



CURB-65, HYPOXEMIA AS SEVERITY PREDICTORS AND FEMALE GENDER AS POOR OUTCOME INDICATOR IN COMMUNITY ACQUIRED PNEUMONIA (CAP)

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ABSTRACT

BACKGROUND - CAP is one of the leading causes of morbidity and mortality worldwide, so early prediction of severity and outcome is required for further management of CAP patients.

OBJECTIVES - To assess the severity of CAP by using CURB-65 scoring system and status of hypoxemia in the patients who presented in emergency and outpatient department and gender specific outcome in the patients who are admitted in inpatient department.

METHODOLOGY - A prospective, observational study which included all adults attending the EMD, OPD and admitted in IPD fulfilling the inclusion criteria.

RESULTS - Out of 47 males and 23 female (total 70) patients admitted through EMD or OPD, 56 patient (80%) had low CURB score, 63 patients (90%) had hypoxemia, 53 patients (75%) presented with age of more than 65 years, 50% (7 out of 14) patients with high CURB-65 were confused. 13 out of 23 females (56%) patients had less stability and longer hospital stay as compared to 12 out of 47 male (26%) patients.

CONCLUSION - CURB-65 scoring system was not adequately helpful in deciding the severity and further management while hypoxemia and age emerged as good individual predictors for severity of CAP while female gender was associated with poor outcome and longer hospital stay. Hypoxemia even with low CURB-65 score helped in severity assessment and ICU admission.

KEYWORDS :

INTRODUCTION

CAP is one of the leading causes of morbidity and mortality across world. CAP can be defined by both clinical and radiological findings. In the absence of available radiological facilities CAP is defined by (a) symptoms of LRTI (lower respiratory tract infection) for less than 1 week; (b) at least one systemic feature (temperature > 37.7 C, chills and rigors or malaise); (c) At least one new focal respiratory system finding (bronchial breath sounds and/or crackles); and (d) no other explanation for the illness. New radiological findings such as shadowing in the form of lobar or patchy consolidation, loss of diaphragmatic, cardiac or mediastinal silhouette, interstitial infiltrates or bilateral perihilar opacities for which there is no other explanation (acute pulmonary edema, pulmonary tuberculosis, etc.)¹ additionally define CAP. Moreover, clinicians often overestimate short-term mortality, even among low-risk patients leading to unnecessary admissions. High costs of admission and increase risks of hospital acquired infections discourage routine admissions. Risk stratifying scores are thus essential to aid the clinician in appropriate disposition of a patient with CAP². In the ED an easily reproducible score with readily available criteria like the CURB-65 can be useful. Hypoxemia (O₂ saturation less than 92% and low PaO₂/FiO₂ is 300 mmHg or less) in patients with moderate to severe CAP is associated with poor outcome however its impact on those at lower risk is lacking. The addition of hypoxemia as a scoring index to those with mild pneumonia (CURB-65 score 0-1) could affect the need for hospitalization, length of stay and outcome. A new study evaluating the relationship between gender and outcome of patients with CAP is warranted.⁴

METHODS: - STUDY DESIGN AND STUDY PATIENTS

We conducted a prospective observational study in the emergency, OPD and IPD under department of general medicine, in a tertiary care Sharda Hospital, School of Medical Sciences and Research, Greater Noida, U.P., with a

sample size of 70 patients (47 males and 23 female). Inclusion criteria was patient's age more than 18 years presented with symptoms of pneumonitis and exclusion criteria was known pulmonary carcinoma, cytotoxic lesions, aspiration pneumonia, known cases of pneumonia and those recently discharged (< 14 days) from a hospital, known case of pulmonary tuberculosis.

VARIABLE DEFINITIONS: -

CURB-65 (Confusion of new onset, Blood Urea nitrogen more than 7 mmol/l (19 mg/dL), Respiratory rate of 30 breaths per minute or more, Blood pressure less than 90 mmHg systolic or diastolic blood pressure 60 mmHg or less, Age 65 or older),^{6,7}
Hypoxemia (PaO₂ less than 60 mmHg, PaO₂/FIO₂ ratio less than 300, or oxygen saturation less than 90%), Each subject was evaluated for blood cultures within 24 hours of admission, antimicrobial given within 8 hours of admission, oxygenation status assessment and prior influenza and pneumococcal vaccine administration.

