to your patient. For each category, the default values (the lowest score) are displayed. A young, fit patient having a minor operation can still submit the form exactly as is without changing the values, and the result will still be a percent risk for morbidity and mortality. The updated P-POSSUM formula employed in this application still overestimates risk in low risk categories, as demonstrated by this. The anticipated risk calculated below is more accurate the more "risky" the procedure.

SOFA (Sequential Organ Failure Assessment) A score used to forecast mortality called the Sequential Organ Failure Assessment (SOFA) Score is based on how dysfunctional each of six organ systems is. The worst metrics measured over the previous 24 hours are used to generate the score upon admission and every 24 hours until discharge. The number and severity of organ dysfunction in six organ systems can be calculated using the straightforward and objective SOFA score (respiratory, coagulation, liver, cardiovascular, renal, and neurologic). Scores range from zero (best) to twenty-four (worst). The fast SOFA score (SOFA) helps medical professionals determine the likelihood of morbidity and mortality from sepsis.

Euro Score II (European System for Cardiac Operative Risk Evaluation)
Predicts the likelihood of in-hospital death following major heart surgery. The patient's information is requested in 17 different ways by the model: the following: Renal dysfunction 2, an extracardiac artery disease, Unhealthy Mortality, a critical preoperative condition, active endocarditis, prior heart surgery, and chronic lung disease NYHA, CCS class 4 angina, diabetes on insulin, and LV function current MI, hypertension in the lungs, Urgency, the intervention's weight, Thoracic aorta surgery The proposed surgery, the heart's condition, and logistic regression are used to determine the likelihood of death. The use of it online is free. There are two primary uses for Euro Score II Risk models: The first is that before having a cardiac operation, the chance of death can be calculated using a risk model like Euro SCORE. This is crucial because it helps clinicians and patients decide if an operation is wise by balancing the risks and rewards. The second is as a quality-control strategy. It is possible to compare the number of actual deaths with the estimated risk of mortality for a population of patients undergoing heart surgeries. This comparison can be used to gauge how well the hospital, unit, or surgeon in issue performs.

PIMS III (Paediatric index of mortality) Based on information gathered within the first hour of arrival, the PIM 3 score is one of several severity scoring systems used to forecast the course of paediatric patients admitted to the PICU. The PIM 3 is a straightforward and low-cost method that consists of 10 available factors that forecast death before patients undergo advanced care. Patients in the PICU frequently have uncertain prognoses, and the PICU staff and procedures may have an impact on fatality rates. The outcomes and prognoses of PICU patients can therefore be accurately predicted using a score system for the severity of the illness.

SNAPPE II Neonatal intensive care unit admissions have seen considerable increases in survival and decreases in mortality and morbidity thanks to advancements in the field (NICU). However, there are big differences amongst NICUs in terms of procedures and results. Prognostication score systems have been used in paediatric ICUs and NICUs to solve this issue. Due to the quantity and complexity of the elements, SNAP was difficult to utilise as a first-generation new-born disease severity score. On the basis of parameters, assessment done within 12 hours of admission following stabilisation, the SNAPPE-II was analysed. A

Mercury Thermometer (35 to 42 °C) was used to measure the temperature in the axilla, and it was left there for three minutes. Using the blood gas and Electrolytes analyser, which is available in our NICU, arterial blood gas analysis (ABG) is used to calculate the serum pH and PaO2/FiO2 levels. By using an electronic weighing equipment and measuring the birth weight of new-borns without wearing any clothes, Based on the information provided on referral papers, the birth weight of out born neonates was recorded. using a paediatric urine collection bag or a catheter to quantify urine output (ml/kg/hr), Utilizing the modified Ballard score to determine gestational age.

2. REVIEW OF LITERATURE:

S. No	Study Title and Author	Study Location	Findings
1.	Prediction of mortality in Intensive Care Units: a multivariate feature selection (2020) By Flavio Monteiro, Fernando Meloni, Jose Augusto, Baranauskas, Alessandra Alaniz Macedo	University of Sao Paulo, Brazil	According to the study's findings, the researcher approach had a stronger ability to predict the likelihood of mortality, a smaller reliance on the training set, and cheaper expenditures for ICU surveillance. The strategy also demanded a wider variety of viable ICUs and lower implementation costs.
2.	Using time series themes, ICU mortality can be predicted (2012) By Sean McMilan, Chih-Chun Chia, Alexander Van Esbroeck, Ilan Rubinfeld, Zeeshan Syed	USA	The use of motif discovery to the clinical problem of forecasting intensive care unit mortality was investigated by the researcher in the research paper. The researcher described a method for locating and incorporating data in themes that are significantly over- or underrepresented in ICU time series of patients who are experiencing in-hospital mortality.
3.	An approach for ICU mortality prediction that is boosted by amputation (2012) By Natalia M Arzeno, Joyce C Ho, Haris Vikalo, Joydeep	India	Researcher generated projected characteristics for all patients data on their demographics, the observations for each of the 37 time-varying variables in

