

To Determine Severity and Prognostic Factors of Patients Admitted in Emergency with Community Acquired Pneumonia

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Abstract

Aim: The aim of the study is to determine systematically the performance of existing clinical prediction score (SMART_COP, CURB_65, PSI, ATS/IDSA, SCAP Score) to risk stratify the Emergency department patients with Community acquired pneumonia. *Method:* This study was conducted on 80 patients presented to the department of emergency medicine, during July 2016 to November 2019. *Results:* Maximum age group of 51-70 with mean age 57.5 ± 14.78 years. Smoking about 75% males have smoking as risk factor and the most common comorbid condition is hypertension. Among 80 patients, 10 have CURB_65 score of 0, 24 patients have score of 1, 30 patients have score of 2, 11 patients have score of 3, 3 patients have score of 4 and 2 patients have score of 5. Among 80 patients, 19 patients has SCAP major criteria and 36 patients had minor criteria. The mortality was seen in about 10 patients. SMART_COP has highest AUC value among different pneumonia severity score for predicting the need of vasopressor support and SMART_COP score > 5 have good accuracy in predicting the need of vasopressor support in patients with CAP. *Conclusion:* Early microbiological diagnosis, early antibiotic administration in patients with SMART_COP score > 4 and PSI class 4 and 5 can decrease the morbidity and mortality in CAP patients.

Keywords: Pneumonia; Vasopressor; SMART_COP.

Introduction

Pneumonia is defined as an acute infection of the lung parenchyma, with symptom onset in the community [1]. Community-acquired pneumonia (CAP), "Captain of the men of Death" as described by Sir William Osler in 1982 still remains a major cause for morbidity and mortality despite all highly sophisticated advances in both diagnosis and therapeutic management of community acquired pneumonia [2,3]. Community acquired pneumonia (CAP) is a common disorder with an incidence of about 20% to 30% in developing countries compared to an incidence of 3% to 4% in developed countries [4-6].

Severe CAP is defined as a pneumonia requiring supportive therapy within a critical

care environment that is associated with a higher mortality rate. Severe CAP is frequently a multisystem disease and patients will often present with multiple organ failure [7].

Despite their widespread use in clinical practice, traditional markers such as severity of disease estimation by the patient, fever, or white blood cell counts do not reliably assess disease severity and mortality risk [8].

Mortality reduction can be achieved by correct prediction rule that allows physicians to select patients with severe CAP who require ICU treatment early in the course of illness facilitates the appropriate initial management and antibiotic treatment [9]. Number of studies suggest that routine clinical judgment is often not sufficient for assessing the severity of CAP [10].

Clinical judgment alone may underestimate its severity and lead to variations in rates of admission to the hospital and intensive care unit (ICU). In addition, the decision to admit a patient to the ICU based on clinical judgment alone has been found to be sub optimal. In this light, validated clinical prediction rules for CAP management offer a useful adjunct to the art of clinical practice.

In developing countries such as India where half population is low economical status site of care is major burden for the patients. Determination of extent of disease severity is vital in optimizing therapeutic options such as requirement of invasive or non invasive ventilator support, need of vasopressor or inotropic support, path of treatment, whether patient can be discharged home, diagnostic strategy and oral or intravenous antibiotics [11].

The aim of the study is to validate the significance of clinical prediction scores in prognosis of severity of Community Acquired Pneumonia and to determine site of care decisions based on clinical prediction scores.

Materials and methods

Study Design

This is a prospective study done in a tertiary care hospital during July 2016 to November 2018 in Department of Emergency Medicine. A total of 80 patients presented to emergency department with Community acquired pneumonia are selected for the study.

Inclusion Criteria

1. Signs and symptoms suggestive of Community Acquired Pneumonia.
2. Evaluation variables performed with in 24 hrs.

Exclusion Criteria

1. Age <18 and >80 years.
2. Previously admitted in a hospital for >48.
3. Presence of structural lung disease.
4. Broad-spectrum antibiotic therapy (lasted for at least 7 days in the past month).
5. Corticosteroid therapy with at least 10mg of prednisone per day.
6. Malnutrition.
7. Neutropenic patients.

8. Chemotherapy patients.
9. Patients with HIV related disorders.
10. Transplant recipients.

Results

Age distribution: Among patients studied there were totally 80 patients among which maximum number of patients 42 patients belong to age group between 51-70 (52.5%) followed by 21 patients between age 31-50 (26.3%). 5 patients belong to age < 30 (6.3%) and 12 (15%) patients belong to age >70 as shown in the table. The mean age of the study is 57.5 ± 14.78 .

Smoking distribution: 48.75% patients has smoking as risk factor and 51.25% patients do not have smoking as risk factor. Among 55% of male 75% males have smoking as a risk factor.

Comorbidities: The most common comorbid condition is hypertension in 46 patients followed by diabetes mellitus in 36 patients, COPD in 20 patients, Cerebrovascular accident in 8 patients, Coronary artery disease in 5 patients, Tuberculosis and Chronic kidney disease in one patient each.

Distribution of need of vasopressors: In present study among 80 patients 20 (25%) patients required vasopressor support.

Ventilator support: Need for ventilator support studied among the patients studied among 80 patients 52 (65%) patients required ventilator support, which includes both invasive and non-invasive ventilation, and 28 (35%) patients did not require ventilator support.

Distribution of outcome: among 80 patients 70 (87.5%) patients was discharged and mortality was seen in 10 patients (12.5%).

Distribution of patients admitted in ICU and Ward: among 80 patients, 61 (76.3%) patients were admitted in ICU and 19 (23.8) patients were admitted in ward.

