Prediction of 90 Day Outcome in Patients with AECOPD Using PEARL Score

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Abstract

Background: Acute exacerbations of Chronic Obstructive Pulmonary Disease (AECOPD) lead to frequent hospitalizations and increased mortality. The PEARL score has emerged as a prognostic tool for assessing the risk of post-discharge outcomes in these patients.

Objective: This study aims to evaluate the 90-day outcome ofpatients admitted for AECOPD using the PEARL score.

Methods: A prospective observational study was conducted on 100 patients hospitalized for AECOPD at Maharajahs Institute of Medical Sciences. Patients were categorized into low, intermediate, and high-risk groups based on their PEARL scores. Outcomes assessed included survival, readmission, and mortality over a 90-day follow-up period.

Results: The mean age of the participants was 69.52 years, with 56% male. The low-risk group (0-1) had a survival rate of 79.48%, while the intermediate (2-4) and high-risk (5-9) groups demonstrated survival rates of 41.8% and 38.9%, respectively. Readmission rates were significantly higher in the intermediate (53.48%) and high-risk (50%) groups compared to the low-risk group (12.82%). The mortality rate was highest in the high-risk group (11.1%).

Conclusion: The PEARL score is an effective tool for predicting 90-day outcomes in AECOPD patients, with clear implications for patient management and follow-up strategies. Early identification of high-risk patients can facilitate targeted interventions to improve outcomes and reduce readmission rates. Further research is warranted to validate these findings in larger cohorts.

Keywords: AECOPD, PEARL score, Readmission, Mortality, Survival rate

INTRODUCTION:

Chronic Obstructive pulmonary disease (COPD) exacerbation is a leading cause of frequent hospitalizations and readmissions worldwide[1,2].COPD readmission may be defined as either rehospitalization exclusively for acute exacerbation of COPD (AECOPD) or secondary to any cause. There is a lack of consensus when defining readmission time intervals, which may range from 30 days to 2 years [3]. Around one-third of patients are readmitted within 90 days [4,5]. Previous hospitalization for AECOPD is a strong predictor for future readmission [6,7] with the frequency ofrehospitalization closely linked to the number of admissions in the previous year[8]. Predictably, frequent COPD exacerbations requiring hospital admission are associated with higher mortality [9]. Globally, several tools like BODE, CODEX, ADO, and PEARL have been developed to prognosticate the risk of post-discharge readmission or mortality in hospitalized COPD exacerbations [10,11,12]. We aim to assess post-discharge 90-day outcomes in patients admitted with acute COPD exacerbation using the PEARL score.

METHODS:

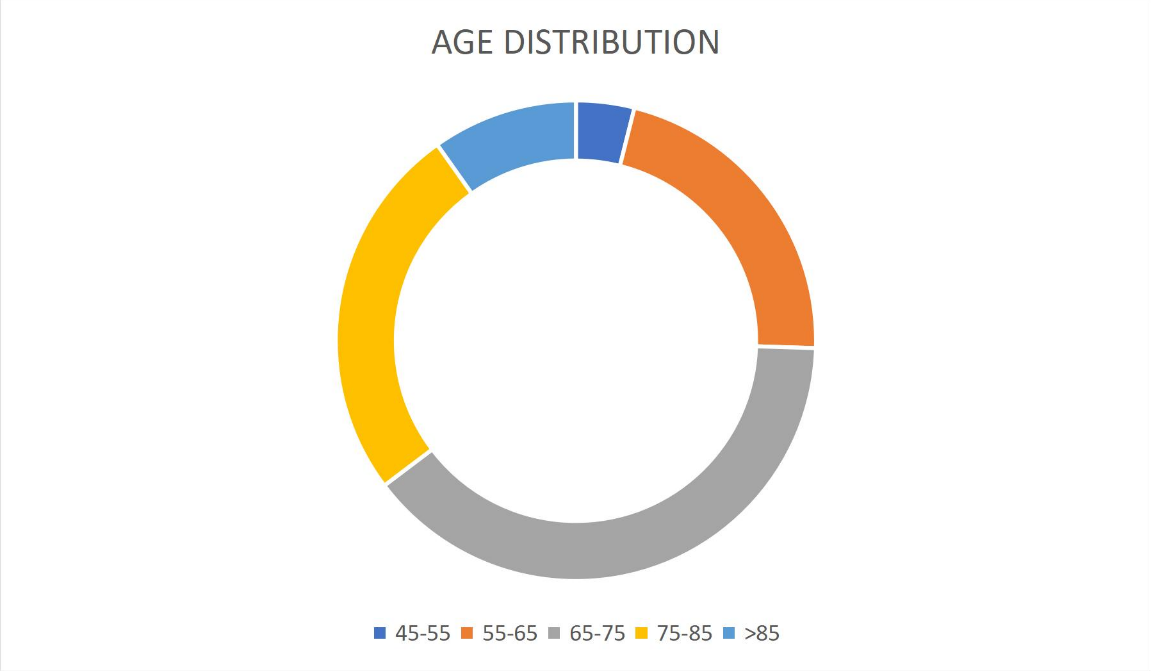
A hospital-based prospective observational study was done on 100 cases of AECOPD hospitalized at Department of Respiratory Medicine, Maharajahs Institute of Medical Sciences;Vizianagaram.The Study was done during a period of 1 year [April 2023 to April 2024].Simple random sampling technique was used. Patients admitted in Respiratory ICU with acute exacerbation of COPD were included. Exclusion criteria include patients having expected survival of less than 1 year for reasons other than COPD, uncontrolled comorbidities that could likely cause death within 2 years, medical history or clinical signs of asthma, inability to perform spirometry or six-minute walk test or both, and unstable angina, congestive heart failure, and myocardial infarction within the past 4 months. After applying inclusion and exclusion criteria, the patients underwent detailed clinical examination, followed by chest X-ray, CBP, ABG analysis, ECG, 2D ECHO, and spirometry with reversibility. Data was collected using patient charts and hospital records. PEARL score [13] of each patient was obtained at the time of admission. PEARL score comprised of five components; Previous hospital admission (P), Extended medical research council dyspnoea (eMRCD) Score[14], Age (A), Right heart failure (R) and Left heart failure (L)with score ranging from 0 to 9(Table 1). Patients were further divided into three sub-groups using PEARL score obtained as low risk group with score 0-1, intermediate risk group with score 2-4 and high risk group with score 5-9. The cohort of these patients was followed up for a period of 90 days after discharge from hospital and the 90 day post discharge outcome was compared among these three PEARL sub-groups. The primary outcome after 90 days comprised of survival, readmission and death. Survival group was defined as patients without readmission or death within 90 days after discharge from hospital. The 90 day post-discharge outcome information following discharge from hospital was obtained by telephonic interviews with patient and/or nearest family member and by reviewing hospital records. Informed consent was obtained from each participant using informed consent form in Telugu.