			hours 0-48 and 47-47 of their stay, most recent value for each variable.
4.	Using logistic regression to predict the percentage of hospital deaths (2012) By SL Hamilton, JR Hamilton,	Hamilton, Britain	By using liner stepwise regression, the researcher's produced variables from the patient data records are evaluated for significance. The predictor and responder variables for a logistic regression analysis are, respectively, screened generated variables and the associated patient outcome data.
5.	Predicting mortality with linear Bayes classification (2012) By Martin Macas, Jakub Kuzilek, Tadeas Odstclilik, Michal Huptych	Online	The report explains the researcher's response to the PhysioNet challenge 2012, which ultimately finished in fourth place overall. The researcher employed a straightforward linear Bayes classifier, and we chose the features using an optimizer that was based on social impact theory.
6.	A protective ventilation strategy's impact on Acute Respiratory Distress Syndrome mortality (2010) By Marcelo Britto Passos Amato, Carmen Silvia Valente Barbas, Denise Machado Medeiros, Ricardo Borges Magaldi, Guiiherme Paula Schettino etc	Online	Comparing the protective approach to conventional ventilation in patients with acute respiratory distress syndrome, it was found to be related with better survival at 28 days, a High Rate of artificial breathing, and a decreased risk of Barotrauma.. There was no correlation between protective

			ventilation and a greater chance of survival to hospital release.
7.	Comparative evaluation of scoring methods in ICU and emergency department in predicting mortality of critically unwell (2017) By: Sasi Sekhar T. V. D., Anjani Kumar C., Bhavya Ch., Sameera B.*, Rama Devi Ch.	India	In terms of predicting the outcomes for critically ill patients, CU ratings performed better than ED scores. This discrepancy appears to be primarily caused by the intricacy of ICU scores.
8.	Creation of Machine Learning Models for ICU Mortality Risk Prediction Using the MIMIC-IV Database (2022) By : Liang Li 2, Wen Ouyang 1, Xing Liu 1 and Yongzhong Tang 1,*	China	Our data analysis models offer compelling evidence that the APS III-LODS-based scoring system is more accurate at predicting mortality in the ICU than models that use a single scoring system. In summary, this work demonstrated that XGBoost-based machine learning techniques might outperform more traditional logistic regression and support vector machine models.
9.	Predicting hospital mortality for intensive care unit patients: Time-series analysis. (2019) By: Aya Awad	UK	The EMPICU-RF and EMPICU-BN models in this investigation have the best performance. The study demonstrates that performance improves significantly at 6 hours after ICU admission, after which it improves only moderately until 48 hours following ICU admission.

10.	Intensive Care Unit Mortality Prediction: An Improved Patient-Specific Stacking Ensemble Model By: Shaker El-Sappagh, Hazem M. El-Bakry, Samir Abdelrazek.	Egypt	Extensive tests were performed utilising patient time series data of various lengths to predict patient mortality.

OBJECTIVES:

- To calculate standardized mortality for all ICUs.
- Analysis of all the mortalities.
- Compare the standard mortality of ICUS with 2 months
- Ensure the regularity of scoring system to predict the mortality

3.METHODOLOGY:

1. **RESEARCH QUESTION:** This is new addition in NABH 5th edition and hence needs to be implemented across Intensive care areas of the Hospital.

2. **STUDY DESIGN**: Concurrent Audit for all ICU admitted patients after 24 hours of admission.

3. **STUDY SETTING:** Intensive Care Area of BLK Max hospital

4. **STUDY POPULATION**

- **Inclusion Criteria:** All ICU patients after 24 Hours of admission
- **Exclusion Criteria:** All ICU patient who expired/transferred with in 24 Hours of admission
- **Study tools:** APACHE II, SOFA, POSSUM, SNAPPE, PIMS, Euro Score II

5. **DURATION OF STUDY:** 2 MONTHS 24 March, 2022 to 23 June, 2022

6. **SAMPLE SIZE:** All ICU patients

7. **DATA COLLECTION PROCEDURE:** Data will be collected Manually and through online tools

