Respiratory Medicine (2011) 105, 1732–1738

available at www.sciencedirect.com

ScienceDirect

journal homepage: www.elsevier.com/locate/rmed

Low CURB-65 is of limited value in deciding discharge of patients with community-acquired pneumonia☆

Stefano Aliberti [a,*], Julio Ramirez [b], Roberto Cosentini [c], Anna Maria Brambilla [c], Anna Maria Zanaboni [d], Valeria Rossetti [e], Paolo Tarsia [e], Paula Peyrani [b], Federico Piffer [e], Francesco Blasi [e]

[a] *Dipartimento di Medicina Clinica e Prevenzione, University of Milan-Bicocca, Clinica pneumologica, AO San Gerardo, Via Pergolesi 33, 20052 Monza, Italy*
[b] *Division of Infectious Diseases, Department of Internal Medicine, University of Louisville, Louisville, 40202 KY, USA*
[c] *Emergency Medicine Department, IRCCS Fondazione Cà Granda, Ospedale Maggiore Policlinico, Via F. Sforza 35, 20122 Milan, Italy*
[d] *Computer Science Department, University of Milan, Via Comelico 39, 20135 Milan, Italy*
[e] *Dipartimento toraco-polmonare e cardio-circolatorio, University of Milan, IRCCS Fondazione Cà Granda, Ospedale Maggiore Policlinico, Via F. Sforza 35, 20122 Milan, Italy*

Received 2 May 2011; accepted 13 July 2011
Available online 6 August 2011

KEYWORDS
Community-acquired pneumonia;
CURB-65 score;
Site-of-care;
Cardiovascular events;
Hypoxemia;
Hospitalization

Summary
Background: The relationship between clinical judgment and indications of the CURB-65 score in deciding the site-of-care for patients with community-acquired pneumonia (CAP) has not been fully investigated. The aim of this study was to evaluate reasons for hospitalization of CAP patients with CURB-65 score of 0 and 1.
Methods: An observational, retrospective study of consecutive CAP patients was performed at the Fondazione Cà Granda, Milan, Italy, between January 2005 and December 2006. The medical records of hospitalized patients with CAP having a CURB-65 score of 0 and 1 were identified and reviewed to determine whether there existed a clinical basis to justify hospitalization.
Results: Among the 580 patients included in the study, 218 were classified with a CURB-65 score

Abbreviations: AMI, acute myocardial infarction; ATS, American Thoracic Society; BTS, British Thoracic Society; CAP, community-acquired pneumonia; COPD, chronic obstructive pulmonary disease; CPAP, non-invasive continuous positive airway pressure; CURB-65, confusion, blood urea nitrogen, respiratory rate, blood pressure, and age $\geq$65 years; ER, emergency room; FiO_2, fraction of inspired oxygen; LOS, length of stay in the hospital; N, number; NIV, non-invasive ventilation; $PaCO_2$, partial pressure of carbon dioxide in arterial blood; PaO_2, partial pressure of oxygen in arterial blood; PSI, pneumonia severity index; SAPS, simplified acute physiology score; SD, standard deviation; USA, United States of America.

☆ The work was presented at the 2008 European Respiratory Society Annual Conference.

* Corresponding author. Tel.: +39 0392339284, +39 3394171538(mobile); fax: +39 0392339437.
E-mail address: stefano.aliberti@unimib.it (S. Aliberti).

0954-6111/$ - see front matter
doi:10.1016/j.rmed.2011.07.006

of 0 or 1. Among those, 127 were hospitalized, and reasons that justified hospitalization were found in 104 (83%) patients. Main reasons for hospitalization included the presence of hypoxemia on admission (35%), failure of outpatient therapy (14%) and the presence of cardiovascular events on admission (9.7%). Used as the sole indicator for inappropriate hospitalization, the CURB-65 score had a poor positive predictive value of 52%.
Conclusions: Although the CURB-65 has been proposed as a tool to guide the site of care decision by international guidelines, this score is not ideal by itself, and should not be regarded as providing decision support information if a score of 0 and 1 is present. In CAP patients with CURB-65 scores of 0 or 1, further evaluations should be performed and completed by clinical judgment.

