Original Article

ICCU OUTCOME WITHIN FIRST 24 HOURS IN PATIENTS OF ACUTE MYOCARDIAL INFARCTION USING APACHE II SCORING SYSTEM
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Abstract
Categorization of patient illness into grades of severity occurs frequently in ICU. Severity of illness scoring systems is important for defining populations of critically ill patients. These scores are helpful for deciding whether a purported benefit of therapy is real, for guidance in hospital administrative policies and allocation of resources such as nursing and ancillary care.

Keywords: APACHE-Acute Physiology & Chronic Health Evaluation MI- Myocardial infarction

Introduction
Categorization of patient illness into grades of severity occurs frequently in ICU. There are numerous severity of illness scoring systems that have been developed and validated over past two decades. Severity of illness scoring systems is important for defining populations of critically ill patients. These scores are helpful for deciding whether a purported benefit of therapy is real, for guidance in hospital administrative policies and allocation of resources such as nursing and ancillary care.

Currently, the most commonly utilized scoring systems are APACHE (Acute physiology and chronic health evaluation system II & III), SAPS (Simplified Acute physiologic score) and MPM (Mortality predication model). All the severity illness-scoring systems have some common variables. These common threads include age, vital signs, assessment of respiratory, renal and neurologic function and evaluation of chronic medical illness.

Aims & objective
1) To predict ICCU outcome in patients of acute myocardial infarction using APACHE II scoring system
2) To compare the predicted mortality with the actual mortality

APACHE II scoring system is the most commonly used scoring system. It stands for acute physiology and chronic health evaluation. It includes 12 physiologic variables (internal body temperature, mean arterial pressure, HR, RR, Oxygenation, Arterial pH, Sr Na+, Sr K+, SrCreatinine, Heamatocrit, WBC count, GCS score), types of ICU admission after elective surgery vs non surgical or after emergency surgeries, and chronic co-morbid conditions. All these variables are used to derive APACHE II score. Depending on the score, the value is put in the formula, which after adding diagnostic category weight gives predicted mortality. The data required for collection is simple and the predictive ability of APACHE II, as compared to APACHE III and SAPS, is good and APACHE II has the best calibration.

Material & methods
This study consists of 70 cases of acute myocardial infarction, studied from December 2003 to March 2005 in ICCU of department of Medicine, IGGMC, Nagpur.
**Study design:** Prospective validation study.

**Inclusion criteria**
Consisted 70 cases with typical ischaemic chest pain along with ST segment elevation >1mm in 2 consecutive leads, new or presumably new bundle branch block and/or biochemical markers of myocardial infarction.¹

**Exclusion criteria**
1) Patients with old MI
2) Patients with coronary artery bypass graft⁴

APACHE II score was measured on admission and patients were followed for a period till discharge (i.e. 6 days post admission). The ratio of M:F was 2.5:1. The mean age of patients was 54.7+/-10.5 years and maximum patients were in age group of 46-55 years (i.e. n=35 i.e. 38.57%).

**Results**
13 cases out of 70 died. The mean APACHE score of survivors was 6+/- 2.7 & non-survivors was 14.76 +/- 4.5. The predicted mortality went on increasing parallel to APACHE II score increments. The predicted mortality was compared with actual mortality using test of proportions and was found to be same. 9 patients out of 13 (69.23%) who died were not thrombolysed due to one or the other contraindication.

**Table 1:** Age incidence:

<table>
<thead>
<tr>
<th>Sr. no.</th>
<th>Age group (in yrs)</th>
<th>No. of cases</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>35-45</td>
<td>14</td>
<td>20</td>
</tr>
<tr>
<td>2</td>
<td>46-55</td>
<td>27</td>
<td>38.57</td>
</tr>
<tr>
<td>3</td>
<td>56-65</td>
<td>19</td>
<td>27.14</td>
</tr>
<tr>
<td>4</td>
<td>66-75</td>
<td>7</td>
<td>10</td>
</tr>
<tr>
<td>5</td>
<td>&gt;75</td>
<td>3</td>
<td>4.29</td>
</tr>
</tbody>
</table>

Maximum number of cases were found in age group 46-55 years (38.57%), minimum were in age group of >75 years (4.29%).