Table 1: Distribution of laboratory parameters of patient studied

Laboratory parameters	Number of patients (n=80)	Percentage (%)
<i>Blood urea ≥ 20 mmol/l</i>		
Yes	75	93.75
No	5	6.25
<i>Sodium ≤ 130</i>		
Yes	18	22.5
No	62	77.5
<i>RBS >250</i>		

Yes	40	50.0
No	40	50.0
<i>HCT ≤ 30%</i>		
Yes	42	52.5
No	38	47.5
<i>Ph ≤ 7.35</i>		
Yes	33	41.25
No	47	58.75
<i>Serum Albumin (< 35)</i>		
Yes	16	20.0
No	64	80.0
<i>Pleural effusion</i>		
Yes	38	47.5
No	42	52.5
<i>Chest X-Ray (ML)</i>		
Yes	39	48.75
No	41	51.25

SMART_COP score: 36 patients belong to low risk, 21 patients to moderate risk, 10 (12.5%) patients to high risk and 13 patients (16.3%) belonged to very high risk need of IRVS.

CURB65 score: among patients studied 10 (12.5%) belonged to Class 0, 24 (30.0) patients belonged to Class 1, 30 patients (37.5%) belonged to class 2, 11 (13.8%) patients belonged to class 3, 3 (3.8%) patients belonged to class 4, 2(2.5%) patients belonged to class 5.

SCAP_MAJOR score: among 80 patients 19 (23.75%) patients were met with SCAP major criteria.

SCAP_MINOR score: among 80 patients 36 (45%) patients were met with SCAP minor criteria.

ATS_MAJOR score: among 80 patients 16 (20%) patients were met with ATS/IDSA major criteria.

ATS/IDSA minor criteria: 34 (42.5%) patients were met with ATS/IDSA minor criteria.

Sputum Culture: 25 patients had shown streptococcus in culture, 18 pts had shown staphylococcus, 14 had shown klebsiella, 3 had shown E.coli, pseudomonas is seen in 12 and others in 9 pts.

Table 2: Comparison of various clinical variables with SMART COP

Clinical Variables	SMART_COP_GRP (Mean ± SD)					F Value	p Value
	Low Risk [n = 36]	Moderate Risk [n = 21]	High Risk [n = 10]	Very High Risk [n = 13]	Total [n = 80]		
AGE	59.36 ± 13.55	56.14 ± 15.76	53.3 ± 18.73	57.77 ± 14	57.5 ± 14.78	0.51	0.68
GCS	15 ± 0.0	14.43 ± 2.4	15 ± 0.0	14.38 ± 1.66	14.75 ± 1.4	1.16	0.33
SBP	124.72 ± 22.36	130.95 ± 28.62	104 ± 30.98	90.77 ± 32.26	118.25 ± 30.14	7.71	0.00**
DBP	76.67 ± 13.31	77.62 ± 14.8	63 ± 17.67	55.38 ± 18.98	71.75 ± 17.27	8.35	0.00**
HR	111.28 ± 18.95	109.19 ± 21.46	101.2 ± 23.4	137.54 ± 20.25	113.74 ± 22.84	7.68	0.00**
RR	31.83 ± 9.69	35.33 ± 8.74	33.6 ± 9.16	44.31 ± 4.33	35 ± 9.62	6.60	0.00**
TEMP	99.49 ± 1.29	99.2 ± 1.2	99.08 ± 1.01	100.34 ± 1.3	99.5 ± 1.28	2.79	0.049*
CBG	242.42 ± 102.05	220 ± 110.46	201.8 ± 91.02	242.46 ± 119.8	231.46 ± 105.11	0.52	0.67
HB	11.19 ± 2.03	10.78 ± 2.51	9.97 ± 1.52	10.78 ± 2.67	10.86 ± 2.22	0.81	0.49
TC	15950 ± 5218.95	16023.81 ± 4972.01	11440 ± 4021.66	16669.23 ± 8292.1	15522.5 ± 5752.29	2.05	0.11
PLT	227388.89 ± 85624.86	272519.05 ± 152938.77	275110 ± 104657.37	238823.08 ± 141591.16	247058.75 ± 117992.64	0.86	0.46
UREA	45.69 ± 24.28	56.51 ± 40.76	47.82 ± 28.95	67.5 ± 43.46	52.34 ± 33.61	1.55	0.21
S_CR	1.36 ± 0.61	1.55 ± 0.92	1.63 ± 1.02	2.18 ± 1.58	1.58 ± 0.98	2.38	0.08
NA	133.14 ± 8.21	135.95 ± 9.16	137.1 ± 4.68	135.38 ± 6.69	134.74 ± 7.92	0.98	0.41
K	4 ± 0.65	3.87 ± 0.9	4.35 ± 0.47	4.38 ± 0.53	4.07 ± 0.71	2.16	0.10
CL	96.86 ± 3.85	94.86 ± 20.12	97.4 ± 3.63	99.15 ± 4.52	96.78 ± 10.75	0.44	0.73
HCT	31.14 ± 4	30.33 ± 4.76	29.2 ± 2.62	31.92 ± 5.27	30.81 ± 4.3	0.91	0.44
S_ALB	40.01 ± 6.12	40.24 ± 3.16	36.5 ± 5.97	32.54 ± 3.91	38.42 ± 5.8	8.14	0.00**
Ph	7.4 ± 0.06	7.35 ± 0.1	7.31 ± 0.12	7.26 ± 0.12	7.35 ± 0.1	7.16	0.00**
pCO ₂	33.32 ± 7.18	34.17 ± 13.57	37.54 ± 13.25	38.02 ± 18.73	34.84 ± 12.1	0.67	0.58
pO ₂	163.73 ± 63.94	105.91 ± 54.36	88.29 ± 25.49	108.15 ± 43.64	130.09 ± 62.4	8.42	0.00**
HCO ₃	18.91 ± 3.89	19.83 ± 6.17	19.38 ± 4.93	18.65 ± 7.77	19.17 ± 5.33	0.18	0.91
SaO ₂	98.41 ± 3.34	95.64 ± 4.18	95.06 ± 5.26	93.41 ± 5.41	96.45 ± 4.55	5.52	0.00**
LAC	1.54 ± 0.94	2.07 ± 0.79	2.19 ± 1.37	4.91 ± 1.44	2.31 ± 1.57	32.83	0.00**
LOS	5.19 ± 1.65	5.62 ± 1.16	6.6 ± 1.35	6.31 ± 3.2	5.66 ± 1.9	2.14	0.10