Time to clinical stability criteria were defined, as in the American Thoracic Society guidelines for CAP, as all of the following: lack of fever for more than 8 h, improving leukocytosis (decreased more than 10% from the previous day), tolerating oral intake and improved clinical signs (e.g., improved cough and shortness of breath). Criteria for clinical stability were evaluated every day during the first 7 days of hospitalization. Patients who reached their clinical stability within 7 days of admission were defined as being clinically improved. Length of stay (LOS) was calculated as the number of days from the date of admission (counted as day 0) to the date of discharge. Mortality was defined as death by any cause during hospitalization (in-hospital mortality) and within 28 days (28-day mortality). Time to clinical stability, LOS, in-hospital mortality and 28-day mortality were selected as outcomes.⁴

STATISTICAL ANALYSES: - Baseline patient characteristics and clinical outcomes of females and males were compared using Chi-squared or Fisher's exact tests for categorical variables, Sex differences in time to clinical stability and LOS were evaluated. To examine the impact of gender on in-hospital and 28-day mortality, propensity score adjustment methodologies were used. A p-value <0.05 was considered to be statistically significant in all analyses. The Statistical software namely SAS 9.2, SPSS 15.0, Stata 10.1, MedCalc 9.0.1, Systat 12.0 and R environment ver.2.11.1 were used for the analysis of the data and Microsoft word and Excel have been used to generate graphs, tables etc.

RESULTS: -

Age distribution patients study showed that 1.5% patients were in the age group of 18-25yrs and 26-35yrs, 6% in the age group of 36-45yrs, 16% in age group of 46-65yrs and 75% in age group of >65 years (table-1), incidence of hypoxemia was quite high of 90% in CAP patients (table-2), Distribution of patients according to (PaO2/FiO2) showed 10% patients of <100, 46% patients of 100-200, 34% patients 200-300, 10% patients of >300 (table-3), respiratory rate was <30. In 88.5% and >30 in 11.5% patients (table-4), blood pressure study showed maximum patients 91.5% presented with BP >90/60 mmhg and only 8.5% presented with BP <90/60 mmhg (table-5). The patients CURB-65 scoring was assessed at time of admission only 1.5% (1 male, 0 female) patient presented with zero score, 55.5% (27 male, 12 female) with mild, 23% (11 male, 5 female) with intermediate and 20% (8 male, 6 female) with sever scoring (table 6).

TABLE 1: AGE DISTRIBUTION OF PATIENTS STUDIED

Age in years	Number of patients	%
18-25	01	1.5
26-35	01	1.5
36-45	04	06
46-65	11	16
>65	53	75

TABLE 2: INCIDENCE OF HYPOXEMIA IN CAP PATIENTS STUDIED

Hypoxemia	Number of patients	%
Yes	63	90
No	07	10
Total	70	100

TABLE 3: DISTRIBUTION OF PATIENT ACCORDING TO (PAO2/FIO2)

PaO2/FiO2	Number of patients	%
<100	07	10
100-200	32	46
200-300	24	34
>300	07	10

TABLE 4: RESPIRATORY RATE (CYCLE PER MINUTE) OF PATIENT STUDIED

RR	No. of patients	%
<30	62	88.5
>30	8	11.5

TABLE 5: BLOOD PRESSURE (MMHG) OF PATIENTS STUDIED

BP	Number of patients	%
<90/60	6	8.5
>90/60	64	91.5

TABLE 6: GENDER SPECIFIC DATA FOR TO ASSESS THE SEVERITY

CURB 65	No. of patients	%	Male	Female
0	1	1.5	1	0
1	39	55.5	27	12

2	16	23	11	5
>2	14	20	8	6
Total	70	100	47	23

TABLE 7: CORRELATION OF CONFUSION, BUN AND PAO2/FIO2 WITH CURB65 SCOR

CURB65	Normal (0)	Mild (1)	Intermediate (2)	Severe (>2)	p-value
	1	39	16	14	0.46
Confusion	0	0	0	7 (50%)	
BUN					
<19mg/dl	1(100%)	39(100%)	14(87.5%)	1(7%)	<0.001
>19mg/dl	0	0	2(12.5%)	6(43%)	
PaO2/FiO2					
<100	0	0	1	6	0.004
100-200	6	19	5	2	
200-300	5	15	3	1	
>300	4	2	1	0	

Correlation of Confusion and BUN with CURB65 scores done out of 7 from 14 severe CURB65 were confused 2 out of 16 intermediate CURB65 were with BUN >19 mg/dl and 6 out of 14 severe CURB65 were with BUN >19mg/dl (table-7), PaO2/FiO2 correlation with CURB65 has given in table-7. To evaluate stability and duration of hospital we have also assessed the gender specific comorbidities. COPD was present in 30% of male patients while 4% in females, CHF was in 4.3% of females while 13.4% males, no CVA and liver diseases was present in females while 6.6% males were suffering from liver. disease, renal disease was present in 7.9% female while 8.5% in males, diabetes was predominant in males with 63.8% and females with 47.8% (table 8). Length of hospital stay with 10±2 days was higher than males with 8±4 with significant p value of <0. 001.To reach the clinical stability females took more time of 5±2 days as compared to male who took 4±2 days. 56% females took longer stay and with less clinical stability as compared to male only 26%. None of the patient died during hospital stay (table 9).

