

Performance of the DECAF Score in Predicting Hospital Mortality with AECOPD: A retrospective cohort study and an update meta-analysis

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Hu, XR; Cai, WL; Xu, D; Li, DD; Chen, M; Wu, YQ; Shen, YC.

Corresponding author:

yongchun shen

shen_yongchun@126.com

Author Affiliation:

Department of Pulmonary and Critical Care Medicine, West China Hospital, Sichuan University.

ADMINISTRATIVE INFORMATION

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Conflicts of interest - None declared.

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Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 11 June 2024 and was last updated on 11 June 2024.

INTRODUCTION

Review question / Objective This study aimed to investigate the overall prognostic performance of the DECAF score for in-hospital death in patients.

Rationale Acute exacerbation of COPD (AECOPD) is the predominant cause of hospitalization and is associated with significant mortality, high readmission rates, and high medical resource utilization. Accurate prognostic evaluation of hospitalized patients with AECOPD is difficult and there is a need for a reliable and simple tool to identify patients at high risk for in-hospital mortality. To clarify clinical issue of hospital Mortality, we aimed to quantify the accuracy of the DECAF score in predicting mortality in hospitalized

patients with AECOPD through a retrospective study in a Chinese cohort of AECOPD patients and an updated meta-analysis with strict inclusion criteria to prove the generalization of DECAF scores.

Condition being studied An acute exacerbation of chronic obstructive pulmonary disease (AECOPD) is defined as an event characterized by an increase in dyspnoea and/or cough and sputum within 14 days. DECAF score is a simple tool to identify patients at high risk for in-hospital mortality. At present, the increasing number of studies on the usefulness of the DECAF score in predicting mortality with AECOPD have differing results. We aimed to quantify the accuracy of the DECAF score in predicting mortality in hospitalized patients with AECOPD through a retrospective

study in a Chinese cohort of AECOPD patients and an updated meta-analysis.

METHODS

Search strategy Two reviewers independently examined PubMed, Scopus, Embase, Cochrane, Wanfang Data (<http://www.wanfangdata.com.cn/index.html>), China National Knowledge Infrastructure (<https://www.cnki.net/>), and Weipu databases (<http://www.cqvip.com/>) to identify related studies. Search terms were used as medical headings and/or text words: “Acute exacerbation of chronic obstructive pulmonary disease OR Acute exacerbation of COPD OR AECOPD OR COPD exacerbation” AND “DECAF OR Dyspnea, Eosinopenia, Consolidation, Acidemia, Atrial Fibrillation” AND “Sensitivity OR Specificity OR Accuracy.” Reference lists in these studies and in relevant review articles were screened manually.

Participant or population An acute exacerbation of chronic obstructive pulmonary disease (AECOPD) is defined as an event characterized by an increase in dyspnoea and/or cough and sputum within 14 days. AECOPD are usually associated with increased local and systemic inflammation due to airway infections, air pollution, or other lung injuries¹¹. In all patients, the diagnosis was made according to International Classification of Diseases, 10th edition (ICD-10) diagnoses for COPD (J440, J441) at the admission¹². For patients with multiple hospital admissions, only the first admission was recorded.

Intervention Not applicable.

Comparator Not applicable.

Study designs to be included In this retrospective study, we collected data from consecutive AECOPD patients who visited our ward from February 2019 to November 2020. All the potential studies were independently selected.

Eligibility criteria Patients were included in this study if they met the following inclusion criteria: (1) the main diagnosis was AECOPD; (2) age more than 40 years; (3) enough information in the chart to evaluate the DECAF score; Exclusion criteria were as follows: (1) hospitalization for a primary reason other than AECOPD; (2) AECOPD combined with cerebral infarction, hematological disease, or malignancy; (3) automatic discharge, waiver of treatment, missing data.

Information sources PubMed, Scopus, Embase, Cochrane, Wanfang Data (<http://www.wanfangdata.com.cn/index.html>), China National Knowledge Infrastructure (<https://www.cnki.net/>), and Weipu databases (<http://www.cqvip.com/>).

Main outcome(s) Twenty-three non-survivors and 292 survivors of AECOPD were included. At a cut-off value of 1.5, DECAF scores showed good sensitivity (78.3%), low specificity (55.1%), and AUC (0.719, 95% CI: 0.614-0.824). Additionally, 22 studies (including our study) with 824 non-survivors and 8,957 survivors were included in this meta-analysis. The summary estimates were listed as follows: sensitivity 0.77 (95% CI, 0.69-0.83); specificity 0.76 (95% CI, 0.67-0.85); PLR 3.2 (95% CI, 2.4-4.3); NLR 0.31 (95% CI, 0.23-0.40); and DOR 10.00 (95% CI, 7-16). The AUC was 0.83 (95% CI, 0.79-0.86).

Quality assessment / Risk of bias analysis Two reviewers independently assessed the quality of the included studies using the Quality Assessment of Diagnostic Accuracy Studies-2 (QUADAS-2) criteria¹⁵. This tool comprises 4 domains: patient selection, index test, reference standard, and flow and timing. Each domain is assessed in terms of risk of bias, and the first 3 domains are also assessed in terms of concerns regarding applicability¹⁵. Disagreements were resolved through discussion or consultation with the third author.

Strategy of data synthesis Our analyses focused on the ability of the DECAF score to predict in-hospital mortality of hospitalized patients with AECOPD. Heterogeneity between studies was assessed and quantified using the I² statistic. Based on the heterogeneity observed, random (I²>50%) or fixed (I²≤50%)-effect models were used to calculate summary estimates, including sensitivity, specificity, positive likelihood ratio (PLR), negative likelihood ratio (NLR), and diagnostic odds ratio (DOR)¹⁶ and Youden index. Youden index is the sum of sensitivity and specificity minus 1. We generated summary receiver operating characteristic curves (SROCs) and calculated the area under the SROC (AUC). To explore possible contributors to the between-study variance, we further investigated in univariate meta-regression analysis the associations, followed by subgroup analyses. Publication bias was assessed using the Deeks' test at the p < 0.05 level of significance. Statistical analysis was performed using Stata 17.0 (Stata, College Station, TX, USA).

Subgroup analysis Furthermore, five of the 22 articles (including this study), which also examined the prediction of in-hospital mortality by BAP-65, showed that the pooled sensitivity (0.44, 95% CI, 0.29–0.60), specificity (0.98, 95% CI, 0.96–0.99). The AUC was 0.97 (95% CI, 0.95–0.98).

Sensitivity analysis Sensitivity analysis prompts deletion of arbitrary studies with little change in outcome indicators.

Country(ies) involved Department of Pulmonary and Critical Care Medicine, West China Hospital, Sichuan University.

Keywords DECAF Score; Acute Exacerbation of Chronic Obstructive Pulmonary Disease; Mortality; Meta-analysis.

Contributions of each author

Author 1 - xueru hu.
Email: tanghxr@163.com
Author 2 - weiling cai.
Author 3 - dan xu.
Author 4 - diandian li.
Author 5 - fangying chen.
Author 6 - mei chen.
Author 7 - yanqiu wu.
Author 8 - yongchun shen.