Original Research Article

Correlation between the apache IV score and length of stay in obstetrics and gynaecology admissions in ICU

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Abstract

Background: The APACHE (Acute Physiology and Chronic Health Evaluation) is a system for classifying patients in the intensive care unit. Patients are evaluated by physiologic scores and evaluation of chronic health status. Physiologic scores correlate with severity of illness. Results of evaluation can be used to evaluate in predicting length of ICU stay in obstetrics and Gynecology patients. Hence the study was taken to correlate between APACHE IV score and the actual length of stay in obstetrics and Gynecology patients admitted in ICU. **Methods:** All Obstetrics and Gynecology admissions in ICU at Sri Ramchandra Medical Centre, Chennai from July 2007 to July 2009 were studied. Patients less than 18 years of age, ICU stay less than 4 hours were excluded. **Results:** Correlation between APACHE IV score and the patient outcome is statistically significant with a P-value < 0.001. The APACHE IV score and the actual length of stay observed in these patients have a good correlation and has a P-Value<0.006 which is statically significant. The predicted length of stay and the observed actual length of stay in the surviving patients has good correlation with a P-value <0.001 which is statistically significant. **Conclusion:** When compared to all other studies which were done to determine whether APACHE IV scores for patients in ICU correlate with outcomes this study shows that there is no statistical significance for its deviation from a perfect fit in obstetrics and Gynaecology patients.

Key Words: APACHE-IV, Length of stay, Intensive care unit, Obstetrics, Gynaecology.

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INTRODUCTION

APACHE IV scoring system was introduced in 2006 as an improved and updated model for predicting hospital mortality among critically ill patients and is the most recent version of the APACHE scoring system. This model included the new predictor variables like mechanical ventilation, thrombolysis, Pao2/fio2 ratio, impact of sedation on Glasgow Coma Scale, pre-ICU hospital length of stay, location prior to ICU admission and 116 disease specific subgroups in addition to the modifications introduced in the APACHE III.[1] The APACHE (Acute Physiology and Chronic Health Evaluation) is a system for classifying patients in the intensive care unit. Patients are evaluated by physiologic scores and evaluation of chronic health status. Physiologic scores correlate with severity of illness. Results of evaluation can be used to evaluate in predicting length of ICU stay in obstetrics and Gynecology patients. Hence the study was taken to correlate between APACHE IV score and the actual length of stay in obstetrics and Gynecology patients admitted in ICU.

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MATERIAL AND METHODS

All Obstetrics and Gynecology admissions in ICU at Sri Ramchandra Medical Centre, Chennai from July 2007 to July 2009 were studied. Patients less than 18 years of age, ICU stay less than 4 hours were excluded. Data collected in all eligible patients on pre designed proforma. APACHE IV calculator is used to derive APACHE IV scores. Data on length of stay is collected as outcome measure. Statistical analysis using t-test, chi square test for correlation coefficient are used to analyze the results.

RESULTS

Total number of 82 patients were included in the study. The age group of the patients varied from 19 to 90 years of age. The mean age was 27.96 years with standard deviation of 10.72. There were 30(36.58) patients in the age group between 18-25 years, 25 (30.5%) patients in the age group 26-30(19.5%) patients between 30-45 years and 11 (13.4%) patients between > 40 years of age group.

Table 1: Cause of admission and no. of cases

Cause	cases	Cause	cases
Post-Partum Haemorrhage	10	Sepsis	06
Pre-Eclampsia / Eclampsia	16	Jaundice	01
Ectopic Pregnancy	01	HELLP	04
Intra uterine foetal death	08	Pulmonary Edema	07
Abruptio Placenta	05	Diabetic Ketoacidosis – 2	02
Cardiac Illness	12	Transfusion Reaction	04
Seizures	03	Dysfunctional Uterine Bleeding	02
Pulmonary Embolism	07	Anaesthetic Complication	02
Peripartum Cadiomyopathy	01	Hypertension	01
Intestinal Obstruction	01	Chronic Renal Failure	01
Metabolic Acidosis	01	Carcinoma	05
Von Willebrand's Disease	01		

There were a total of 82 patients. Out of which 64(78%) were admitted to intensive care unit for obstetric reasons and 18(22%) of them were for Gynecological reasons. The causes have been enumerated earlier. There were 64 obstetric patients in this study population. Out of which 36 were primigravida and 28 were multigravida. Out of the 82 patients 43 had some chronic disease and 39 did not have chronic disease. The presence or absence of the chronic disease has a statistical significance on the APACHE IV scoring and hence on the outcome. Out of the total of 82 patients 39 patients needed mechanical ventilation. It was observed in my study that the ventilated patients had a poor outcome.

Table 2: Correlation between APACHE score, Actual length of stay (ALS), predicted length of stay (PLS).