Introduction

Community-acquired pneumonia (CAP) is the leading cause of death from infectious disease in western countries, as well as a major burden on healthcare resources. The major impact on the cost of its care is determined by whether or not a patient is admitted to the hospital.[1] Up to 20% of all patients with CAP are hospitalized in the USA and dollars spent on these patients account for 90% of the total cost of care for the disease.[2] In view of these considerations, hospital admission decision represents a cornerstone in the management of CAP patients and should be based on an objective assessment of severity of illness, and stratification of patients on the basis of their mortality risk.[3]

In clinical practice, physicians have the availability of models of prognosis for patients with CAP to quantify severity of illness and to guide their clinical judgment. One of most widely accepted and used tools is the CURB-65 score developed by the British Thoracic Society (BTS).[4] The CURB-65 score uses five clinical and laboratory characteristics (confusion, blood urea nitrogen, respiratory rate, blood pressure, and age $\geq$65 years) and stratifies patients into three risk groups for mortality: patients with none or one of these characteristics are considered at low risk for mortality (0%—2.1%), those with two characteristics at intermediate risk (9.2%), while those with more than two characteristics are considered at high risk for mortality (up to 22%). The CURB-65 score is particularly attractive since it is easy to remember, simple to compute and, thus, cost-effective. Two recent systematic reviews and meta-analysis validated the ability of the CURB-65 in predicting 30-day mortality in patients with CAP.[5,6] Moreover, authors found that CURB-65 performs well at identifying patients with pneumonia who have a low risk of death.[6]

Based on its ability in predicting mortality, the CURB-65 has been adopted internationally as a tool in deciding the site of care for CAP patients, and is now recommended by a large number of national and international guidelines.[3,7,8] Among those, the BTS suggests outpatient management for patients with a low mortality risk, as well as hospitalization for patients with intermediate-high mortality risk.[8]

The relationship between clinical judgment and indications based on the CURB-65 score in deciding the site-of-care for patients with CAP has not been yet investigated. The CURB-65 score could be, thus, used as a quality improvement tool in order to assess inappropriate hospitalizations for CAP patients with low risk for mortality.

The aim of this study was to evaluate reasons for hospitalization of CAP patients with CURB-65 score of 0 and 1.

Methods

Study design and subjects

This was an observational, retrospective study of consecutive adult patients who were referred to the Emergency Room (ER) of the IRCCS Fondazione Cà Granda, Ospedale Maggiore Policlinico, Milan, Italy, between January 2005 and December 2006 with a diagnosis of CAP. The Institutional Review Board of the hospital approved the study. Patients $\geq$ 18 years of age and satisfying the criteria for CAP were included in this study. Immunocompromised patients were excluded from the study, according to the design of the CURB-65 score derivation study.[4] Among the standard operating procedures adopted in the study center, neither the CURB-65 nor the Pneumonia Severity Index (PSI) are currently used by physicians in the ER for site-of-care decision that, thus, remains a clinical decision.

Records of all the enrolled patients were reviewed. Data were collected and included: demographic information, clinical data on admission to the ER, radiological findings and laboratory values, microbiological and in-hospital treatment data, length of stay in the hospital (LOS), in-hospital mortality. Severity of the pneumonia on admission was evaluated by the CURB-65 score.[4] Missing information was assumed to be negative or normal when determining the total score.

Study definitions

CAP was defined as the presence of a new pulmonary infiltrate seen on chest radiograph or computed tomography scan of the chest within 48 h after hospitalization with at least one of the following: 1) new or increased cough with/without sputum production; 2) fever (documented temperature -rectal or oral- $\geq$ 38.3 or $<$36° C); 3) evidence of systemic inflammation (such as abnormal white blood cell count -either leukocytosis, $>$10,000/cm^3, or leucopenia, $<$ 4000/cm^3- or C-reactive protein or procalcitonin values above the local upper limit). LOS was calculated as the number of days from the date of admission to the date of discharge. Immunodepression was considered in patients with neoplastic disease (defined as