8. **RESEARCH METHODOLOGY:** Quantitative Research

4. RESULTS:

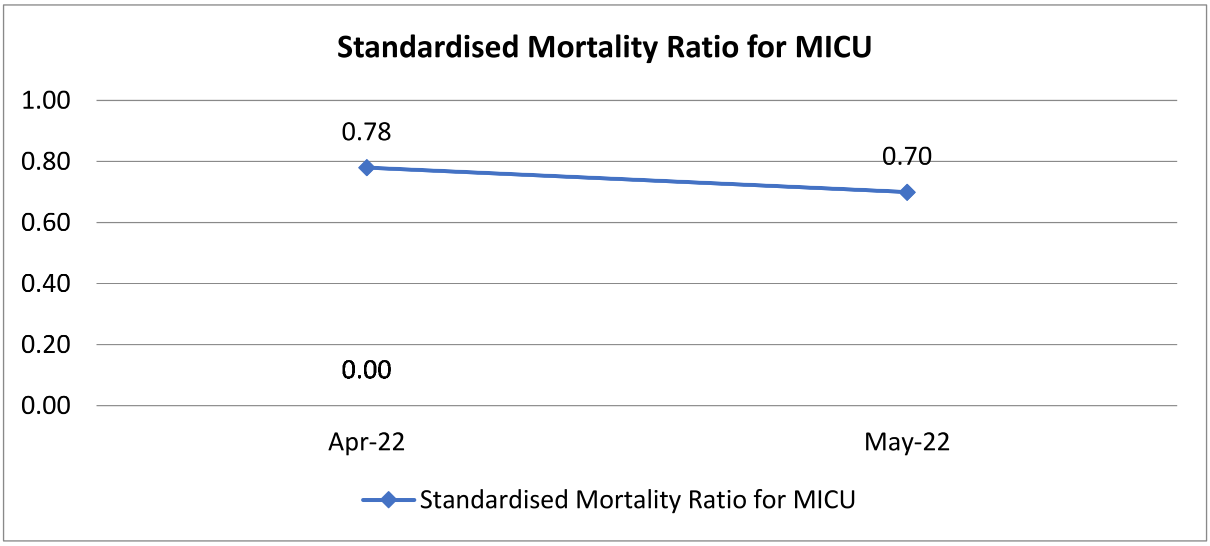
MICU

APRIL	Actual Mortality=NUMBER OF DEATH/TOTAL ADMISSION*100	14.81
	Predicted Mortality	19
	Standardised Mortality Rate=Actual Mortality/Predicted Mortality	0.78

4.1 Table Mortality MICU April

MAY	Actual Mortality=NUMBER OF DEATH/TOTAL ADMISSION*100	12.66
	Predicted Mortality	18
	Standardised Mortality Rate=Actual Mortality/Predicted Mortality	0.70