		APACHE IV	ALS Days)	PLS (Days)	PMR
APACHE IV	Pearson Correlation	1	.304	.635	.859
	Sig. (2- tailed)		.006	.000	.000
	N	82	82	82	82
ALS (Days)	Pearson Correlation	.304	1	.469	.180
	Sig. (2- tailed)	.006		.000	.106
	N	82	82	82	82
PLS (Days)	Pearson Correlation	.635	.469	1	.378
	Sig. (2- tailed)	.000	.000		.000
	N	82	82	82	82
PMR	Pearson Correlation	.859	.180	.378	1
	Sig. (2- tailed)	.000	.106	.000	
	N	82	82	82	82

Correlation is significant at the 0.01 level (2- tailed).

The table shows that there is statistically significant correlation between the APACHE IV score and the outcome of the patient. As the APACHE IV score increases the number of days in intensive care rises. A predicted length of stay in number of days for each patient is calculated and this study observation shows that there is good correlation between the actual and the predicted length of stay.

DISCUSSION

This study shows that the correlation between APACHE IV score and the patient outcome is statistically significant with a P-value < 0.001. This signifies that APACHE IV is a reliable in Obstetrics and Gynaecology patients admitted in intensive care as for any other intensive care patient. The APACHE IV score and the actual length of stay observed in these patients have a good correlation and has a P-Value<0.006 which is statically significant. The predicted length of stay and the observed actual length of stay in the surviving patients has good correlation with a P-value <0.001 which is statistically significant. In a study by Mohammad Ghorbani *et al..*, of the studied patients, 157 died and 682 were discharged (non-survivors and survivors, respectively). The length of stay in the ICU was 10.98±14.60, 10.22 ± 14.21 and 14.30±15.80 days for all patients, survivors, and non-survivors, respectively. The results showed that APACHE-IV model underestimated length of stay in emergency ICU (p<0.001). The findings showed that APACHE-IV was a poor predictor of length of stay in emergency ICU. Therefore, specific models based on big sample sizes of Iranian patients were required to improve accuracy of predictions.[2] In a study by Jack E Zimmerman *et al..*, aggregate mean observed ICU stay was 3.86 days and mean predicted 3.78 days (p < .001), a difference of 1.9 hrs. For 108 (93%) of 116 diagnoses, there was no significant difference between mean observed and mean predicted ICU stay. The model accounted for 21.5% of the variation in ICU stay across individual patients and 62% across ICUs. Correspondence between mean observed and mean predicted length of stay was reduced for patients with a short (< or =1.7 days) or long (> or =9.4 days) ICU stay and a low (<20%) or high (>80%) risk of death on ICU day 1. They concluded that the APACHE IV model provides clinically useful ICU length of stay predictions for critically ill patient groups, but its accuracy and utility are limited for individual patients.[3]

In a study by Amit Chattopadhyay *et al..*, out of 3,949 ICU admissions, 198 were severe sepsis admissions where 134 patients (80%) had usable data. Of these 75 had verifiable APACHE-IV scores (final sample) with 55% men; median age: 67 years (IQR: 21) 53% did not have dialysis; 87% were on mechanical ventilation (MV). Mean ICU-LOS (10.1 days + 6.4) was significantly greater than predicted ICU-LOS (5.6days + 1.8; $p<.001$). ICU-LOS was very strongly correlated with days on MV ($r=0.9$). Mean ICU-LOS was significantly greater for those receiving blood transfusion ($p<.001$); on MV ($p<.001$); having surgery ($p<.001$) and having high frequency of dialysis ($p<.001$) – differences not predicted by APACHE-IV. Overall, the predicted ICU-LOS underestimation was by 4.5 days. It was concluded that the results provide a preliminary indication that APACHE-IV model may be a poor predictor of ICU-LOS in severe sepsis cases.[4] In a study by Tim M E Crozier *et al..* on 6565 patients (2.3% of all ICU patients) had one or more admissions > 21 days and accounted for 23% of total ICU bed-hour usage. Long-stay patients had a mean (SD) age of 60.3 (15.3) years and an APACHE III-J risk of death of 32.7% (21.3%). Metropolitan and tertiary hospitals had the highest proportions of long-stay patients. The three diagnoses most strongly associated with long ICU stay were neuromuscular disease (odds ratio [OR], 13.3; 95% CI, 10.2–17.4; P < 0.001), burns (OR, 6.0; 95% CI, 4.9–7.3; P < 0.001) and cervical spine injury (OR, 5.1; 95% CI, 3.4–7.5; P < 0.001), while the most common diagnosis was pneumonia (12.7% of total). It was concluded that patients who spend > 21 days in the ICU use significant resources but appear to have worthwhile outcomes in all age brackets.[5]

CONCLUSION

When compared to all other studies which were done to determine whether APACHE IV scores for patients in ICU correlate with outcomes this study shows that there is no statistical significance for its deviation from a perfect fit in obstetrics and Gynaecology patients.

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