*p < 0.05 - Significant, **p < 0.0001 - Very High Significant

Table 3: Comparison of various clinical variables with CURB 65

Clinical Variables	CURB_65 [Mean ± SD]						Total [n = 80]	F Value	p Value
	0.0 [n = 10]	1.0 [n = 24]	2.0 [n = 30]	3.0 [n = 11]	4.0 [n = 3]	5.0 [n = 2]			
AGE	54.7 ± 10.92	52.5 ± 15.15	57.17 ± 15.66	67.36 ± 9.41	73.33 ± 10.41	58.5 ± 13.44	57.5 ± 14.78	2.52	0.04*
GCS	15 ± 0	14.5 ± 2.25	14.97 ± 0.18	14.45 ± 1.81	15 ± 0	14.5 ± 0.71	14.75 ± 1.4	0.47	0.80
SBP	116 ± 10.75	132.08 ± 27.5	111.67 ± 28.9	126.36 ± 37.76	76.67 ± 5.77	80 ± 0	118.25 ± 30.14	3.84	0.00**
DBP	74 ± 12.65	78.33 ± 14.04	68.33 ± 17.24	74.55 ± 22.07	50 ± 0	50 ± 14.14	71.75 ± 17.27	2.93	0.02*
HR	98.7 ± 18.1	108.13 ± 20.11	114.73 ± 18.52	133.18 ± 26.74	129.67 ± 31.79	110.5 ± 43.13	113.74 ± 22.84	3.56	0.01*
RR	26.7 ± 6.04	34.25 ± 9.74	34.87 ± 10.14	40.09 ± 4.41	43 ± 7.55	47.5 ± 3.54	35 ± 9.62	3.80	0.00**
TEMP	99.56 ± 1.33	99.31 ± 1.28	99.27 ± 1.15	100.09 ± 1.54	100.2 ± 1.39	100.5 ± 0.71	99.5 ± 1.28	1.20	0.32
CBG	228.5 ± 97.22	225.33 ± 113.18	236.07 ± 110.5	234.82 ± 95.34	214.33 ± 78.36	258 ± 178.19	231.46 ± 105.11	0.07	1.00
HB	10.86 ± 1.78	11.3 ± 2.08	10.25 ± 2.12	11 ± 2.89	11.4 ± 3.14	13.3 ± 0	10.86 ± 2.22	1.17	0.33
TC	14320 ± 3651.73	15150 ± 4815.64	14203.33 ± 6423.1	19636.36 ± 5529.24	21366.67 ± 6619.92	14400 ± 3111.27	15522.5 ± 5752.29	2.37	0.047*
PLT	220400 ± 83764.48	271754.17 ± 140662.83	240130 ± 110470.64	245336.36 ± 134294.25	239666.67 ± 102163.27	208500 ± 12020.82	247058.75 ± 117992.64	0.36	0.87
UREA	34.41 ± 18.91	38.07 ± 28.92	52.97 ± 28.19	90.72 ± 36.28	82.33 ± 33.71	47.75 ± 35	52.34 ± 33.61	6.44	0.00**
S_CR	1.07 ± 0.84	1.08 ± 0.44	1.78 ± 0.84	2.28 ± 1.55	2.67 ± 0.58	1.55 ± 1.06	1.58 ± 0.98	4.86	0.00**
NA	131.2 ± 6.18	136.08 ± 10.76	133.87 ± 6.66	136.09 ± 5.65	135 ± 4.58	141.5 ± 0.71	134.74 ± 7.92	0.96	0.45
K	3.92 ± 0.52	3.99 ± 0.86	4.11 ± 0.73	4.11 ± 0.44	4.57 ± 0.8	4.25 ± 0.07	4.07 ± 0.71	0.48	0.79
CL	96.4 ± 4.2	94.5 ± 18.78	97.53 ± 3.95	98.36 ± 3.8	99.33 ± 3.06	102 ± 1.41	96.78 ± 10.75	0.41	0.84
HCT	29.6 ± 3.89	31.75 ± 4.75	29.77 ± 3.86	30.91 ± 3.59	32.33 ± 4.93	38.5 ± 0.71	30.81 ± 4.3	2.27	0.06
S_ALB	41.4 ± 1.84	40.33 ± 2.58	37.15 ± 7.52	38.36 ± 5.28	30.67 ± 3.06	31.5 ± 6.36	38.42 ± 5.8	3.44	0.01*
Ph	7.38 ± 0.06	7.39 ± 0.1	7.35 ± 0.11	7.29 ± 0.09	7.26 ± 0.13	7.33 ± 0.03	7.35 ± 0.1	2.19	0.07
pCO ₂	35.35 ± 9.26	34 ± 12.35	32.88 ± 10.67	44.66 ± 14.76	25.8 ± 12.17	31.1 ± 7.21	34.84 ± 12.1	2.15	0.07
pO ₂	152.51 ± 40.28	128.8 ± 69.22	125.25 ± 61.63	133.08 ± 73.31	136.2 ± 61.37	80.5 ± 21.92	130.09 ± 62.4	0.54	0.74
HCO ₃	20.5 ± 4.25	20.16 ± 5.57	18.09 ± 4.2	21.03 ± 7.08	13.33 ± 7.57	15.3 ± 0.42	19.17 ± 5.33	1.82	0.12
SaO ₂	99.5 ± 1.27	96.68 ± 3.56	96.67 ± 4.01	93.03 ± 7.47	96 ± 5.29	94.8 ± 3.96	96.45 ± 4.55	2.44	0.04*
LAC	1.24 ± 0.49	1.66 ± 0.75	2.38 ± 1.44	3.83 ± 2.03	4.33 ± 2.89	3 ± 1.41	2.31 ± 1.57	6.59	0.00**
LOS	5 ± 1.89	5.25 ± 1.54	5.73 ± 1.36	5.82 ± 1.99	6.33 ± 3.06	11 ± 4.24	5.66 ± 1.9	4.59	0.00**