4.2 Table Mortality MICU May



Graph:4.3

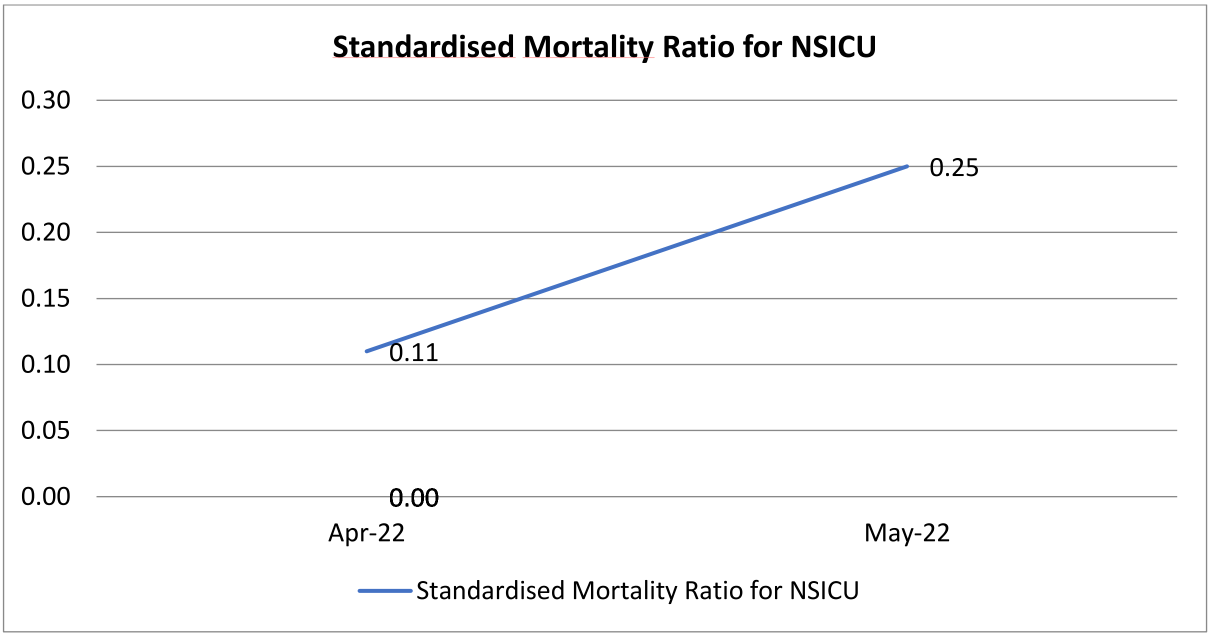
NSICU

APRIL	Actual Mortality=NUMBER OF DEATH/TOTAL ADMISSION*100.	2.17
	Predicted Mortality	20
	Standardised Mortality Rate=Actual Mortality/Predicted Mortality	0.11

4.4 Table Mortality NSICU April

MAY	Actual Mortality=NUMBER OF DEATH/TOTAL ADMISSION*100.	4.76
	Predicted Mortality	19
	Standardised Mortality Rate=Actual Mortality/Predicted Mortality	0.25

4.5 Table Mortality NSICU May



Graph 4.6

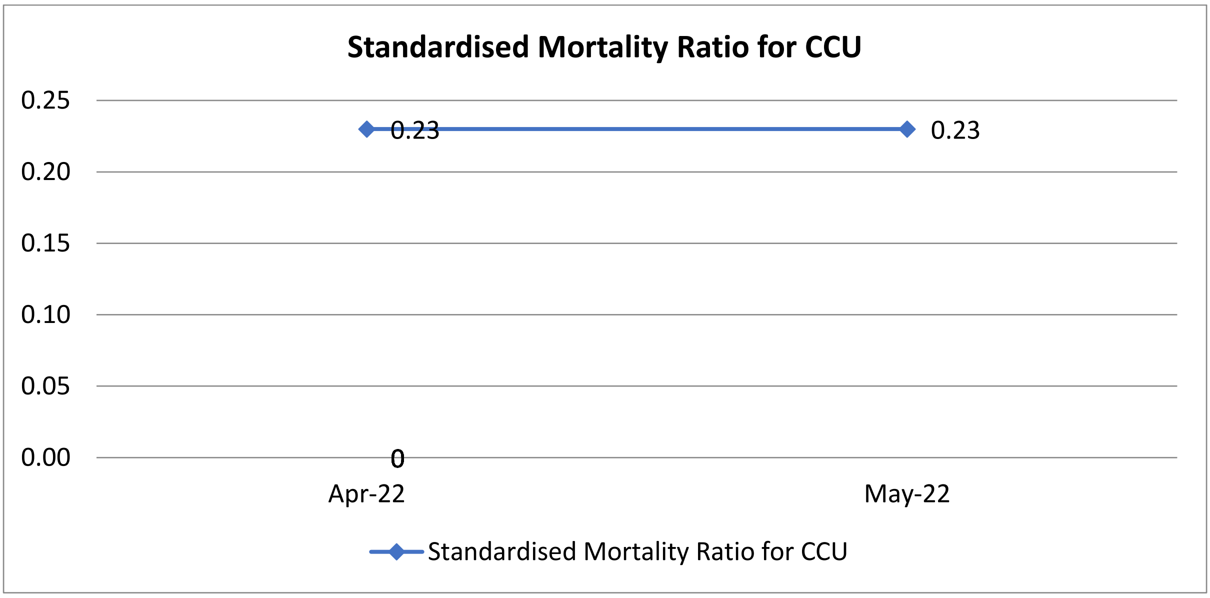
CCU

APRIL	Actual Mortality=NUMBER OF DEATH/TOTAL ADMISSION*100.	2.78
	Predicted Mortality	12
	Standardised Mortality Rate=Actual Mortality/Predicted Mortality	0.23

4.7 Table Mortality CCU April

MAY	Actual Mortality=NUMBER OF DEATH/TOTAL ADMISSION*100.	1.39
	Predicted Mortality	6
	Standardised Mortality Rate=Actual Mortality/Predicted Mortality	0.23

