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Utility of DECAF Score as A Bed Side Tool in Predicting Outcomes in Patient with Acute Exacerbation of Chronic Obstructive Pulmonary Disease

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ABSTRACT

Background

Acute exacerbations of chronic obstructive pulmonary disease (AECOPD) can be fatal. It is the third leading cause of death worldwide, causing 3.23 million deaths in 2019. The DECAF (Dyspnea, Eosinopenia, Consolidation, Acidemia, Atrial Fibrillation) score is a widely used system for predicting the survival of patients with AECOPD. It uses Routinely available indices, is quick and can be easily used by clinicians to identify sick patients who need vigilant care.

Methods

A cross sectional study was conducted at College of Medical Sciences Teaching Hospital, Bharatpur for 6 months. Patients with COPD meeting inclusion Criteria were selected and the DECAF score at time of admission was calculated. Their duration of hospital stay, use of ventilator and final outcome were noted and its relation to the Decaf score was analysed.

Results

A total of 163 patients (Male-87, Female-76) were included in the study. The mean age of the patients was 70 ±10 years and mean duration of hospital stay was 5.91±2.19 days. There is significant relationship between DECAF score and the mortality (p-value < 0.001) with higher the score higher the chance of not improving. Analysis between the DECAF score and length of Hospital stay by regression equation found the regression coefficient 0.410 to be significant (p-value < 0.001) indicating that if DECAF score increases by one, the length of hospital stay will also increases by 0.41 day.

Conclusions

Patients with a DECAF score of four or higher have a significant risk of mortality as well as long duration of hospital stay. Thus, DECAF is a simple tool that incorporates routinely available indices to predict adverse outcomes in AECOPD.

Keywords: AE COPD; DECAF score; pulmonaray.

INTRODUCTION

Chronic Obstructive Pulmonary Disease (COPD) is a common, preventable and treatable disease that is characterized by persistent respiratory symptoms and airflow limitation that is due to airway and/or alveolar abnormalities usually caused by significant exposure to noxious particles or gases and influenced by host factors including abnormal lung development. [1] Chronic Obstructive Pulmonary Disease (COPD) is the third leading cause of death worldwide, causing 3.23 million deaths in 2019.[2] COPD has a chronic, stable pattern aggravated by sudden, acute episodes of dyspnea and productive cough triggered by infections, tobacco smoking or air pollution and can be fatal.[3] The in-hospital mortality rate for AECOPD may range from 2.5% to 25%.[4] Various clinical Scores

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have been developed to assess the severity of AE COPD with the aim of aiding clinicians to intensify or modify the treatment given to ease the patients suffering. The Dyspnea, Eosinopenia, Consolidation, Acidemia and Atrial Fibrillation (DECAF) score is a risk stratification tool designed to predict risk of death in patients with AECOPD, and can be easily applied at the bedside to guide treatment. Administering DECAF in severely ill patients can help to identify high-risk patients who must be closely monitored with efficient and timely medical interventions to help reduce the overall mortality rate. The accuracy of the DECAF score is relatively higher than those of other similar scoring systems such as the BAP-65[5], the CURB-65[6] or the COPD and the asthma physiology score (CAPS)[7].

METHODS

We conducted a cross sectional Hospital Based study in College of Medical Sciences for 6 months from August to February, 2023 A total of 160 patients meeting the inclusion criteria were enrolled for the study after taking written consent A Case proforma containing all the variables needed in the study was used to collect the data. Breathlessness was graded in reference to the best result in the past 3 months according to the extended Medical Research Council (MRC) dyspnea (eMRCD) Score and the patients were divided into two groups

i) Unable to leave the house but who are able to independently manage washing and/or dressing (eMRCD 5a) and
ii) Unable to leave the hoise and requiring assistance with both (eMRCD 5b).

A Complete blood count, absolute eosinophil count and arterial blood gas and chest x-ray was obtained. The presence of atrial fibrillation was confirmed by ECG recording at the time of hospital admission. Acute exacerbation of COPD was defined as any event in the natural history of disease of patients with prior diagnosis of COPD or clinically diagnosed as COPD by the treating physician characterized by increase in baseline dyspnea, cough production or sputum consistency which warrants a change/ intensification in the existing treatment

Patients were scored according to the DECAF scoring system, wherein the following parameters are given points

DECAF: Dyspnea according to eMRCD, extended MRC dyspnea, Eosinopenia, Consolidation, Acidemia and atrial Fibrillation. Based on DECAF score the patients were be divided into low risk (DECAF 0-1), intermediate risk (DECAF-2) and high risk (DECAF 3-6). The patients were then followed during the entire hospital stay and the treatment was individualized according to the need of the patient. The outcome of the patient were recorded as –

i) Mortality ii) Improved/discharged
ii) Left against advise iv) Static

The length of hospital stay was also noted

Variable	Score
Dyspnea-	
eMRCD 5a	1
eMRCD 5b	2
Eosinopenia	1
Consolidation	1
Acidemia	1
Atrial Fibrillation	1
Total	6

The data were collected and analyzed using SPSS version 21.0. Modified students t test was used to assess the relation between DECAF score and Morality and the severity of COPD, as evident by the length of hospital stay and the use of ventilators in patients who survived was also analyzed using T test. A p- value of <0.05 was considered significant.