*p < 0.05 - Significant, **p < 0.0001 - Very High Significant

Table 4: Comparison of various clinical variables with PSI GRP

Clinical Variables	PSI_GRP (Mean ± SD)				Total [n=80]	F Value	p Value
	Class-II [n=4]	Class-III [n=5]	Class-IV [n=53]	Class-V [n=18]			
AGE	66.25 ± 10.9	61.8 ± 4.32	53.32 ± 15.23	66.67 ± 10.64	57.5 ± 14.78	4.99	0.00**
GCS	15 ± 0	15 ± 0	14.74 ± 1.52	14.67 ± 1.41	14.75 ± 1.4	0.12	0.95
SBP	130 ± 34.64	128 ± 25.88	117.55 ± 28.75	115 ± 35.36	118.25 ± 30.14	0.45	0.72
DBP	75 ± 23.8	78 ± 10.95	71.89 ± 15.82	68.89 ± 21.66	71.75 ± 17.27	0.42	0.74
HR	98.75 ± 15.39	106.4 ± 16.02	108.77 ± 19.91	133.72 ± 23.27	113.74 ± 22.84	7.76	0.00**
RR	21.75 ± 3.95	26.2 ± 5.97	34.09 ± 9.08	43.06 ± 5.57	35 ± 9.62	11.65	0.00**
TEMP	99.15 ± 1.24	99.16 ± 0.77	99.39 ± 1.27	99.99 ± 1.39	99.5 ± 1.28	1.23	0.31
CBG	131.5 ± 11.36	197.2 ± 64.92	222.55 ± 102.15	289.44 ± 109.11	231.46 ± 105.11	3.68	0.02*
HB	11.23 ± 1.61	12.18 ± 0.86	10.84 ± 2.13	10.48 ± 2.77	10.86 ± 2.22	0.80	0.50
TC	15250 ± 3570.71	11900 ± 2952.96	15162.26 ± 5512.16	17650 ± 6888.46	15522.5 ± 5752.29	1.59	0.20
PLT	241500 ± 87857.84	231800 ± 85106.99	254301.89 ± 122261.65	231205.56 ± 124107.53	247058.75 ± 117992.64	0.20	0.90
UREA	37.8 ± 9.38	37.46 ± 19.66	47.48 ± 29.81	74.03 ± 41.67	52.34 ± 33.61	3.81	0.01*
S_CR	1.25 ± 0.5	1.17 ± 0.26	1.51 ± 0.86	1.98 ± 1.36	1.58 ± 0.98	1.58	0.20
NA	143 ± 4.9	135.2 ± 7.79	134.49 ± 8.4	133.5 ± 6.25	134.74 ± 7.92	1.66	0.18
K	4.18 ± 0.69	3.42 ± 0.29	4.15 ± 0.79	4.01 ± 0.43	4.07 ± 0.71	1.76	0.16
CL	98.75 ± 4.57	97.6 ± 2.97	96.02 ± 12.89	98.33 ± 4.2	96.78 ± 10.75	0.26	0.85

HCT	31.75 ± 4.65	34 ± 3.39	30.7 ± 4.26	30.06 ± 4.45	30.81 ± 4.3	1.19	0.32
S_ALB	39.75 ± 4.27	41.8 ± 2.05	38.44 ± 6.35	37.11 ± 4.85	38.42 ± 5.8	0.94	0.43
Ph	7.41 ± 0.04	7.43 ± 0.04	7.36 ± 0.1	7.3 ± 0.11	7.35 ± 0.1	3.36	0.02*
pCO ₂	35.58 ± 6.79	32.26 ± 6.48	32.07 ± 10.91	43.53 ± 13.89	34.84 ± 12.1	4.67	0.01*
pO ₂	124.33 ± 97.21	140.16 ± 62.69	125.87 ± 59.01	140.99 ± 68.06	130.09 ± 62.4	0.31	0.82
HCO ₃	20.75 ± 1.58	21.04 ± 4.75	18.71 ± 5.38	19.65 ± 5.96	19.17 ± 5.33	0.49	0.69
SaO ₂	97 ± 2.58	98.2 ± 2.68	97.06 ± 3.51	94.05 ± 6.87	96.45 ± 4.55	2.38	0.08
LAC	1.03 ± 0.45	0.9 ± 0.64	2 ± 1.16	3.91 ± 1.81	2.31 ± 1.57	13.39	0.00**
LOS	3.75 ± 2.75	4.6 ± 0.55	5.98 ± 1.77	5.44 ± 2.04	5.66 ± 1.9	2.61	0.06

