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ORIGINAL ARTICLE

Predicting in-hospital mortality in acute exacerbation of COPD: Is there a golden score?

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KEYWORDS

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Abstract *Background:* Acute exacerbations of chronic obstructive pulmonary disease (AECOPD) impose a considerable burden of morbidity, mortality, and health care cost and frequently require hospital admission. Clinicians lack a validated tool for risk stratification of such admissions.

Aim: To find the best prognostic score for prediction of in-hospital mortality due to AECOPD by comparing between the DECAF, the modified DECAF, the BAP-65 and the 2008 scores.

Methods: 264 patients admitted to Chest Department, Menoufia University Hospitals for management of AECOPD were included; either retrospectively from January 2014 to February 2015 or prospectively from March to September 2015. The 4 scores were calculated for each of them.

Results: Twenty patients (7.58%) died during their hospital stay. The non-surviving group had a statistically significant higher age, all were males and 19 of them were smokers. The DECAF score had an area under receiver-operating characteristic curve (AUROC) of 0.828, its sensitivity was 0.8, while its specificity was 0.623. The AUROC of the modified DECAF score was 0.774, its sensitivity and specificity were 0.8 and 0.443 respectively. The BAP score had the highest AUROC (0.861), its sensitivity and specificity were 0.8 and 0.951 respectively. The 2008 score had an AUROC of 0.774, its sensitivity and specificity were 1 and 0.279 respectively.

Conclusion: BAP-score had higher AUROC and was more accurate in predicting in-hospital mortality than DECAF, modified DECAF and the 2008 scores.

Introduction

Acute exacerbations of chronic obstructive pulmonary disease (AECOPD) are major events in the long-term course of the disease since their repetition is associated with impaired lung function, health status and survival and markedly increased health care costs [1]. On the short term, they impair often notably health status and expose to risks of acute respiratory failure and death. Home-based care has been shown to represent a valuable alternative for many patients visiting emergency departments (EDs), allowing to avoid or shorten hospital stays [2]. However, most patients with AECOPD visiting EDs are hospitalized. In that context, assessing the severity of AECOPD is mandatory to guide decisions of orientation (home, hospital medical ward or intensive care unit) as well as

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Table 1 DECAF score [6].

Variable		Score
Dyspnoea	eMRCD 5a	1
	eMRCD 5b	2
Eosinopenia (<0.05 3109/l)		1
Consolidation		1
Acidaemia (pH < 7.3)		1
Atrial fibrillation		1
Total DECAF score		6

DECAF, dyspnoea, eosinopenia, consolidation, acidaemia and atrial fibrillation; eMRCD, extended MRC dyspnoea.

Table 2 Modified DECAF score [7].

Variable		Score
Dyspnoea	eMRCD 5a	1
	eMRCD 5b	2
Eosinopenia (<0.05 3109/l)		1
Consolidation		1
Acidaemia (pH < 7.3)		1
Frequency of admission in AECOPD in last year (⩾2)		1
Total modified DECAF score		6

Modified DECAF, dyspnoea, eosinopenia, consolidation, acidaemia and frequency of admission; eMRCD, extended MRC dyspnoea.

Table 3 BAP-65 score [8].

Variable	Point
BUN > 25 or Urea > 9	1
Altered mental status	1
Pulse > 109 beats/min	1
Age > 65 years	1
Total score	4

Table 4 2008 score [9].

Variable		Point
Age	<70 years	0
	⩾70 years	1
MRC (baseline, steady state)	0–1	0
	2–3	1
	4–5	2
Number of signs of severity* at entry	0	0
	1–2	2
	3 and more	3
Total score		6

* Signs of severity: cyanosis, use of accessory inspiratory muscles, paradoxical abdominal movement, asterixis, neurological impairment, lower limb edema.

intensity of monitoring, treatment and follow-up during and after acute episode [3] (see Tables 1–4).

In stable COPD, prognostic indices have been thoroughly investigated and tools predicting mortality risk, such as the BODE Score, are well established [4]. However, prognostic research in exacerbations requiring hospitalization has been limited, and there appears to be little common ground between predictors of mortality in stable disease and during AECOPD [5].

Recently, few clinical scores were developed to assess the severity of AECOPD aiming to help clinicians in their decisions regarding patients suffering such episodes [6–9]. Hence, the aim of this work was to compare the prognostic value of the DECAF score, the modified DECAF score, the BAP 65 score and the 2008 score in predicting in-hospital mortality of patients with AECOPD to help in planning of proper management protocols.

Methods

In this study, a total of 264 patients admitted to Chest Department, Menoufia University Hospitals for management of AECOPD were included; either retrospectively (174 patients) by reviewing the hospital's records during the period from January 2014 to February 2015 or prospectively (90 patients) during the period from March to September 2015. The recruited patients were those who had complete data regarding the required score items and matched the inclusion criteria. The total patients recruited were 176 males and 88 females with age ranging between 40 and 89 years.

The diagnosis of AECOPD was according to Global Initiative for Chronic Obstructive Lung Disease (GOLD) criteria supported by spirometric evidence of airflow obstruction (forced expiratory volume in one second (FEV1)/forced vital capacity (FVC) < 0.70) when clinically stable [10], while an exacerbation of COPD was defined as an acute event characterized by a worsening of the patient's respiratory symptoms that is beyond normal day-to-day variations and leads to a change in medication [11,12]. Exclusion criteria were: domiciliary ventilation, comorbidity expected to limit survival to less than 12 months (as metastatic malignancy) or primary reason for admission other than AECOPD. Informed consents were obtained from patients in the prospective part of the study and ethics approval was obtained from the Menoufia University Hospital's Review Board before data collection.

The collected data included age, sex, smoking, and assessment of stable state dyspnea grade over the preceding 3 months based on the extended Medical Research Council Dyspnea Score (eMRC) [13], in addition to admission data regarding: clinical examination including assessment of mental state conscious level and signs of severity of exacerbation (cyanosis, use of accessory inspiratory muscles, paradoxical abdominal movement, asterixis, neurological impairment, lower limb edema), chest radiological examination, ECG, arterial blood gases analysis, measurement of blood urea nitrogen (BUN), complete blood count (CBC). Severity scores for AECOPD were calculated for each patient, which are: DECAF [6], modified DECAF [7], BAP-65 [8] and 2008 score [9]. Patients were managed according to their condition and prognosis was recorded, either recovery and discharge or in-hospital mortality.

Statistical analysis was performed with the SPSS statistical software package version 14 (SPSS Inc., Chicago, IL, USA). Student's T test was used to compare means. Chi square test