Table 1. The PEARL score components.

PEARL Score	Components	Score
P	Previous admissions: < 2 admissions within past year ≥ 2 admissions within past year	 0 3
E	eMRCDscore: eMRCD 1-3 eMRCD 4 eMRCD 5a eMRCD 5b	 0 1 2 3
A	Age: <80 ≥80	 0 1
R	Right heart failure (cor pulmonale): Absent Present	 0 1
L	Left heart failure: Absent Present	 0 1
	Total PEARL score	9

RESULTS:

A total of 100 patients were included for final analysis. The mean age of the patients was 69.52 ± 10.83 years with range from 45 to 98 years. The study population comprised of 56% (n= 56) male and 44% (n=44) female. The highest numbers of patients were in age group 66 to 75 years in both sex.



Patient stratification into low, intermediate and high risk PEARL groups (n= 100)	
PEARL group	n (%)
Low risk (0-1)	39 (39)
Intermediate risk (2-4)	43 (43)
High risk (5-9)	18 (18)

The intermediate risk group had the highest number of patients (43%) followed by low risk group with (39%) of patients while high risk group had the least number of patients (18%)

Ninety days post discharge outcome of hospitalized COPD patients in low, intermediate and high risk PEARL groups					
PEARL strata	OUTCOME				p value
	Survival (%)	Readmission(%)	Death(%)	Total	
Low risk (n=39)	31 (79.48%)	5 (12.82%)	3 (7.69%)	39	0.005
Intermediate risk (n=43)	18 (41.8%)	23 (53.48%)	2 (4.65%)	43	
High risk (n=18)	7(38.9%)	9(50%)	2(11.1%)	18	
Total	56 (56%)	37 (37%)	7 (7%)	100	

Highest proportion of survival was seen in low risk PEARL group (79.48%). Higher risk of readmission was observed in both intermediate and high risk PEARL groups; 53.48% and 50% respectively while it was significantly less in low risk PEARL group (12.82%). The risk of death was lowest in the intermediate risk PEARL group (4.65%) highest risk of death observed in high risk group (11.1%).

DISCUSSION:

1. Efficacy of the PEARL Score: The findings confirm the PEARL score's effectiveness in predicting 90-day outcomes in AECOPD patients, with significant differences in survival, readmission, and mortality rates across risk categories. Similar studies have validated the utility of scoring systems for prognostication in COPD patients [15, 16].

2. Survival Outcomes: The low-risk group demonstrated a survival rate of 79.48%, highlighting that patients with fewer prior admissions and lower dyspnoea severity generally have better prognosis [17]. This suggests that early identification of low-risk patients can lead to improved post-discharge outcomes.

3. Readmission Rates: The high readmission rates observed in the intermediate (53.48%) and high-risk (50%) groups underscores the need for targeted interventions. Enhanced follow-up care and patient education are critical for this demographic to reduce readmissions [18].

4. Mortality Risk: The increased mortality risk in the high-risk group (11.1%) aligns with existing literature indicating that frequent hospitalizations and severe symptoms are linked to higher mortality in COPD [19]. Comprehensive management strategies for high-risk patients are essential.

5. Clinical Implications: Stratifying patients using the PEARL score allows healthcare providers to tailor post-discharge plans, optimizing resource allocation and prioritizing high-risk patients for follow-up care [20].

6. Limitations and Future Research:This study's single-center design and relatively small sample size are notable limitations. Future research should focus on larger, multi-center studies to validate the PEARL score's predictive capabilities across diverse populations[21].

7. Broader Context:These results contribute to the growing body of evidence supporting prognostic scoring systems in COPD management. Integrating tools like the PEARL score into routine clinical practice could enhance decision-making and improve patient outcomes [22].

Conclusion:

The PEARL score is a valuable metric for forecasting 90-day outcomes in patients admitted for AECOPD, effectively reflecting variations in survival, readmission, and mortality rates. Early detection of high-risk individuals can facilitate focused management strategies, enhancing outcomes after discharge. Integrating the PEARL score into clinical practice can improve patient care and optimize resource use in managing COPD. Future investigations should aim to confirm these results through larger, multi-center studies.

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