JIDC | THE JOURNAL OF INFECTION IN DEVELOPING COUNTRIES

Brief Original Article

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

Jaffar A. Al-Tawfiq[1,2], Michael Diamond[3,4], Diamond Joy[1,5], Kareem Hinedi[3]

[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.

Methodology: The retrospective study included CAP patients, admitted to a general hospital in Eastern Saudi Arabia. The CURB-65 was extracted from the available medical records.

Results: During the study period, from 2013 to 2016, a total of 1786 adults were admitted with a mean age of 63.9 ± 21.7 (range 14-108 years). The majority of the patients (51.7%) had CURB-65 score 0 or 1 followed by the score 2, 3 and 4/5 (29%, 15.2%, and 4.1%, respectively). The mean CURB-65 was 1.4 ± 1.12 for those who survived and 2.27 ± 1.03 for those who died ($p < 0.001$). The mean age was 63.01± 21.9 years for survived patients and 75.1 ± 15.58 years for fatal cases ($p < 0.001$). 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%, respectively.

Conclusions: The mortality rates of admitted patients with CAP did not differ from those reported in the literature. However, the utilization of CURB-65 score was low and there is a need for wider implementation of pneumonia severity index for patients presenting with CAP.

Key words: CURB-65 score; community-acquired pneumonia; mortality; middle east respiratory syndrome coronavirus; MERS-CoV.

J Infect Dev Ctries 2017; 11(10):811-814. doi:10.3855/jidc.9585

(Received 11 July 2017 – Accepted 03 October 2017)

Introduction

Community-acquired pneumonia (CAP) is a common diagnosis leading to admissions throughout the world and remains a cause of substantial morbidity and mortality worldwide. CAP is also important as it may lead to respiratory failure and may result in death. Various objective scoring systems were developed to standardize the approach to designation of the severity of CAP. These criteria help in the calculation of the expected mortality rate and thus inform the clinician on the need for hospital admission. The recent CAP guidelines state that major decisions regarding diagnostic and treatment issues of CAP spin around initial assessment of severity using a scoring system [1]. There are four proposed pneumonia severity scores: the Pneumonia Severity Index (PSI) [2], the Infectious Diseases Society of America (IDSA)/American Thoracic Society (ATS) severe pneumonia criteria [1], CURB-65 [3] and the Japanese Respiratory Society (JRS) scores [4]. The JRS scores relies on physiological and radiological criteria (radiological extent, temperature, pulse rate, respiratory rate and dehydration) and laboratory data (WBC count, C-reactive protein value and PaO2 or SpO2 value) [4]. Another scoring system is the expanded-CURB-65 (CURB-65, lactate dehydrogenase, platelet, and albumin) [5]. The CURB-65 score components include scoring patient based on confusion, blood urea, respiratory rate, blood pressure, and age ≥ 65 years [3,6]. The score had been associated with mechanical ventilation, rate of hospital admission, and duration of hospital stay among hospitalized patients [7]. Based on local guidelines, CURB-65 should be used for hospitalized patients and that hospitalization is recommended for patients with CURB-65 score of ≥ 2 [8,9]. However, there is a limited data on the use of CURB-65 among CAP patients in Saudi Arabia [10]. Thus, in this study we analyze the pattern of the CURB-65 severity score for CAP in patients hospitalized in one medical center in Saudi Arabia. We also tried to

elucidate 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).

