Performance of CURB-65 in predicting mortality of patients with community-acquired pneumonia in Saudi Arabia

Jaffar A. Al-Tawfiq1,2, Michael Diamond3,4, Diamond Joy1,5, Kareem Hinedi3

1 Specialty Internal Medicine, Johns Hopkins Aramco Healthcare, Dhahran, Saudi Arabia
2 Indiana University School of Medicine, Indianapolis, Indiana, United States of America
3 Division of Hospital Medicine, Johns Hopkins Aramco Healthcare, Dhahran, Saudi Arabia
4 St Peter’s College, University of Oxford, England, United Kingdom
5 Department of Medicine, The James Cook University Hospital, Middlesbrough, United Kingdom

Abstract
Introduction: Various objective scoring systems were developed to standardize the approach to the designation of severity of community-acquired pneumonia (CAP). There is limited data on the use of CURB-65 among admitted CAP patients in Saudi Arabia. Metho...
alleviated the admission pattern and mortality among admitted patients.

**Methodology**

The medical record of patients admitted with CAP were obtained from the health information unit from 2013 to 2016. The patients’ data were collected using a standard Microsoft Excel data collection sheet and the data were obtained from paper charts and electronic medical records. The Excel sheet contained information regarding the CURB-65 and the mortality within 30 days of the admission. CURB-65 score was calculated as having a score of one for the presence of each one of the following items at the time of admission: confusion, Blood urea ≥ 19 mg/dL, respiratory rate of ≥ 30/minute, a systolic blood pressure (BP) <90 mmHg or diastolic BP ≤ 60 mmHg, age ≥ 65 years, as described previously [3,6]. The study was approved by the Institutional Review Board (IRB).

**Statistical Analysis**

Statistical analysis was done using Excel. Descriptive analyses were done for demographic, results of the tests and the monthly number of cases. Minitab (Minitab Inc. Version 17, PA 16801, USA; 2017) was used to calculate the mean age (± SD) of patients and the comparison between those who died and those who survived. One-way ANOVA was used for the Age versus CURB-65 score comparison, and Chi-Square test for association between CURB-65 and death. A significant p value was considered for p < 0.05.

**Results**

During the study period, a total of 1786 adults were admitted with CAP. The mean age was 63.9± 21.7 years (range 14-108 years). The majority of the patients (51.7%) had CURB-65 score of 0 or 1 followed by score of 2, 3, and 4/5 (29%, 15.2%, and 4.1%, respectively) (Table 1). The overall 30-day crude mortality rate was 7.6%. The mortality rates for CURB-65 scores 0, 1, 2, 3, and 4/5 were 1.8%, 4.3%, 10.2%, 14%, and 21.9% (Table 1). The mean age was 63.01 ± 21.9 years for survived patients and 75.1 (± 15.58) for the fatal cases (p < 0.001) (Table 2). The mean CURB-65 was 1.41 ± 1.12 for those who survived and 2.27 ± 1.03 (p < 0.001) for those who died (Table 2). There was a clear relationship between mean age and CURB-65 score with increasing mean age as the CURB-65 increases(Figure 1).

**Discussion**

This study describes the CURB-65 score among 1786 admitted adults with CAP in a Saudi Arabian hospital. The majority (51.7%) of the patients had CURB-65 score of 0 or 1. The overall mortality rate was 7.1% and was similar to a recent study describing the mortality rate of 6.7% among 1834 CAP patients [11].

The specific mortality rates for CURB-65 scores of 0, 1, 2, 3 and for 4/5 were 1.4%, 4.1%, 9.8%, 13.2%, and 20.5%, respectively. Thus, the CURB-65 score and calculated mortality rates mirror those described

---

**Table 1. Percentage of different CURB-65 score and the mortality rate in relation to CURB-65 Score.**

<table>
<thead>
<tr>
<th>CURB-65 Score</th>
<th>Number of patients</th>
<th>% from the total number</th>
<th>Number of death</th>
<th>Mortality Rate (%)</th>
<th>Mortality from the Literature [3]</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>438</td>
<td>24.5</td>
<td>8</td>
<td>1.8</td>
<td>0.6</td>
</tr>
<tr>
<td>1</td>
<td>485</td>
<td>27.2</td>
<td>21</td>
<td>4.3</td>
<td>2.7</td>
</tr>
<tr>
<td>2</td>
<td>518</td>
<td>29.0</td>
<td>53</td>
<td>10.2</td>
<td>6.8</td>
</tr>
<tr>
<td>3</td>
<td>272</td>
<td>15.2</td>
<td>38</td>
<td>14.0</td>
<td>14</td>
</tr>
<tr>
<td>4 or 5</td>
<td>73</td>
<td>4.1</td>
<td>16</td>
<td>21.9</td>
<td>27.8</td>
</tr>
<tr>
<td>All</td>
<td>1786</td>
<td>100</td>
<td>136</td>
<td>7.6</td>
<td></td>
</tr>
</tbody>
</table>