4.8 Table Mortality CCU April



Graph 4.9

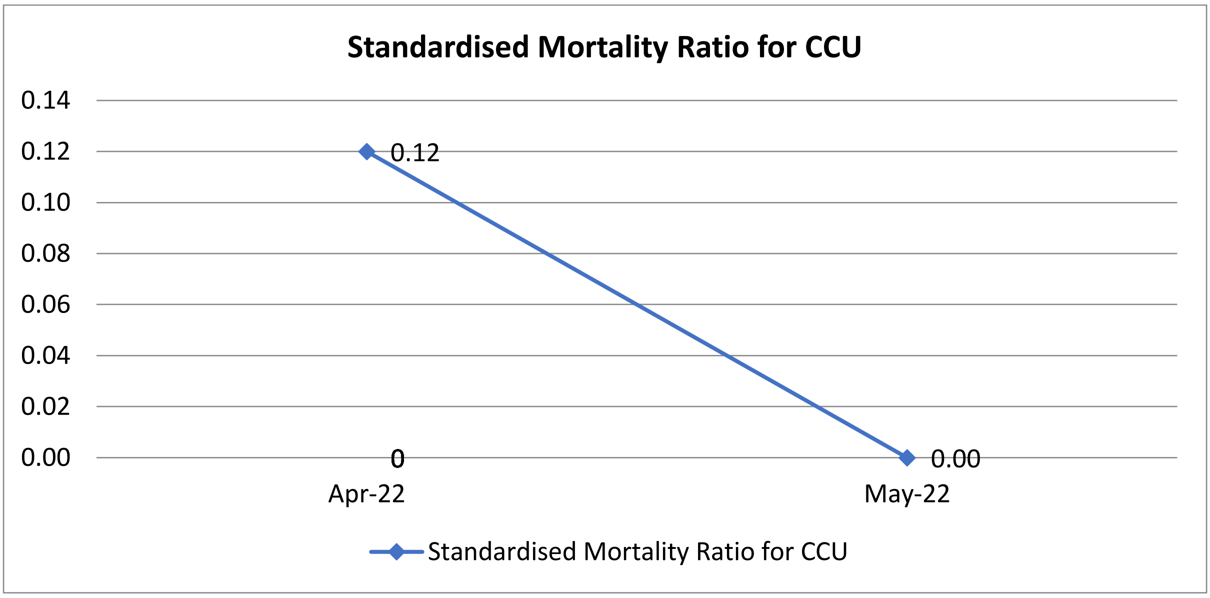
SICU

APRIL	Actual Mortality=NUMBER OF DEATH/TOTAL ADMISSION*100.	2.86
	Predicted Mortality	25
	Standardised Mortality Rate=Actual Mortality/Predicted Mortality	0.12

4.10 Table Mortality SICU April

MAY	Actual Mortality=NUMBER OF DEATH/TOTAL ADMISSION*100.	0.00
	Predicted Mortality	10
	Standardised Mortality Rate=Actual Mortality/Predicted Mortality	0.00

