Original Research Paper

Volume - 11 | Issue - 01 | January - 2021 | PRINT ISSN No. 2249 - 555X | DOI : 10.36106/ijar

Anesthesiology

A PROSPECTIVE COMPARITIVE STUDY OF APACHE II AND APACHE IV IN MORTALITY PREDICTION IN ICU

Dr R Kavitha* MD Associate professor, Govt.Thiruvarur Medical College, Thiruvarur.
*Corresponding Author

Dr. Kiran Mayi DA Junior Resident , Madurai Medical College.

ABSTRACT Various scoring systems have been developed to predict mortality and morbidity in intensive care unit, but different data has been reported so far. **Aims:** To compare the predicted mortality of APACHE II and APACHE IV. **Methodology :** This prospective study was conducted in 12 bed ICU center in our hospital. 57 patients were taken with age group of above 15years irrespective of diagnosis, managed in ICU for >24hrs . APACHE II and APACHE IV scores were calculated based on the worst values of the first 24 h of admission. All enrolled patients were followed during their ICU stay Or till death and outcome was recorded as survivors or non survivors. **Results :** There were 40 survivors .In APACHE II the mean score for survivors was 16.39 ± 6.82, which was less compared to mean the score of 22.08 ± 7.18 for non survivors. (P = 0.001).In APACHE IV the mean score for the survivors was 83.96 ± 17.93, which was less compared with mean the score of 107.44 ± 21.53 for non survivors.(P < .001) **Conclusion:** Discrimination, was fair for both models, but APACHE IV was superior to APACHE II. Calibration, was better for APACHE II than APACHE IV in our ICU. There was good correlation observed between the models.

KEYWORDS : Intensive Care Unit , Mortality ,APACHE II,APACHE IV, Calibration .

1.INTRODUCTION:

The scoring system is mandatory to predict patient outcome, Comparing quality-of-care and to do Stratification for clinical trials. It is an essential part of improvement in clinical decisions in identifying patients with unexpected outcomes. Proper application of these models helps in decision making at the right time and in decreasing hospital cost. They have become a necessary tool to describe ICU populations and to explain differences in mortality.

No scoring system currently incorporates all these features. An ideal scoring system should be on the basis of easily/routinely recordable variables ,should be Well calibrated with A high level of discrimination .Should be applicable to all patient populations and Can be used in different countries .Should have the ability to predict functional status or quality of life after ICU discharge. Ideal model should be well-validated, calibrated – (estimated deaths Vs observed deaths)and discriminated – (Die Vs survive)

2.AIM

To compare predicted morality OF APACHEII AND APACHE IV.

3.MATERIALS &METHODS

After obtaining permission from ethical committee and getting consent form patients, the prospectively study conducted for 2 months duration in a 10 bedded ICU . 57 patients were taken all above 15 years, irrespective of diagnosis managed in ICU for > 24 hours were enrolled. APACHE II and APACHE IV scores were calculated based on the worst values of the first 24 hrs of admission. All enrolled patients were followed during their ICU stay Or till death and outcome was recorded as survivors or non-survivors.Statistical analysis was carried out using SPSS Version and P < 0.05 were considered as significant. Descriptive statistics were calculated where applicable. Discrimination is how well a model can predict outcome, was tested by calculating area under receiver operating characteristics (ROC) curve, a graphical plot of true positive (sensitivity) against false positive rate (1-specificity). The best cut-off value was derived by the best Youden Index. Calibration is how well the model tracks the outcome, was tested by Hosmer-Lemeshow Goodness of fit test. Student paired t-test was used to compare between the scores. Correlation between the models was calculated by Spearman's rho.

CALIBRATION

- homer lemshow goodness fit test
- student paired t test

DESCRIMINATION

- calculating area under roc curve
- graphical plot of sensitivity and specificity

CORRELATATION

- spearmans correlation coffiecient

CRITERIA FOR SELECTION:

INCLUSION CRITERIA : - patient above 15years of age

EXCLUSIONCRITERIA CRITERIA:-

- patients ,below 15years age
- post resucitation status,
- icu stay <24hours

4. RESULTS :

TABLE NO 1: COMPARITIVE RESULTS BETWEEN TWO GROUPS

APACHE II		APACHE IV
TOTAL SAMPLE	:57	57
SCORE RANGE	:6-35	85-151
MEAN	:19.31	101.68
SD	: +_6.99	+_27.35
There were 40 survivors the mean score for survivors was 16.39 ± 6.82, which was less compared to mean the score of 22.08 ± 7.18 for nonsurvivors (P = 0.001)		the mean score for the survivors was 83.96 ± 17.93, which was less compared with mean the score of 107.44 ± 21.53 for nonsurvivors (P < 0.001)
BEST YOUNDEN CUTT OFF score >17 • Patients above this score are 22 • Out of 22 .17 patients died and 5 patients survived Prediction: Nonsurvivors 80% survivors 20%		BEST YOUDEN CUTOFF Score >85 • Patients above this score are 18 • Out of 18 pts, 17 patients died and one patient survived Prediction:Nonsurvivors 92% Survivors 8%
correlation coeffiecient • The Hosmer-Lemesh • ow Chi-square coefficient value calculated for calibration was 7.9 (P = 0.34)		correlation coeffiecient • The Hosmer-Lemesh • ow Chi-square coefficient value calculated for calibration was 14.26 (P = 0.05).
SENSITIVITY:100%		SENSITIVITY :94.1%
SPECIFICITY :87.5%		SPECIFICTY :95%
SMR. :0.7		SMR. :0.9
Area under ROC curve of 0.73		Area under ROC curve 0.79

- The cut-off point with best Youden index for APACHE II was 17 and for APACHE IV was 85. Above cut-off point, mortality was higher for both models (P < 0.005).
- There was good correlation between APACHE II and APACHEIV

with Spearman's rho correlation coefficient of 0.748 (P<0.01).

- Similarly correlation among the survivors was 0.708 (P<0.01)and among,the nonsurvivors was0.655(P<0.01)were also good.

ICU LENGTH OF STAY : ICU stay period in survived patients: predicted ICU LOS: 30-45days. observed ICU LOS:15-25 days.expired pateints:predicted ICU LOS:40-50days observed ICU LOS::10-20days. predicted icu stay period is longer than observed .

5.DISCUSSION:

Acute Physiology And Chronic Health Evaluation (APACHE), introduced in1981,takes into consideration of various parameters like physiological variables,vital signs,urine output,neurological score,ageand co-morbid conditions, which may have a significant impact on the outcome of Critically ill patients.APACHE II, formulated in 1985, estimate risk based on data available within the first 24hrs of admission.]APACHE II is a widely used scoring system to quantify the severity of illness in ICU and has been validated in many clinical trials.APACHE IV, introduced in 2006, is the most recent version of APACHE. The new variables added toThis model are mechanical ventilation, thrombolysis, impact of sedation on Glasgow coma Scale,PaO2/FiO2 ratio ,pre ICU hospital length of stay,location prior toICU and disease specific subgroups. USES : Audit tool APACHE III use for individual patients in triage. SOFA/MODS –to assess response to therapies and interventions . Comparisons between different units are susceptible to misinterpretation. Certain disease states or conditions may generate very high severity scores, even though they do not generally result in high mortality. Scoring systems do not have a linear scale If the scoring system is used outside of these pre-validated limits , then reliability cannot be assumed Lead time bias The inappropriate interpretation of the score . Overall, they should be considered as a facet to assist the clinician. CONS : The APACHE system is the only validated ICU risk-adjustment model that provides performance information about two separate outcomes of care, mortality and ICU length-of-stay (LOS). Prediction of duration of a patient's stay in the ICU, is difficult and less studied than the prediction of mortality. Prolonged stay in the ICU not only increases the overall costs and consumes more resources, but also limits the number of beds available for use. APACHE IV (score of >85) is probably a more reliable prediction of high risk of death in patients than APACHE II (score >17). APACHE IV score is a valid model of predicting outcome in stroke patient.

comparison of the actual mortality rates in an ICU with the predicted mortality rate (PMR) can be used to indicate the performance of an ICU and to compare outcomes across different ICUs. Previous studies have shown that APACHE IV performed better than APACHE II in conditions such as acute lung injury and neurological damage. However, for conditions such as pancreatitis and sepsis APACHE II performed better than APACHE IV. APACHE II weights were given by a panel of experts, the APACHE IV weights were given by multiple logistic regression analysis. Lead time bias is another factor affecting the accuracy of risk prediction, which was difficult to quantify in our study. However, APACHE IV model had considered the location of patient and duration of illness prior to being admitted in ICU. Besides this, overall quality of ICU is affected by the bed occupancy ratio, lab facility and availability, trained man powers, nurse to patient ratio and financial status of the patient's care giver. Limited resources signifies resources limited within the hospital or outside in the community.

6.CONCLUSION:

Discrimination, was fair for both models, but APACHE IV was superior to APACHE II. Calibration, was better for APACHE II than APACHE IV in our ICU. There was good correlation observed between the models.

7.REFERENCES :

1. Palazo M. Severity of illness. In: Vincent JL, Abraham E, Moore FA, Kochanek PM, Fink MP, editors. Text Book of Critical Care. 6th ed. Albany (NY): Elsevier Publishers; 1996. pp. 17–29.
2. Bouch DC, Thompson JP. Severity score system in critically ill. Oxf J. 2008;8:181–5.
3. Becker RB, Zimmerman JE. ICU scoring systems allow prediction of patient outcomes and comparison of ICU performance. Crit Care Clin. 1996;12:503–14.