*p < 0.05 - Significant, **p < 0.0001 - Very High Significant

Table 5: Comparison of various clinical variables with SCAP MAJOT

Clinical Variables	SCAP_MAJOR [Mean + SD]			t Value	P Value
	No [n=61]	Yes [n=19]	Total [n=80]		
AGE	58.25 ± 15.02	55.11 ± 14.1	57.5 ± 14.78	0.81	0.42
GCS	14.98 ± 0.13	14 ± 2.79	14.75 ± 1.4	1.54	0.14
SBP	126.39 ± 23.6	92.11 ± 34.41	118.25 ± 30.14	4.93	0.00**
DBP	76.72 ± 13.87	55.79 ± 17.74	71.75 ± 17.27	5.36	0.00**
HR	109.59 ± 20.25	127.05 ± 26.04	113.74 ± 22.84	-3.06	0.00**
RR	32.82 ± 9.09	42 ± 7.9	35 ± 9.62	-3.96	0.00**
TEMP	99.31 ± 1.23	100.12 ± 1.28	99.5 ± 1.28	-2.43	0.02*
CBG	229.62 ± 98.81	237.37 ± 126.07	231.46 ± 105.11	-0.28	0.78
HB	10.86 ± 2.07	10.89 ± 2.71	10.86 ± 2.22	-0.05	0.96
TC	15455.74 ± 5187.28	15736.84 ± 7447.61	15522.5 ± 5752.29	-0.19	0.85
PLT	242672.13 ± 114775.12	261142.11 ± 130067.7	247058.75 ± 117992.64	-0.59	0.56
UREA	50.37 ± 31.8	58.66 ± 39.12	52.34 ± 33.61	-0.94	0.35
S_CR	1.45 ± 0.77	1.99 ± 1.41	1.58 ± 0.98	-1.60	0.12
NA	134.36 ± 8.47	135.95 ± 5.84	134.74 ± 7.92	-0.76	0.45
K	3.99 ± 0.73	4.34 ± 0.58	4.07 ± 0.71	-1.90	0.06
CL	96.18 ± 12.08	98.68 ± 3.96	96.78 ± 10.75	-0.89	0.38
HCT	30.64 ± 3.84	31.37 ± 5.6	30.81 ± 4.3	-0.53	0.60
S_ALB	40.24 ± 5.06	32.58 ± 3.92	38.42 ± 5.8	6.05	0.00**
Ph	7.38 ± 0.08	7.26 ± 0.12	7.35 ± 0.1	3.96	0.00**
pCO ₂	33.8 ± 9.33	38.16 ± 18.37	34.84 ± 12.1	-1.00	0.33
pO ₂	137.42 ± 66.8	106.56 ± 38.03	130.09 ± 62.4	2.53	0.01*
HCO ₃	19.69 ± 4.71	17.51 ± 6.86	19.17 ± 5.33	1.57	0.12
SaO ₂	97.26 ± 3.97	93.86 ± 5.38	96.45 ± 4.55	2.98	0.00**
LAC	1.75 ± 0.95	4.1 ± 1.84	2.31 ± 1.57	-5.35	0.00**
LOS	5.52 ± 1.42	6.11 ± 2.96	5.66 ± 1.9	-0.83	0.42

*p < 0.05 - Significant, **p < 0.0001 - Very High Significant

In the present study among 80 patients 36 patients had ATS/IDSA minor criteria and 44 patients did not have minor criteria. The mean age for patients who had minor criteria was 56.47 ± 14.08. The mean SBP for patients who had minor criteria was 110. ± 37.25. The mean DBP for patients who had minor criteria was 67.35 ± 20.5. The mean HR for patients who had minor criteria was 123.5 ± 23.8. The mean RR for patients who had major criteria was 39.88 ± 7.46. The mean temperature for patients who had minor criteria was 99.73 ± 1.29. The mean serum

creatinine for patients who had minor criteria was 2.02 ± 1.22. The mean serum albumin for patients who had minor criteria was 35.85 ± 5.34. The mean serum blood urea nitrogen for patients who had minor criteria was 68.65 ± 39.34. The mean pH for patients who had minor criteria was 7.3 ± 0.12. The mean partial pressure of oxygen for patients who had minor criteria was 108.82 ± 51.68. The mean saturation of oxygen for patients who had minor criteria was 94.48 ± 5.49. The mean lactate for patients who had minor criteria was 3.17 ± 1.88.

Table 6: Area under the ROC curve (AUC) for Vasopressor with SMART COP, CURB 65, PSI, SCAP (Major, Minor) and ATS (Major, Minor).

Test Result Variable(s)	Area	Std. Error	P Value	95% Confidence Interval	
				Lower Bound	Upper Bound
SMART_COP	0.885	0.053	<0.0001	0.780	0.989
CURB_65	0.815	0.051	<0.0001	0.715	0.914
PSI	0.829	0.049	<0.0001	0.733	0.926
SCAP_MAJOR	0.867	0.060	<0.0001	0.750	0.983
SCAP_MINOR	0.800	0.054	<0.0001	0.694	0.906
ATS_MAJOR	0.833	0.064	<0.0001	0.708	0.959
ATS_MINOR	0.817	0.053	<0.0001	0.713	0.920

