

A STUDY ON PERFORMANCE EVALUATION OF APACHE SCORE WITH ADMISSION RESOURCE IN MICU TO PREDICT THE HOSPITAL MORTALITY AT ONE OF THE MULTISPECIALITY HOSPITAL, BANGALORE.

Dr. Deepak Dutt

Student, Department of Healthcare Management, Chitkara University, Punjab

Abstract- Realizing the utility of scoring systems in mortality prediction of critical ill patient admitted to medical intensive care units (MICUs), studies worldwide have expressed a need to validate the Acute Physiology and Chronic Health Evaluation (APACHE) II score for databases of respective countries. Literature available in this area in the Indian context is scanty. The present study was undertaken to evaluate of quality of patient care in MICU in terms of APACHE score in predication of mortality risk, as well as in determination of model validity in critically ill patients in MICU. The study was prospectively carried out 2 months at MICU of a tertiary Institute in Bangalore, which admitted consecutive medical and surgical patients. Based on admission resource of MICU admission, a widely used ICU prognostic scoring model, the Acute Physiology and Chronic Health Evaluation II (APACHE II) scoring system has been recognized. It has shown to be an accurate measurement of patient severity and correlates strongly with outcome in critical patients. Nonetheless, the qualified systematic database indicating APACHE II score, i.e. patient diagnosis, clinical condition, scientific parameters and laboratory values could hardly be established in routine.

Key Words: APACHE Score, MICU (Medical Intensive Care Units), Mortality, Critical Patients, Prediction.

1.1. DEFINITION:

APACHE II (Acute Physiology and Chronic Health Evaluation II) is a severity-of-disease classification system one of several ICU scoring system. It is applied within 24 hours of admission of a patient to an Intensive Care Unit (ICU): an integer score from 0 to 71 is computed based on several measurements; higher scores correspond to more severe disease and a higher risk of death.

1.2. MORTALITY RATE

A mortality rate is a measure of the frequency of occurrence of death in a defined population during a specified interval. Morbidity and mortality measures are often the same mathematically; it's just a matter of what you choose to measure, illness or death.

1.3. CALCULATION OF APACHE SCORE

APACHE II score = acute physiology score + age points + chronic health points. Minimum score = 0; maximum score = 71. Increasing score is associated with increasing risk of hospital death.

1.4. IMPORTANCE OF APACHE

The APACHE II severity score has shown a good calibration and discriminatory value across a range of disease processes, and remains the most commonly used international severity scoring system worldwide.

1.5. OBJECTIVES OF STUDY

1. To assess the quality of care at ICU by measuring predicted mortality at ICU through APACHE score.
2. The APACHE II system was applied within an intensive care unit to evaluate its ability to predict patient outcome.
3. To compare illness severity with outcome for clinical and surgical patients.
4. To compare actual mortality with the predicted death rate.

2.1. LITERATURE REVIEW

- 2.2. According to Zimmerman JE, Kramer A, McNair DS, Malila FM APACHE IV (2006) "predictions of hospital mortality have good discrimination and calibration and should be useful for benchmarking performance in U.S. ICUs. The accuracy of predictive models is dynamic and should be periodically retested. When accuracy deteriorates they should be revised and updated".
- 2.3. According to Parajuli BD, Shrestha GS, Pradhan B, Amatya R. (2016) "Discrimination was better for APACHE IV than APACHE II model however Calibration was better for APACHE II than APACHE IV model in our study. There was good correlation between the two models observed in our study". SD

RESEARCH METHODOLOGY

2.4. RESEARCH MEANING

Research is a systematic, formal, rigorous and precise process employed to gain solutions to a problem or to discover and interpret new facts and relationships. This chapter explains the methods adopted by the researcher, for a study on "performance evaluation of apache score with admission resource in MICU to predict the hospital mortality". It deals with the research approach, research design, population, sample size, sampling technique, procedure for the data collection and statistical analysis.

2.5. RESEARCH DESIGN

The research design used in this study is descriptive research design.