---

**Figure 1. Interval Plot of Mean Age (± SD) versus CURB-65 Score.**
Table 2. CURB-65 Score and Mean Age with Standard Deviation (SD) and 95% Confidence Interval (95% CI) in relation to outcome.

<table>
<thead>
<tr>
<th>Death</th>
<th>Number</th>
<th>Mean</th>
<th>SD</th>
<th>95% CI</th>
<th>Mean age</th>
<th>SD</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>136</td>
<td>2.27</td>
<td>1.03</td>
<td>(2.0790, 2.4679)</td>
<td>75.06</td>
<td>15.6</td>
<td>(71.33, 78.79)</td>
</tr>
<tr>
<td>No</td>
<td>1650</td>
<td>1.41</td>
<td>1.12</td>
<td>(1.3591, 1.4672)</td>
<td>63.1</td>
<td>21.9</td>
<td>(62.062, 64.136)</td>
</tr>
</tbody>
</table>

previously [3,6]. However, almost half of the admitted patients had a score of 0 or 1. Those patients are recommended to be treated as outpatient as the associated mortality rate is low [3]. Patients with a score of 2 needs regular ward admission and patients with a score of 3-5 would require intensive care unit admission [3]. There might be other reasons for the admission of patients with low CURB-65 score in the current study. However, these reasons were not specifically sought but could be related to the routine screening for Middle East Respiratory Syndrome Coronavirus (MERS-CoV). Our hospital was of the first hospitals in the region to adopt a standardized screening for MERS-CoV [12–14]. Such screening may had then resulted in routine admissions of those patients. The Saudi Arabian Ministry of Health guidelines allow home isolation of patients suspected to have mild MERS-CoV infection [15–17]. However, the logistics of home isolation and the fear of spread of MERS-CoV influence decisions regarding the admission of such patients [12,18]. Previously published studies did not show differentiating factors among patients with MERS and those without MERS [12,18]. Thus, the lack of predictors of MERS on presentation makes this distinction difficult to achieve. The current study did not evaluate other factors influencing admissions such as ability to safely and reliably take oral medication and the availability of outpatient support resource as suggested by recent guidelines [1]. Routine use of CURB-65 score is advised, however, the actual practice in this part of the World is not well documented. In one study from Oman, CURB-65 severity score was documented for only 2.3% of hospitalized patients [19]. In a study from Nigeria, none of 249 CAP patients had CURB-65 score documentation in hospital notes [20]. Thus, there is a need to have more education with audit and feedback to utilize CAP severity scores in order to make informed decisions about the need for admission.

Pneumonia severity index (PSI) was thought to be superior to the British Thoracic Society’s CURB-65 and the modified American Thoracic Society criteria in predicting CAP severity [21]. Nevertheless, CURB-65 score remains an easy score to obtain with excellent prediction ability. The CORB score (acute Confusion, Oxygen saturation ≤90%, Respiratory rate > 30/minute, and Systolic Blood pressure < 90 mm Hg or a diastolic blood pressure < 60 mm Hg was proposed for elderly patients. In one study, the CORB score was a useful tool for hospitalized elderly patients [22].

**Conclusion**

The mortality rates of admitted patients with CAP did not differ from those in the medical literature. However, the utilization of CURB-65 score seems to be low and there is need for wider implementation of pneumonia severity scores for patients presenting with CAP in our hospital. There is a need for further prospective studies to elucidate the features and characteristics of patients with low CURB-65 scores needing admission. This approach would then enhance the optimal utilization of services and proper placement of patients. Further studies should also be directed towards comparing low and high CURB-65 score patients in relation to length of stay and antibiotic utilization.

**References**


Corresponding author
Dr Jaffar A. Al-Tawfiq
P.O. Box 76, Room A-428-2, Building 61,
Johns Hopkins Aramco Healthcare,
Dhahran 31311, Saudi Arabia
Tel: +966-13-877-9748
Fax: +966-13-877-3790
Email: jaffar.tawfiq@jhah.com; jaltawfi@yahoo.com

Conflict of interests: No conflict of interests is declared.