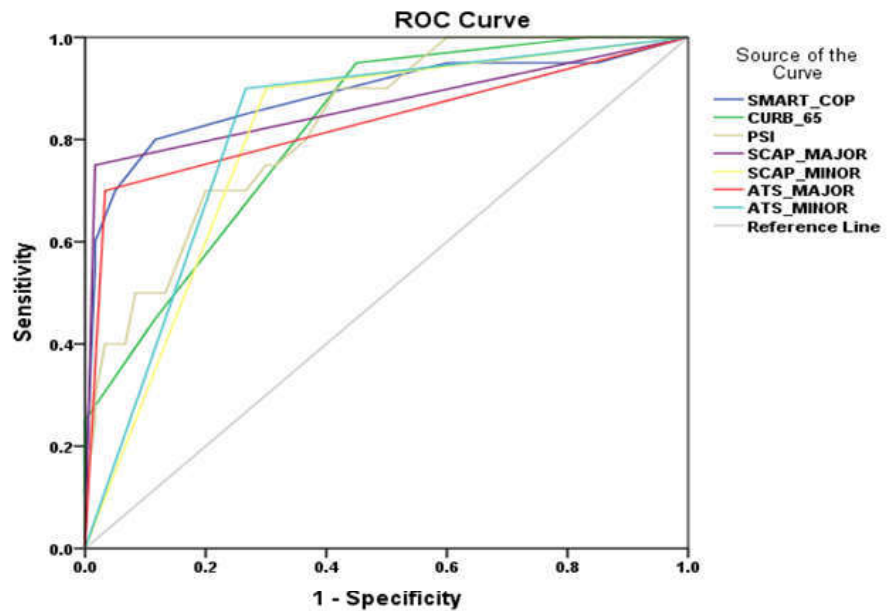


Fig. 1: Receiver operating characteristic (ROC) curves for Vasopressor with SMART COP, CURB 65, PSI, SCAP (Major, Minor) and ATS (Major, Minor)

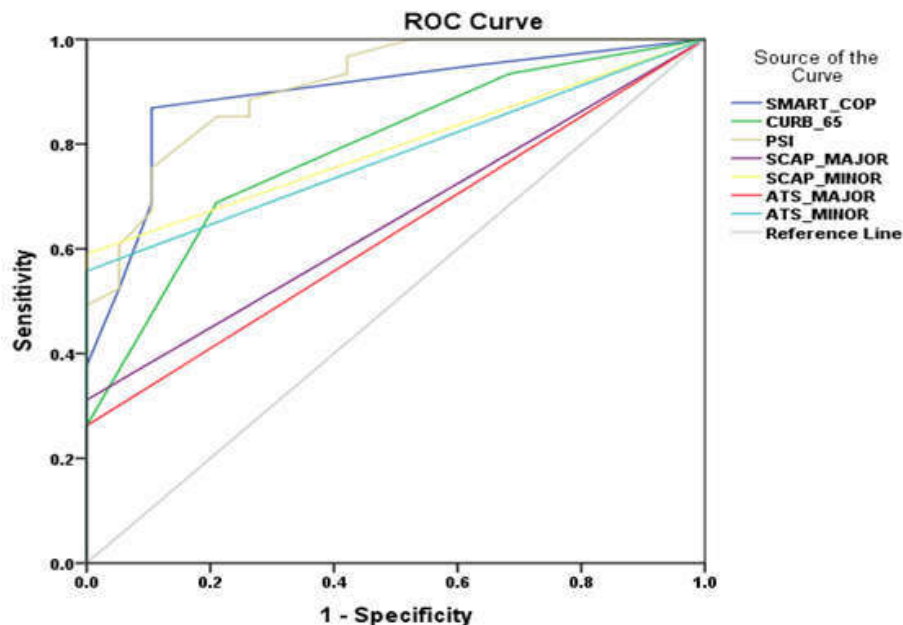


Fig. 2: Receiver operating characteristic (ROC) curves for Admit_in (ICU) with SMART COP, CURB 65, PSI, SCAP (Major, Minor) and ATS (Major, Minor).

ROC curve to predict ICU admission among different score studied. PSI was sensitive to predict ICU admission when compared to other pneumonia severity scores. Area under curve for PSI is 0.91 where as SMART COP is 0.89, CURB65 is 0.79, SCAP major criteria is 0.65, minor criteria is 0.79, ATS/IDSA minor criteria was 0.77, major criteria was 0.63. p value of SMART_COP, CURB65,PSI, SCAP minor and ATS/IDSA minor criteria was very high significant i.e, <0.0001 and p value of SCAP major criteria 0.041 and ATS major criteria was 0.086.

ROC curve to predict mortality among different score studied. PSI was sensitive to predict mortality when compared to other pneumonia severity scores. Area under curve for PSI is 0.936 where as SMART COP is 0.89, CURB65 is 0.828, SCAP major criteria is 0.92, minor criteria is 0.81, ATS/IDSA minor criteria was 0.82, major criteria was 0.84. P value of SMART_COP, CURB65, PSI, SCAP major/minor and ATS/IDSA major/minor criteria was very high significant i.e, p<0.0001 (Table 7).