2.6. Descriptive Research Design

Descriptive research is a methodology that is not exclusive to market researchers but one that can apply to a variety of research methods used in healthcare, psychology, and education. At its core, descriptive research seeks to describe the characteristics or behavior of an audience. While it's not grounded in statistics, and usually leans towards more qualitative methods, it can include quantifiable data as well. The purpose of descriptive research is, of course, to describe, as well as explain, or validate some sort of hypothesis or objective when it comes to a specific group of people.

2.7. METHODS OF DATA COLLECTION

Secondary data is used in this study.

2.8. Secondary Data

Secondary data is information which has been collected in the past by someone else. For example, researching the internet, newspaper articles and company reports. The sources of Secondary data includes,

- ☐ Books
- ☐ Magazines
- ☐ Journals
- ☐ Registers
- ☐ Newspapers
- ☐ Websites

2.7. Population

The target population consisted of Patients who are all discharged from MICU in a Multispecialty Hospital Bangalore.

2.8. SAMPLING TECHNIQUE

The sampling technique used for the present study is simple random sampling.

2.9. ANALYSIS TOOLS

The analysis used in this study is as follows,

3. Simple percentage analysis

Percentage analysis is the method to represent raw streams of data as a percentage (a part in 100 - percent) for better understanding of collected data. Percentage Analysis is applied to create a contingency table from the frequency distribution and represent the collected data for better understanding. Percentage is a special kind of ratio. Percentage are used for making comparison between two or more series of data. Percentage are used to describe relationship and it can also be used to compare in terms of distribution of two or more series of data.

$$\text{PERCENTAGE OF RESPONENTS} = \frac{\text{NUMBER OF RESONENTS} * 100}{\text{TOTAL RESPONENTS}}$$

ANALYSIS & INTERPRETATION

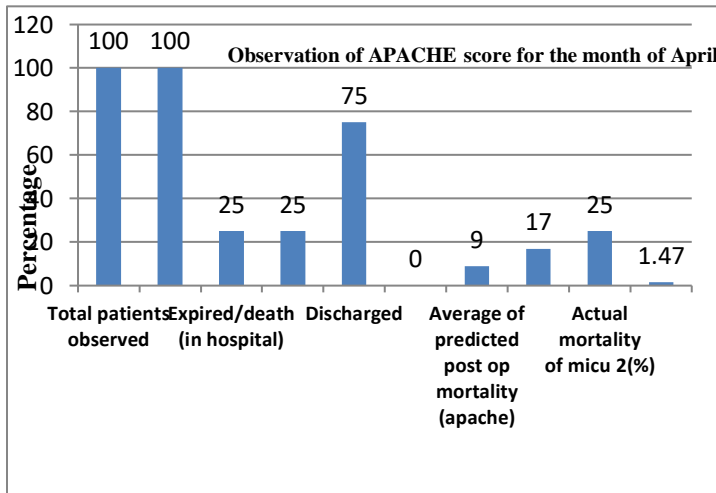
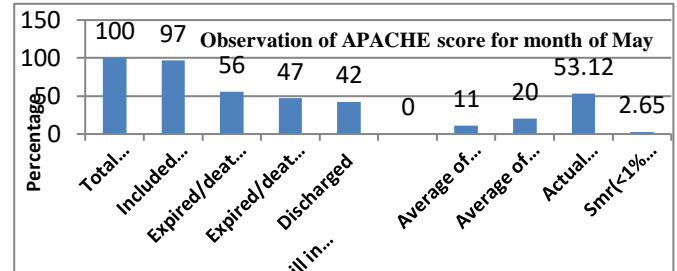


Chart-2.3.1. Showing the percentage of observation of APACHE score for the month of April

The above table shows that 100%(12) of the patients are observed in the month of April,

100%(12) have included in the study in the month of April, 25%(3) patients are expired in the month of April, 75%(9) of patients are discharged in the month of April, 0%(0) are still in hospital in the month of April, 9% Average of predicted post op mortality (APACHE)in the month of April, 17% average of predicted non op mortality (APACHE)in the month of April, 25% Actual mortality of MICU 2 (%)in the month of April, <1% SMR (<1% indicates better quality of care at



unit)in the month of April.