**Table 2:** Age group, mean APACHE II score & mean predicted mortality:

<table>
<thead>
<tr>
<th>Sr. no.</th>
<th>Age group (in yrs)</th>
<th>Mean score</th>
<th>Mean predicted mortality</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>35-45</td>
<td>7.38</td>
<td>11.48</td>
</tr>
<tr>
<td>2</td>
<td>46-55</td>
<td>5.86</td>
<td>10.17</td>
</tr>
<tr>
<td>3</td>
<td>56-65</td>
<td>10.26</td>
<td>17.07</td>
</tr>
<tr>
<td>4</td>
<td>66-75</td>
<td>10.71</td>
<td>17.24</td>
</tr>
<tr>
<td>5</td>
<td>&gt;75</td>
<td>7.33</td>
<td>12.87</td>
</tr>
</tbody>
</table>

**Table 3:** Distribution of different APACHE scores and number of patients (n=70):

<table>
<thead>
<tr>
<th>Sr. no.</th>
<th>APACHE Scores</th>
<th>Number of patients</th>
<th>Mean predicted mortality</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0-5</td>
<td>29</td>
<td>7.06%</td>
</tr>
<tr>
<td>2</td>
<td>6-10</td>
<td>27</td>
<td>10.73%</td>
</tr>
<tr>
<td>3</td>
<td>11-15</td>
<td>8</td>
<td>21.06%</td>
</tr>
<tr>
<td>4</td>
<td>16-20</td>
<td>6</td>
<td>31.15%</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>70</td>
<td></td>
</tr>
</tbody>
</table>

Mean actual and predicted mortality:
Mean predicted mortality: 12.28%
Mean actual mortality: 18.57%
The actual and predicted mortality of all patients (n=70) was compared using test of proportions. The statistical analysis showed no significant difference between actual and predicted mortality i.e. they were the same.

Table 4: APACHE II score ranges and deaths among patients:

<table>
<thead>
<tr>
<th>Sr. no.</th>
<th>APACHE Scores</th>
<th>Number of patients</th>
<th>Deaths</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0-5</td>
<td>29</td>
<td>1</td>
<td>3.45</td>
</tr>
<tr>
<td>2</td>
<td>6-10</td>
<td>27</td>
<td>1</td>
<td>3.70</td>
</tr>
<tr>
<td>3</td>
<td>11-15</td>
<td>8</td>
<td>5</td>
<td>62.50</td>
</tr>
<tr>
<td>4</td>
<td>16-20</td>
<td>6</td>
<td>6</td>
<td>100</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>70</td>
<td>13</td>
<td></td>
</tr>
</tbody>
</table>

Discussion
The mean APACHE II score of all patients was 7.62+/−4.65 the mean APACHE II score of survivors was 6+/−2.7 and non-survivors was 14.76+/−4.5%.

There was a meaningful correlation between APACHE II scores and the mortality rate for all the patients. The predicted mortality in our study was 12.28%, whereas the actual mortality was 18.57%. The observed mortality was same as the predicted mortality.

The results found were same as those of U Ludwig, John Hutling et al (2000)⁵, who tried to validate APACHE II scoring system in 1,714 patients of acute myocardial infarction. They found that there was a close correlation between observed and predicted mortality in classes of patients with various APACHE II scores.

Chiang HT, Lin SL (2001)⁶ found similar results when they prospectively studied 694 patients of acute MI and tried to predict the mortality using APACHE II scoring system. David T Wong, Sally L Crofts et al (1995)⁷ tried to evaluate the predictive ability of APACHE II system for medical and surgical ICU patients in a total number of 1,724 admissions. When the observed death rate was compared with the predicted death rate the linear regression analysis gave r=0.99, i.e. they were same.

The difference between predicted and actual mortality may be explained by many factors i.e. limitations of APACHE II scoring system, difference between the population which validated the study and the population studied, some patient features like nutritional, social, ethnic, cultural and economic conditions.

In each successive APACHE II score interval, the mortality rate was higher than that of the preceding interval.

Increasing APACHE II scores were associated with the increasing mortality. Scores >= 12 were uniformly associated with death in our study.

The APACHE II score associate with death in our study is less than that observed by others: U Ludwig et al (1995)⁵ score>20 were associated with death. Turner JS, Mudliar et al (1991)⁸ found that score >30 were associated with death. However Chiang T et al (2001)⁹ had different observations and in their study they found that scores >25 were uniformly associated with death. However, in all studies, low score predicted survival and high scores predicted death.

Kappa analysis was used to determine the extent of agreement between APACHE II score and mortality, which showed 81% agreement (excellent).

The predicted mortality was compared with the actual mortality using Test of Proportions and was found to be equal.
Although APACHE II index was not developed for assessing individual prognosis, intensive care unit physicians and medicine, as a whole, have yearned for such predictive ability. It is helpful for clinical decision making or for information to families about survival chances of individual patient.

**Conclusion**

1) In hospital, mortality can be accurately predicted in patients of acute myocardial infarction using (APACHE) acute physiology II scoring system.

2) APACHE II score in survivors is less as compared to non-survivors.

3) APACHE II score of >12 is uniformly associated with death in our study population (Kappa analysis showed agreement of 81% which is excellent in statistical terms).

4) The predicted mortality based on APACHE II score and the actual or the observed mortality was same, as proved by the Test of Proportions.

**References**