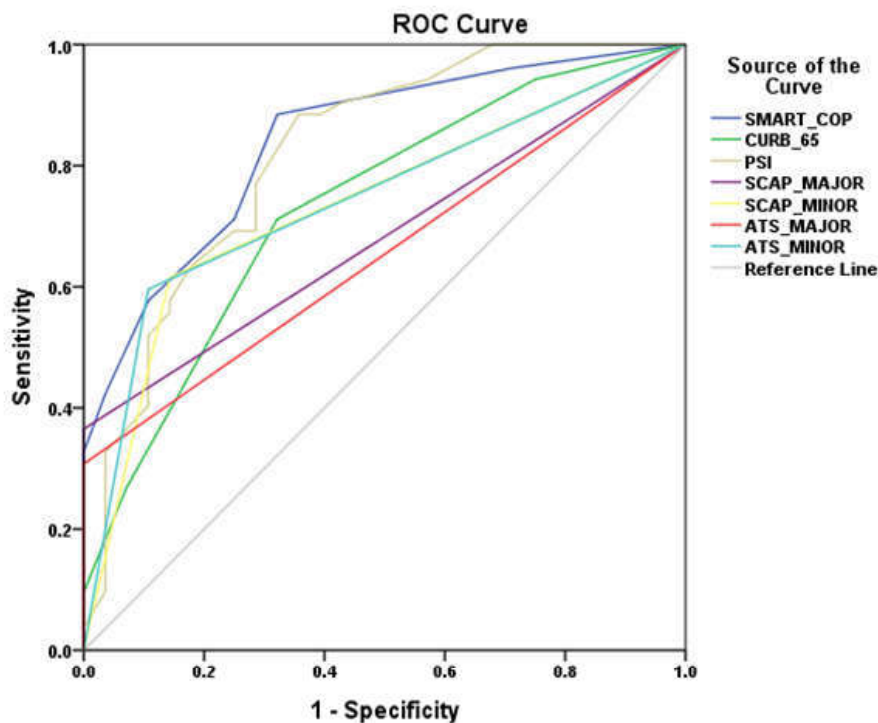


Fig. 3: Receiver operating characteristic (ROC) curves for Ventilator support with SMART COP, CURB 65, PSI, SCAP and ATS.

Table 7: Area under the ROC curve (AUC) for outcome with SMART COP, CURB 65, PSI, SCAP (Major, Minor) and ATS (Major, Minor).

Test Result Variable(s)	Area	Std. Error	p Value	95% Confidence Interval	
				Lower Bound	Upper Bound
SMART_COP	0.891	0.088	<0.0001 VHS	0.719	10.000
CURB_65	0.828	0.056	0.001 SIG	0.718	0.938
PSI	0.936	0.027	<0.0001 VHS	0.883	0.988
SCAP_MAJOR	0.926	0.036	<0.0001 VHS	0.855	0.996
SCAP_MINOR	0.814	0.050	0.001 SIG	0.716	0.912
ATS_MAJOR	0.843	0.077	<0.0001 VHS	0.692	0.994
ATS_MINOR	0.829	0.048	0.001 SIG	0.735	0.922

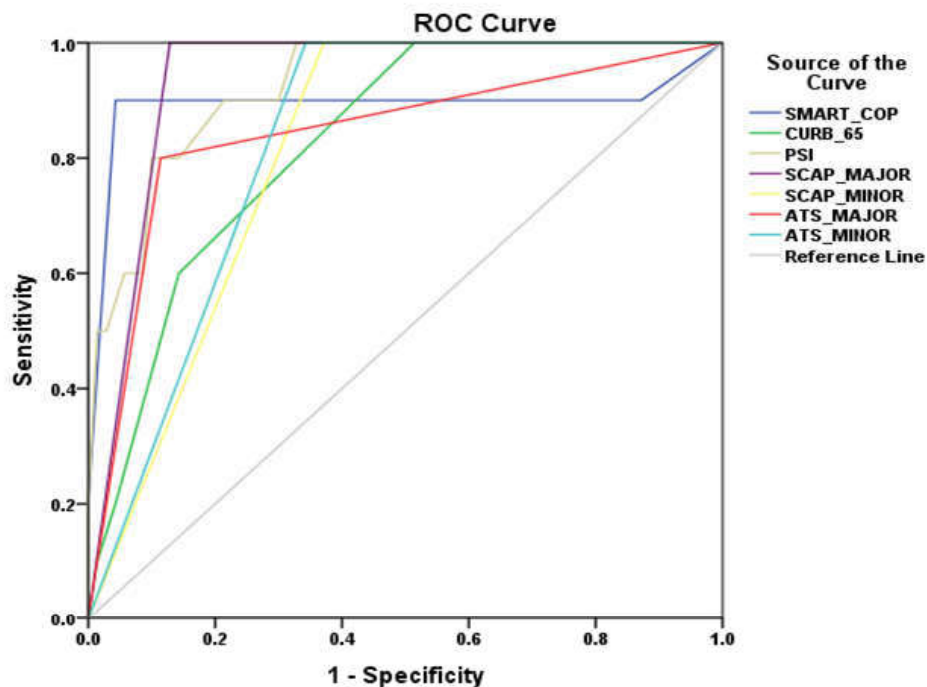


Fig. 4: Receiver operating characteristic (ROC) curves for outcome with SMART COP, CURB 65, PSI, SCAP and ATS.

Discussion

In present study (n=80), 5 (6.3%) patients were <30 years, 21 patients (26.3%) were between 31-50 years, 42 (52.5%) patients are between 51-70 years, 12 (15%) patients are greater than 70 years of age. In this study group majority of patients were between 51-70 years.

In a study by Vidyasagar et al. [12] majority of subjects (70%) were less than 60 yrs of age with 30% in the age group > 60 years. 25% were in 51 to 60 years. In the present study, 55% were males, and 45% were females.

The most common comorbidity of patients associated with CAP was hypertension in 46 patients. In a study conducted by Babu et al. (2017) [13] the major comorbidities of patients associated with CAP were chronic renal failure (40%), congestive heart failure (30%), and chronic liver failure (25%).

Among 80 patients, 25 patients had shown streptococcus in culture, 18 pts had shown staphylococcus, 14 had shown Klebsiella, 3 had shown E.coli, Pseudomonas is seen in 12 and others in 9 patients respectively.

In a study by Vidyasagar et al. (2015) [12] out of 95 patients, 34 subjects (42.5%) were admitted in ICU, 32.5% of subjects were put on ventilator support.

In present study, 61 (76.3%) patients were admitted in ICU and 19 (23.8) patients were admitted in ward. Study done by Man et al. (2007) [2] demonstrated that prospective comparison of three predictive rules for assessing severity of community-acquired pneumonia The ICU admission rate of low-risk groups was 2.7% in PSI, 2.3% in CURB65.