4.11 Table Mortality SICU April



Graph 4.12

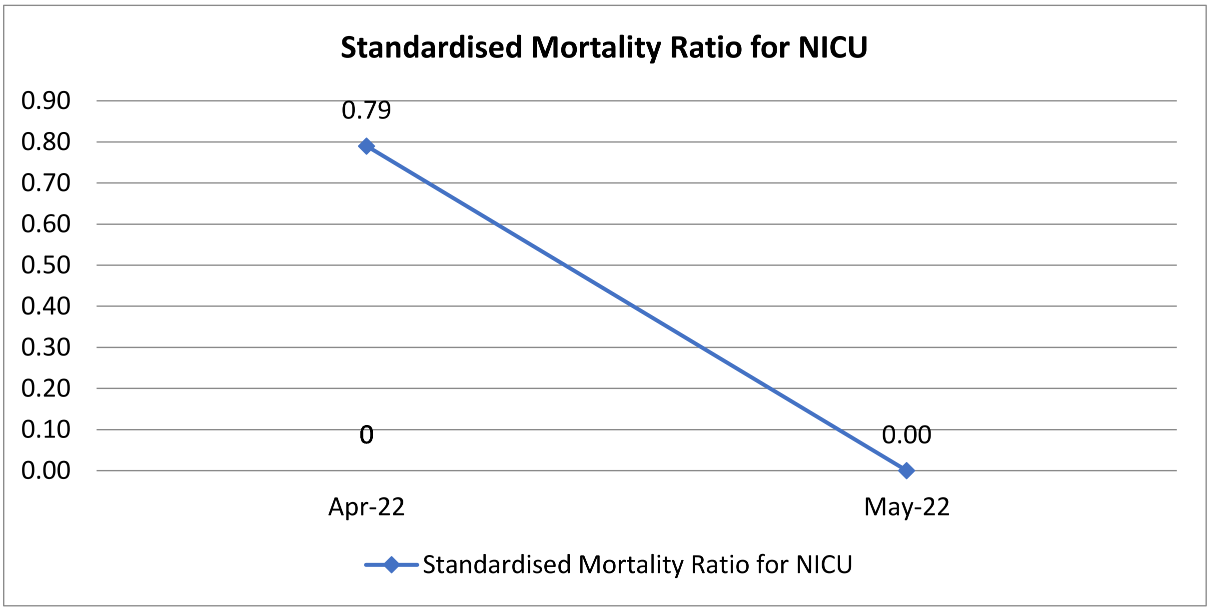
NICU

APRIL	Actual Mortality=NUMBER OF DEATH/TOTAL ADMISSION*100.	8.70
	Mean APACHE II Predicted Mortality:	11
	Standardised Mortality Rate=Actual Mortality/Predicted Mortality	0.79

4.13 Table Mortality NICU April

MAY	Actual Mortality=NUMBER OF DEATH/TOTAL ADMISSION*100.	0.00
	Mean APACHE II Predicted Mortality:	5
	Standardised Mortality Rate=Actual Mortality/Predicted Mortality	0.00

4.14 Table Mortality NICU April



Graph 4.15

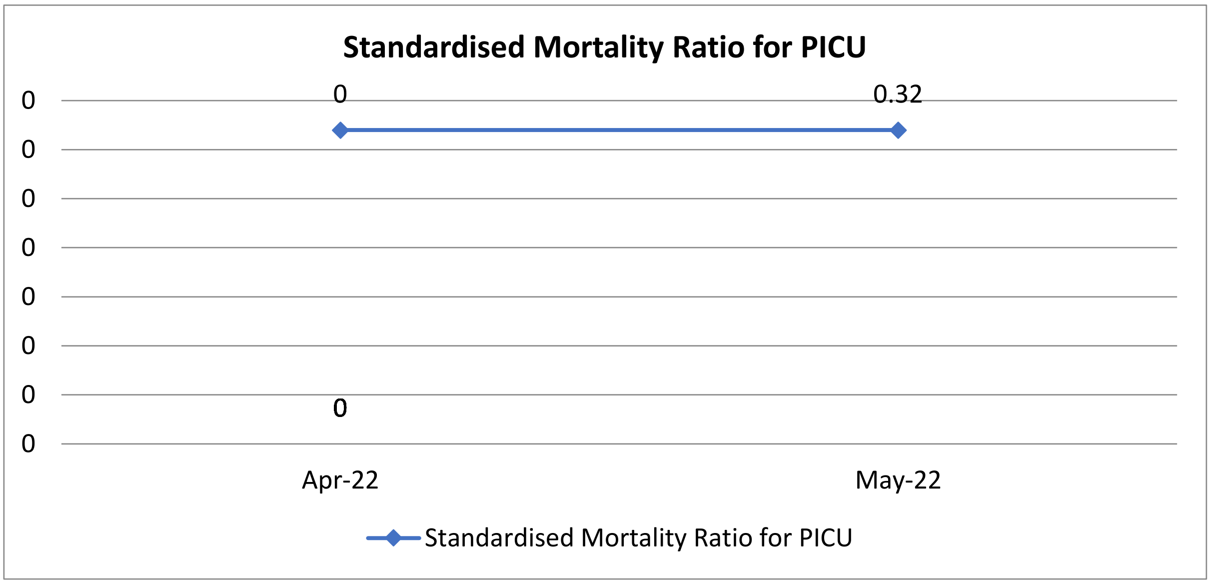
PICU

APRIL	Actual Mortality=NUMBER OF DEATH/TOTAL ADMISSION*100.	0.00
	Mean APACHE II Predicted Mortality:	6.57
	Standardised Mortality Rate=Actual Mortality/Predicted Mortality	0.00

4.16 Table Mortality PICU April

MAY	Actual Mortality=NUMBER OF DEATH/TOTAL ADMISSION*100.	1.85
	Mean APACHE II Predicted Mortality:	5.76
	Standardised Mortality Rate=Actual Mortality/Predicted Mortality	0.32