TABLE 8 COMORBIDITIES WITH CAP

Comorbidities	Female (23)	Male (47)
• COPD	4 (17.6)	4 (30)
• Congestive heart failure	1 (4.3)	4 (13.4)
• Cerebrovascular accident	0	0
• Liver disease	0	3 (6.6)
• Renal disease	2 (7.9)	4 (8.5)
• Diabetes mellitus	11 (47.8)	30 (63.8)
• Clinical signs		
• Heart rate >125 beats/min	04 (17.3)	5 (10.6)
• Temp. <35C or >40C	02 (8.6)	3(6.7)

TABLE 9 OUTCOMES BY SEX FOR 70 PATIENTS WITH CAP

Subjects n	Female	Male	p-value
• Length of hospital stay days	10±2	8±4	<0.001
• Time to clinical stability days	5±2.	4±2	<0.001
• No. of patients with longer Stay and less clinical stability	13(56%)	12(26%)	<0.001
• In hospital mortality	0	0	
• 28-days mortality	0	0	

DISCUSSION: -

In a busy emergency and outpatient medicine departments assessment of severity and the possible outcome plays a crucial role in the management and disposition of patients with CAP. This is true not only for the evaluation of disease and severity in a patient with pneumonia, but also the triaging decision regarding hospitalization or ICU admission, and

consequently the selection of initial antimicrobial treatment. So, we have to evaluate the patients on the basis of their clinical characteristic features individually and by fitting them into different scoring systems and make a certain benchmark to categories the CAP patients.

In our study of the 70 patients who presented with CAP and were admitted through the ED and OPD, 91% were aged over 50 years. A sizable amount (>75%) of those were elderly aged over 65 years. The severity of CAP was found to be significantly related with the age of the patient. Studies conducted by Capelastegui *et al*⁸ and Lim *et al*⁹ noted the mean age of their study population to be 64.1 and 61.8 years, respectively.

In another prospective observational study conducted exclusively among those aged more than 65 years with CAP (mean SD age 81.1(+/-)7.9 years), Mynith K *et al*¹¹ reported that the sensitivity and specificity of CURB in predicting death was as high as 81 and 52%, respectively. In a prospective comparative study conducted across 32 EDs across Britain it was found that the recently developed CURB-65 severity score is a better tool for predicting mortality than the CURB score. This finding underrates the importance of older age as a predictor of short-term mortality in pneumonia. In contrast to all studies there is very strong association of age in severity predictor.

Mortensen and colleagues assessed the causes of death in a cohort of 2287 patients with CAP and found that hypoxemia was significantly associated with pneumonia related mortality (hazard ratio 1.99; 95%CI 1.32-3.00).¹⁴

Myint *et al*¹³ studied 195 elderly patients with severe pneumonia and found that hypoxemia was the most severe mortality predictor at six weeks. This finding was further studied by Sanz *et al*¹⁵ among those exclusively with mild pneumonia. They concluded that 50% (294 of the 585) patients with mild pneumonia were hypoxemic at admission, had a longer hospital stay, were more likely to require mechanical ventilation and had a higher mortality as compared to the non-hypoxemic patients. Forest W. Arnold *et al*⁷ done a study on gender specific outcome in CAP they concluded that There were 6718 patients in this study, of whom 40% were female. This study shows that the epidemiology of CAP may be changing, and that females have worse outcomes for CAP than males. They are more likely to take longer to reach clinical stability, have longer hospital stays and are 15% more likely to have died after 28 days. In our study 80% patients had low CURB score, 90% patients had hypoxemia, 75% patients presented with age of more than 65 years, 50% (7 out of 14) patients with high CURB-65 were confused. 13 out of 23 females (56%) patients had less stability and longer hospital stay as compared to 12 out of 47 male (26%) patients.

CONCLUSION:-

CURB-65 scoring system was not adequately helpful in deciding the severity and further management while hypoxemia and age emerged as good individual predictors for severity of CAP while female sex was associated with poor outcome and longer hospital stay. Hypoxemia even with low CURB-65 score helped in severity assessment and ICU admission. Current CAP scoring systems may need to be revised regarding female mortality risk.

COMPETING INTERESTS:-

The authors declare that there is no conflict of interests regarding publication of this paper.

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