In a study done Shah et al. (2009) [1] to validate Pneumonia Severity Index and CURB-65 Severity Scoring Systems in Community Acquired Pneumonia in an Indian Setting out of 130 patients 35 patients required ICU admission.

Out of 80 patients, mortality is seen in 10 patients (12.5%). In a study by Eldaboosy et al. (2015) [14], the mortality rate in this study was 10% and mortality was higher in the elderly and patients with comorbidities.

In a study done by Shah et al. (2009) [1] to Validate Pneumonia Severity Index and CURB-65 Severity Scoring Systems in Community Acquired Pneumonia in an Indian Setting out of 150 patients mortality was seen in 16 patients.

In present study, 20 patients required Vasopressor support. In a study done by Chalmers et al. (2008) [15] in Predicting the Need for Inotropic Support for Young Adults Admitted to the Hospital with Community-Acquired Pneumonia.

AUC value to predict the need of vasopressor among different group studied SMART_COP score has highest AUC value to predict the need of vasopressor support i.e. 0.88. AUC value for CURB_65 is 0.81, PSI is 0.82, SCAP major /minor 0.86/0.80, ATS/IDSA major and minor criteria is 0.83/0.81.

In Australian CAP Charles et al. (2008) [16] studies A SMART-COP has highest AUC value (0.87) to predict the need of vasopressor support. Whereas the AUC value for PSI is 0.69 and CURB_65 is 0.67. The AUC values correlates with present study.(31).

Marti et al. (2012) [17], performed a meta-analysis comparing different scoring systems in pneumonia prognosis. They concluded that new severity scores for CAP in predicting the need for IRVS or ICU admission (ATS/IDSA 2007 minor criteria, SCAP score and SMART- COP), had better discriminative performance in comparison to the previous ones (PSI and CURB-65).

In present study, 61 patients required ICU admission. 36 patients belong to low risk group and among them 19 patients required ICU admission.

Among 80, 16 patients had major criteria and all patients required ICU admission. 34 patients had minor criteria and 34 patients required ICU admission.

Among different scores used to predict ventilator support in patients admitting to ER PSI has more AUC to predict ICU admission.

In a study by Splinder et al. (2006) [18] to evaluate the accuracy of score systems. The need for ICU treatment was significantly higher ($P < 0.0001$) in high-risk than in low-risk patients for two severity scores: 19 out of 53 (35.8%) versus one out of 61 (1.6%) for PSI; 12 out of 22 (54.5%) versus eight out of 92 (8.7%) for CURB-65.

In a study done by Pereira et al (2012) [8] to assess severity of patients with community acquired of pneumonia, a ROC value for predicting ICU admission in patients with CAP PSI was 0.86, curb 65 was 0.79 ATS/IDSA was 0.82, SMARTCOP 0.83, SCAP 0.75. The value of the study correlates with present study.

In a study done by Singanayagam et al. (2009) [19] in severity assessment of SCAP AUC value to predict ICU admission are 0.87, 0.77, 0.80 for SMART_COP, CURB_65, PSI respectively.

In present study among 80 patients 52 patients required ventilator support. In present study among 80 patients mortality was seen in 10 patients and 70 patients were discharged home.

In distribution of patients in SMART_COP, 36 patients belong to low risk group and 21 patients belong to moderate risk group, 10 patients belong to high risk group, only 1 patient of low risk group had mortality 13 patients belong to very high risk group and mortality was seen in 9 patients.

In distribution of patients in CURB_65, among 80 patients 10 patients has score 0 and, 24 patients has score 1 and no mortality was seen in both scores, 30 patients has score 2 and mortality was seen in 4 patients, 11 patients has score 3 and mortality was seen in 4 patients, 3 patients has score 4 and mortality was seen in 1 patient, 2 patients has score 5 and mortality was seen in 1 patient.

In distribution of patients in PSI, among 80 patients no patient belonged to class 1, 4 patients belonged to class 2, 5 patients belonged to class 3 and no mortality was seen in first 3 classes, 53 patients belonged to class 4 and 2 patients had mortality, 18 patients belonged to class 5 and 8 patients had mortality.

In distribution of patients in ATS/IDSA, among 80 16 patients had major criteria and mortality was seen in 8 patients. 34 patients had minor criteria and mortality was seen in 10 patients.

In distribution of patients in SCAP, among 80 19 patients had major criteria and mortality was seen in 10 patients. 36 patients had minor criteria and mortality was seen in 10 patients. Among different scores used to predict ventilator support in patients admitting to Emergency department PSI has more AUC value to predict outcome. PSI has AUC of 0.93 where as CURB65 has 0.82 SMART_COP has 0.89, major criteria of SCAP has 0.92 minor criteria of SCAP has 0.81, major criteria of ATS/IDSA has 0.84, minor criteria of ATS/IDSA has 0.82. P value for SMART_ COP, PSI, SCAP major criteria, SCAP minor criteria, ATS/IDSA major and minor criteria have very high significant P value < 0.0001 , whereas CURB 65 have P value of 0.13.

In a study done by Pereira et al. (2012) [8] to assess severity of patients with community acquired of pneumonia, AUC value for predicting mortality in patients with CAP PSI was 0.89, CURB_ 65 was 0.87, ATS/IDSA was 0.67, SMART_COP and SCAP were not assessed.

Conclusion

SMART_COP and PSI can be used to determine the severity and prognosis of the patients presenting to Emergency Department with Community acquired pneumonia. Early microbiological diagnosis, early

antibiotic administration in patients with SMART_COP score > 4 and PSI class 4 and 5 can decrease the morbidity and mortality in CAP patients.

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