4.17 Table Mortality PICU April



Graph 4.18

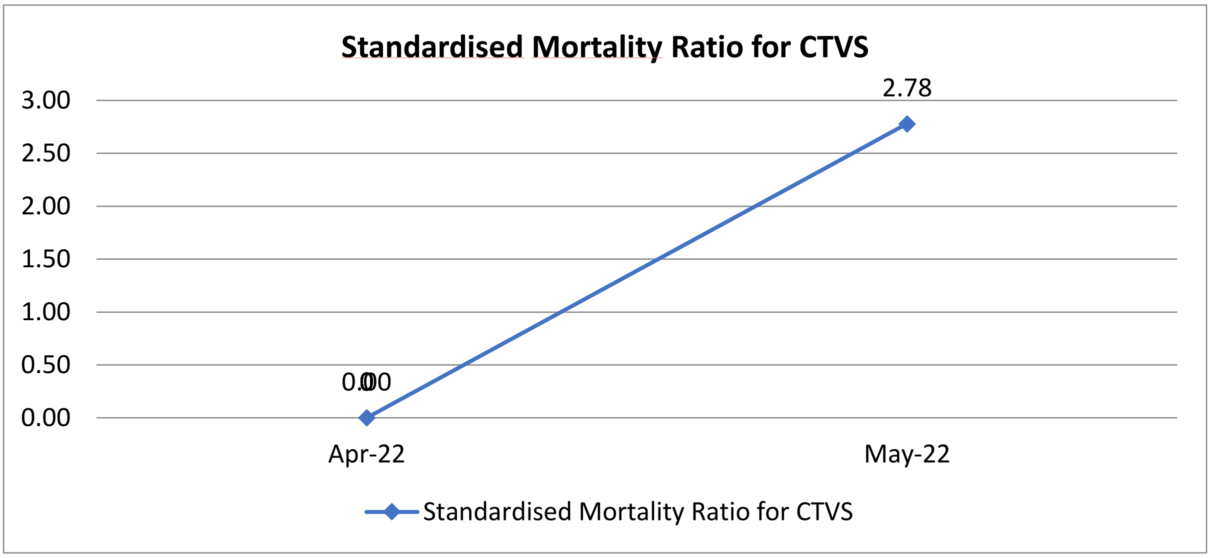
CTVS

APRIL	Actual Mortality=NUMBER OF DEATH/TOTAL ADMISSION*100.	0.00
	Predicted Mortality	1
	Standardised Mortality Rate=Actual Mortality/Predicted Mortality	0.00

4.19 Table Mortality CTVS April

MAY	Actual Mortality=NUMBER OF DEATH/TOTAL ADMISSION*100.	3.33
	Predicted Mortality	1.2
	Standardised Mortality Rate=Actual Mortality/Predicted Mortality	2.78

4.20 Table Mortality CTVS April



Graph 4.21

5. DISCUSSION:

- This study includes the severity of patient conditions in all ICU'S (MICU, SICU, NSICU, CCU, CTVS, NICU, PICU) in terms of APACHE II, SOFA, POSSUM, SNAPPE, PIMS and EUROSCORE score which probably reflects the mortality prediction by different scores. Different scores have been used and accepted in many ICU for the performance of mortality prediction, with the AUC ranging from 0.74 to 0.86. The reasons of respiratory failure, the source of cardiovascular failure, surgeries leading to post-surgical ICU admission, the type of operation. Were among the diagnostic category weight variables that were included.
- The principal patient condition stood out from the rest for practical reasons. Because of the variations in the populations used to calculate these ratings and the various statistical techniques, comparing the accuracy of multiple scoring systems can be challenging. According to some research, the ICU ratings, particularly in the upper score range in the ill patients with most severe diseases, may be more accurately calibrated to critically ill patients than the ED scores.
- Practice auditing and mortality data comparison are essential for ensuring that patients are fully aware of hazards and for raising the level of care in hospitals. To address this issue, the Surgical APACHE II (14) and other surgical outcome scores were created, but the POSSUM (15) remains the most extensively studied and widely used across specialties and patient populations.
- In total, 1 research participant passed away in April, which was exactly in line with the P-POSSUM forecast of mortality. With a P-POSSUM score of 0.12, the difference between expected and observed frequencies throughout various predicted mortality ranges was not statistically significant. Like previous research in other surgical specialties, P-POSSUM was more accurate at predicting overall risk than risk among the subgroups. The previous demonstration of this is the same.(16,17)
- Hariharan demonstrated that the PIM2 score exhibited strong unfairness, with an area of 0.82 (95 percent confidence interval: 0.72-0.92). (3) The PIM2 score is completed within an hour of PICU arrival, allowing for the early detection of illness severity and the classification of kids in need of assistance. (6) In April, there were no deaths, therefore there was no difference between actual and expected mortality. In May, there was one death, but 5.56 was predicted, so there was a difference of 0.32.
- We only included individuals who were having combined valve surgery because it is well recognised that the first Euro SCORE overestimates the anticipated risk particularly in these patients. (7,8) There are, however, significant criticisms of the Euro SCORE II model itself. The Euro SCORE II is based on hospital mortality, which is defined as death in the hospital where the surgery took place, and predicts this outcome. All participating units could provide information on status at discharge, but not all units could provide information on status at the end of the 30-day period. Only 56.6 percent of the patients had data at 60 days after surgery in the dataset that was gathered. It is generally established that a systematic follow-up of patients who have undergone heart surgery has problems (9)
- The findings of this study indicate that, when applied to patients with severe sepsis and evidence of hypoperfusion at the time of ED presentation, the SOFA score performs with medium to good accuracy for predicting in-hospital death. The SOFA score was developed by the European Society of Intensive Care Medicine's Working Group on Sepsis-Related Problems with the aim of developing an impartial