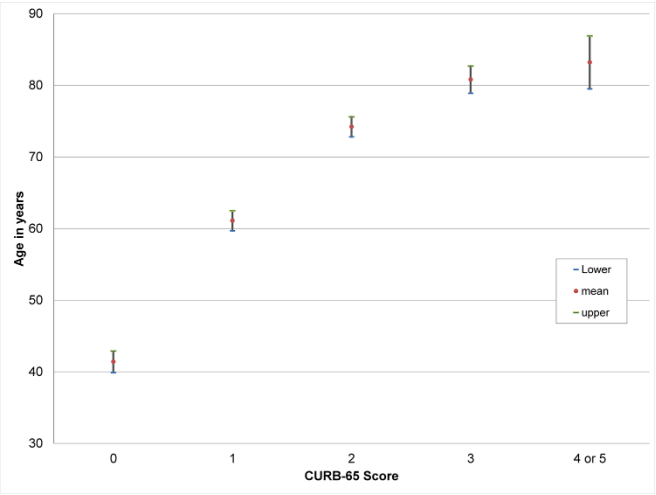
Statistical Analysis

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 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).

Figure 1. Interval Plot of Mean Age (± SD) versus CURB-65 Score.



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.

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

Table 2. CURB 65 Score and Mean Age with Standard Deviation (SD) and 95% Confidence Interval (95% CI) in relation to outcome.

		CURB-65 Score and Standard Deviation (SD)			Mean age and Standard Deviation (SD)		
Death	**Number**	**Mean**	**SD**	**95% CI**	**Mean age**	**SD**	**95% CI**
Yes	136	2.27	1.03	(2.0790, 2.4679)	75.06	15.6	(71.33, 78.79)
No	1650	1.41	1.12	(1.3591, 1.4672)	63.1	21.9	(62.062, 64.136)

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 a 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

1. Mandell LA, Wunderink RG, Anzueto A, Bartlett JG, Campbell GD, Dean NC, Dowell SF, File TM Jr, Musher DM, Niederman MS, Torres A, Whitney CG; Infectious Diseases Society of America; American Thoracic Society (2007). Infectious Diseases Society of America/American Thoracic Society Consensus Guidelines on the Management of Community-Acquired Pneumonia in Adults. Clin Infect Dis 44:S27–72.
2. Fine MJ, Auble TE, Yealy DM, Hanusa BH, Weissfeld LA, Singer DE, Coley CM, Marrie TJ, Kapoor WN (1997). A Prediction Rule to Identify Low-Risk Patients with Community-Acquired Pneumonia. N Engl J Med 336:243–250.
3. Lim WS, van der Eerden MM, Laing R, Boersma WG, Karalus N, Town GI, Lewis SA, Macfarlane JT (2003). Defining community acquired pneumonia severity on presentation to hospital: an international derivation and validation study. Thorax 58:377–382.
4. Miyashita N, Matsushima T, Oka M, Japanese Respiratory Society (2006). The JRS guidelines for the management of community-acquired pneumonia in adults: an update and new recommendations. Intern Med 45:419–428.
5. Liu J, Xu F, Zhou H, Wu X, Shi L, Lu R, Farcomeni A, Venditti M3, Zhao YL1, Luo SY1, Dong XJ1, Falcone M (2016). Expanded CURB-65: a new score system predicts severity of