Chart-2.3.2 Showing the percentage of observation of APACHE score for the month of May

The above table shows that 100%(36) of the patients are observed in the month of February, 97%(36) have included in the study in the month of May, 56%(20) patients are expired(in hospital) in the month of May, 47%(17) patients are expired(in icu) in the month of May, 42%(15) of patients are discharged in the month of May, 11% Average of predicted post op mortality (APACHE)in the month of May, 20% average of predicted non op mortality (APACHE)in the month of May, 53.12 Actual mortality of MICU 2 (%)in the month of May, <1% SMR (<1% indicates better quality of care at unit)in the month of May.

MAJOR FINDINGS & RECOMMENDATIONS:

- 100%(12) of the patients are observed in the month of April,
- 100%(12) have included in the study in the month of April,
- 25%(3) patients are expired in the month of April,
- 75%(9) of patients are discharged in the month of April,
- 0%(0) are still in hospital in the month of April ,
- 9% Average of predicted post op mortality (APACHE) in the month of April,
- 17% average of predicted non op mortality (APACHE)in the month of April,
- 25% Actual mortality of MICU 2 (%)in the month of April
- <1% SMR (<1% indicates better quality of care at unit) in the month of April.
- 100%(36) of the patients are observed in the month of May,
- 97%(36) have included in the study in the month of May,
- 56%(20) patients are expired (in hospital) in the month of May,
- 47%(17) patients are expired (in icu) in the month of May,
- 42%(15) of patients are discharged in the month of May,
- 11% Average of predicted post op mortality (APACHE)in the month of May,
- 20% average of predicted non op mortality (APACHE)in the month of May,
- 53.12 Actual mortality of MICU 2 (%)in the month of May,
- <1% SMR (<1% indicates better quality of care at unit) in the month of May

The recommendations include,

1. Regular audit should be done in order to ensure the patient safety in MICU.
2. Findings and feedbacks should be

discussed and shared with MICU consultants in MICU departmental meeting.

3. To calculate APACHE Score for all the patients in MICU, all required parameters should be captured in more systematic manner in order to enhance Patient safety.
4. APACHE score being a good indicator for identifying severity of the condition and predictor of likely outcomes should be captured for each patient and systematically and correlated with outcomes to track changes in quality of care in ICU settings.

• CONCLUSION

SMR <1 Indicates good quality of care at MICU (Non Covid), June, July, August & September 2021.

For the month of April and May SMR >1, Indicates Mainly Covid Sequel patients in May, April Population was very less. Deaths of Covid Sequel patients Observations discussed with MICU Team

Department would take up Capturing of APACHI score ongoing basis henceforth. Have skewed mortality in May 2021 Observations discussed with MICU Team

Department would take up capturing of APACHI score ongoing basis henceforth.

The APACHE score has the advantage of being able to assess the patient at any point during the illness. Information derivable from effective mortality predicting tools may facilitate the appropriate administrative management rationale among the scarcity of healthcare resources and help guiding physician for proper evidence- based decision-making. (Standard Mortality Rate) SMR <1 in both the months indicated good Quality of care at MICU (Non-Covid ICU). Prediction models do face many challenges, but proper application of these models helps in decision making at the right time and in decreasing hospital cost. To enhance patient safety in MICU, involve the whole team, concept of risk and perceived relevance of required parameters for all the team members

should be addressed and that results in the reduction of mortality in intensive care units.

CHALLENGES

- More time consumption (As retrospective study).
- Timely availability of files from MRD.
- Availability of all 17 parameters form file.
- For ventilator patient's difficulties in finding the FiO₂, PaO₂ values in a file, a-A Gradient calculation thereby.
- Deciding on acute /Chronic status of patients in CKD patients.
- Putting value in APACHI calculator to find the exact value also time consuming.
- In few of the patients, Instead of ABG, VBG was done, which might have affect our final score numbers.

LIMITATIONS

- Available files were included in study for every month.
- Few cases excluded from study were parameters were not available completely.
- Accuracy of captured parameters (Not 100%).
- Includes surgical as well as non-surgical MICU.

SUGGESTIONS

- We need to follow APACHE Score for all ICU patient.
- If APACHE Score is high for the patient means, we have to do all the investigation which is mentioned in the APACHE parameters.

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