instrument to describe both individual and collective organ failure (10). Large cohorts of critically sick patients have previously proven the score's utility (11,12). Assessing the change in SOFA during ICU care has been shown to be effective in prior studies for determining outcome (13). To our knowledge, this is the first study of the SOFA that takes calculations into account from the moment a patient presents to and is identified in the ED through the initial stages of ICU treatment. Our results show that the SOFA in this study was associated with favourable, immediate, and statistically significant reductions in the in-hospital mortality. This aspect is significant because it raises the possibility of using such a measurement as a way to assess the effectiveness of therapeutic treatment and as patient-centred outcome in clinical trials that include early sepsis therapies.

- As the SNAPPE II score is an entrance score, it does not accurately predict the prognosis in preterm neonates who are going to develop nosocomial infections or in new-borns whose internal milieu is experiencing dynamic changes.

Suggestion:

- Ongoing training and informational seminars for each employee to keep them informed about the standards for various types of scoring performed by various ICUS.
- Regular audits of the documentation should be performed on a regular basis, and the appropriate team should be trained accordingly.
- Staff should be made aware of the regular scoring being in all ICUS to have the data of Standardized Mortality so that corrective action can be taken and the cause of a high Standardised Mortality Rate can be analysed.
- As the mortality rate among survivors is projected to be quite high and that among non-survivors is predicted to be relatively low, the scoring systems are insufficient for management decisions about specific patients.
- Since incomplete death reporting can alter the ultimate results of the data, comprehensive reporting should be present for accurately projected data.
- Clinicians should be aware that missing values in factors that affect scores can affect how well a mortality prediction model predicts outcomes.
- Enhance capacity to gather and analyse population estimates for mortality and morbidity. Develop a set of standards for the collection of morbidity data.
- Correcting issues by acquiring the audit data required to render a financial report opinion.
- Determining the causes of observations made during internal quality reviews and audit inspections.
- Creating and putting into place action plans to address the results, as well as monitoring and improving the action plans to make sure they are successful.
- Examining the staff structure to make sure they have enough resources to handle future audits that will becoming more difficult.
- Using independent teams to interview members of the audit team and other hospital staff in order to determine the main causes of findings and do the root cause analysis.

6. CONCLUSION:

- The general conclusion is that these scoring systems should only be used to assess the projected mortality and not be used as the main basis for deciding whether to continue therapy. After analysing the data, we can conclude that standardised mortality more mortality has occurred in CTVS that is 2.78 as the ratio is greater than 1.0 which indicates that there is more mortality has been occurred than would be expected.
- In the PICU, the PIM2 score accurately differentiated between survival and death. It will be very beneficial to provide parents with counselling if the PIM2 score is calculated at the beginning of patient management. The presence of shock was strongly linked with mortality.
- It appears that the original Euro SCORE is no longer acceptable for risk classification of adult cardiac surgery currently being performed. Based on a recently updated database, the Euro SCORE II appears to lessen the overestimation of the predicted risk. The Euro SCORE II might also show greater surgical performance right now.
- When used on patients with severe sepsis, The SOFA's ability to forecast in-hospital deaths demonstrated acceptable to good accuracy. The in-hospital mortality is significantly positively correlated with the SOFA over 72 hours. These findings indicate that using the SOFA score for risk stratification is a valid technique, and the SOFA score may be a valuable measurement to employ in clinical and research contexts.
- Regardless of gestational ages, SNAPPE is a reliable predictor of mortality. It helps the clinician identify new-borns who are critically ill and give them priority for care. The duration of stay is not precisely predicted by SNAPPE II. The results of this study support and validate other research's conclusions that P-POSSUM is a trustworthy and accurate technique for assessing in-hospital mortality.

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