RESULTS

A total of 163 patients were included in the study. The mean age of these patients was 70±years. There were 87 men and 76 women. The mean duration of hospital stay was 5.91 ± 2.19 days. In total, 98 patients improved and were discharged, 16 patients left against medical advice and 21 patients died while 5 patients remained static with no improvement and were discharged.

Relationship between DECAF score and Mortality

To find out the relationship between DECAF score and mortality, the following table was prepared using SPSS software and Chi square value was calculated. The subjects were divided into two groups- Improved and not improved which included cases that were static, left against medical advice and died. Calculated value (35.035) indicates a significant relationship between DECAF score and the mortality (p-value is less than 0.001) in other words higher the value of DECAF score higher will be the chances of not improving. Among the patients who died the DECAF score was between 4-6 in almost all the subjects. Only 3 patients with DECAF score of less than 4 had mortality.

Chi-square value =34.035 (p-value<.001)

Relationship between DECAF score and Length of hospital stay

To study the relationship between lengths of hospital stay (Y) and DECAF score (X), a linear regression was run through SPSS and the following information was obtained.

Regression equation: $Y^{\wedge} = 1.17 + 0.41X$ $R^2 = 0.512$

(t-value): (5.933) (13.005)

F-value = 169.132 (p value <.001)

(p-value): (<0.001) (<0.001)

The selected regression equation model was fit because F-value was 169.132 along with p-value less than 0.001. R^2 value is 0.512 which shows a 51.2% variation in the dependent variable length of hospital stay was explained by the independent variable DECAF score. The regression coefficient 0.410 is significant (p-value < than .001) and indicates that if DECAF score increases by one, the length of hospital stay will also increases by 0.41 day and vice versa.

Table 1. Cross tabulation of DECAF score with Clinical outcome.

DECAF score	IMPROVED	CLINICAL OUTCOME		STATIC
		LAMA	MORTALITY	
1	7	0	0	0
2	28	0	2	0
3	35	6	1	0
4	29	2	6	2
5	18	8	9	4
6	0	1	5	0

Table2. Relationship between DECAF score and outcome.

DECAF score	Clinical Status		Chi Square	p-value
	Improved	Not improved		
1-2	35 (94.60%)	2 (5.40%)	34.035	<0.001
3-4	64 (79.00%)	17 (21.00%)		
5-6	18 (40.00%)	27 (60.00%)		

Thus, in our study also the patients with DECAF score of more than 4 also had longer duration of hospital stay as compared to those with scores less than 4.

DISCUSSION

In stable COPD, prognostic indicators have been thoroughly investigated and tools to predict mortality risk, such as the body mass index, air-flow obstruction, dyspnea, and exercise capacity (BODE) score have been well established. However, prognostic studies in patients with exacerbation requiring hospitalization are limited and the predictors of mortality between stable disease periods and AECOPD periods seem to have little in common.[8] Ever since its introduction in 2012, various studies have been conducted time and again throughout the world validating the DECAF score in AE COPD. John et al in his 2012 study involving 920 patients with AE COPD found area under the DECAF Score ROC curve for predicting in hospital mortality was 0.86 (95% CI 0.82 to 0.89) and even concluded that the DECAF Score performed significantly better for the prediction of in hospital mortality than other scores like the (APACHE) II, BAP-65.or the CURB-65[9] Our findings were also consistent with the above mentioned findings such that patients with higher DECAF scoring of more than 3 had higher chance of Mortality. This was again validated by another study done Memon et al involving 162 patients where they observed that more

survivors had a DECAF score from zero to three than non-survivors. The difference in the number of survivors vs. non-survivors was statistically significant for DECAF scores zero and one and for DECAF scores four and five, there were more patients in the "non-survivors" group, and the differences were statistically significant.[10] Echevarria et al.[11] in 2016 also had noted he superior performance of DECAF. Patients with a low-risk DE CAF score had a lower in hospital mortality and may be also suited for home or office treatment compared with those with a low-risk CURB-65 score. In contrast a high-risk DECAF score is associated with both a high risk of death and, in those who die, a short time to death. The latter is particularly true of patients scoring DECAF 5 or 6, in whom the median time to death was only 2 days. Such patients may be suitable for early escalation in care, or alternative palliative care. The DECAF score as a preliminary screening test for patient triaging can help reduce the time spent in various invasive diagnostic procedures and the healthcare costs involved in the process. It can be considered as an effective prognostic tool in predicting in patient mortality as well as ventilator use or increased length of stay in patients of AE COPD.[12] as well as can also guide to facilitate early discharge in patients.[13]

CONCLUSIONS

DECAF is a simple bedside tool that can predict the severity and mortality in patients with AE COPD that incorporates routinely available indices. It effectively stratifies COPD patients admitted with acute exacerbations into mortality risk categories and can guide the treating physician into which patients need intensive monitoring and aggressive care. DECAF scores of zero to two are strong predictors for survival, and DECAF scores of four to six are strong predictors of mortality as well as indicate more severe disease as evident by long duration of hospital stay and ventilator use. The DECAF system can facilitate the efficient management of patients with AECOPD.

Conflict of interest: None

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