community-acquired pneumonia with superior efficiency. Sci Rep 6:22911.
6. Aujesky D, Auble TE, Yealy DM, Stone RA, Obrosky DS, Meehan TP, Graff LG, Fine JM, Fine MJ (2005). Prospective comparison of three validated prediction rules for prognosis in community-acquired pneumonia. Am J Med 118:384–392.
7. Capelastegui A, España PP, Quintana JM, Areitio I, Gorordo I, Egurrola M, Bilbao A (2006). Validation of a predictive rule for the management of community-acquired pneumonia. Eur Respir J 27:151–157.
8. Memish ZA, Arabi YM, Ahmed QA, Shibl AM, Niederman MS, GCC CAP Working Group (2007). Executive summary of the Gulf Cooperation Council practice guidelines for the management of community-acquired pneumonia. J Chemother 19 Suppl 1:7–11.
9. Memish ZA, Arabi YM, Ahmed QA, Shibl AM, Niederman MS, GCC CAP Working Group (2007). Management and prevention strategies for community-acquired pneumonia in the Gulf Corporation Council. J Chemother 19 Suppl 1:33–46.
10. Eldaboosy SAM, Halima KM, Shaarawy AT, Kanany HM, Elgamal EM, El-Gendi AA, Noure MO, Abuelhassan UG, Alshameryg HA (2015). Comparison between CURB-65, PSI, and SIPF scores as predictors of ICU admission and mortality in community-acquired pneumonia. Egypt J Crit Care Med 3:37–44.
11. Ito A, Ishida T, Tokumasu H, Washio Y, Yamazaki A, Ito Y, Tachibana H (2017). Prognostic factors in hospitalized community-acquired pneumonia: a retrospective study of a prospective observational cohort. BMC Pulm Med 17:78.
12. Al-Tawfiq JA, Hinedi K, Ghandour J, Khairalla H, Musleh S, Ujayli A, Memish ZA (2014). Middle East Respiratory Syndrome-Coronavirus (MERS-CoV): a case-controlstudy of hospitalized patients. Clin Infect Dis 59:160–165.
13. Al-Tawfiq JA, Hinedi K, Abbasi S, Babiker M, Sunji A, Eltigani M (2017). Hematologic, hepatic, and renal function changes in hospitalized patients with Middle East respiratory syndrome coronavirus. Int J Lab Hematol 39:272-278.
14. Al-Tawfiq JA, Momattin H, Dib J, Memish ZA (2014). Ribavirin and interferon therapy in patients infected with the Middle East respiratory syndrome coronavirus: an observational study. Int J Infect Dis 20:42–46.
15. Command and Control Center Ministry of Health Kingdom of Saudi Arabia Scientific Advisory Board (2015). Infection Prevention and Control Guidelines for Middle East Respiratory Syndrome Coronavirus (MERS-CoV) Infection 3rd Edition 2015. Available: http://www.moh.gov.sa/en/CCC/Regulations/2015 update.pdf Accessed May 12, 2017.
16. Command and Control Center Ministry of Health Kingdom of Saudi Arabia Scientific Advisory Board (2017). Infection Prevention and Control Guidelines for the Middle East Respiratory Syndrome Coronavirus (MERS-CoV) Infection, 4th Edition 2017. Available: http://www.moh.gov.sa/endepts/Infection/Documents/Guidelines-for-MERS-CoV.PDF Accessed May 12, 2017.
17. Scientific Advisory Council, Ministry of Health, Saudi Arabia (2014). Infection prevention/control and management guidelines for patients with Middle East Respiratory Syndrome Coronavirus (MERS-CoV) infection Scientific Advisory Council Ministry of Health 2014. Available: http://www.moh.gov.sa/en/CCC/StaffRegulations/Corona/Documents/GuidelinesforCoronaPatients.pdf Accessed May 12, 2017.
18. Mohd HA, Memish ZA, Alfaraj SH, McClish D, Altuwaijri T, Alanazi MS, Aloqiel SA, Alenzi AM, Bafaqeeh F, Mohamed AM, Aldosari K, Ghazal S (2016). Predictors of MERS-CoV infection: A large case control study of patients presenting with ILI at a MERS-CoV referral hospital in Saudi Arabia. Travel Med Infect Dis 14:464–470.
19. Al-Abri SS, Al-Maashani S, Memish ZA, Beeching NJ (2012). An audit of inpatient management of community-acquired pneumonia in Oman: a comparison with regional clinical guidelines. J Infect Public Health 5:250–256.
20. Onyedum CC, Chukwuka JC (2011). Admission profile and management of community acquired pneumonia in Nigeria--5 year experience in a tertiary hospital. Respir Med 105:298–302.
21. Maxwell DJ, McIntosh KA, Pulver LK, Easton KL (2005). Empiric management of community-acquired pneumonia in Australian emergency departments. Med J Aust 183:520–524.
22. Williams E, Girdwood J, Janus E, Karunajeewa H (2014). CORB is the best pneumonia severity score for elderly hospitalised patients with suspected pneumonia. Intern Med J 44:613–615.

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.