

# Outcome evaluation in CAP using Pneumonia Outcome Research Team (PORT) severity index

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## ABSTRACT

The community acquired pneumonia is a potentially serious condition and it is difficult to predict outcome in these cases. The present study is aimed at evaluating pneumonia patients' outcome research team (PORT) severity index in cases of pneumonia and to evaluate this system for length of hospital stay, complications and mortality in cases of community acquired pneumonia.

The study included 90 cases of community acquired pneumonia. This was a prospective cross sectional study carried over the period of two years. The mean age of cases studied was 41.95 years in males and 37.50 years in females. The male to female was 7:3. The class I severity index was noticed in 26.67% cases; class II in 36.67%, 25.55% in class III and 11.11% in class IV severity.

The mortality was noticed in 2.22% cases. Various complications were noticed 17.77% cases. They were present in cases with class II, III and class IV and further were present in 80% cases with class IV. The complications increased as the severity index increased.

The average length of stay was 12.43 days. The length of stay was variable with the class of severity. The length of stay was directly proportional to class of severity.

The PORT severity index is useful to assess mortality, complications and length of stay in hospital.

## INTRODUCTION

Pneumonia has been recognized as a common and potentially lethal condition for nearly two centuries. Community acquired pneumonia (CAP) continues to be a common and serious illness<sup>(1)</sup>. The risk factors for CAP include alcoholism, asthma, immunosuppression, age more than 70 years and hospitalization<sup>(2)</sup>.

Initial management of patients suspected of having CAP is challenging because of broad range of clinical presentation, potential life threatening nature of illness and associated high cost of care<sup>(3)</sup>.

Approaches to severity assessment of CAP are slowly evolving. Early studies used prediction tools developed for other conditions such as the simplified acute physiologic score (SAPS) and appropriateness evaluation protocol (AEP). But these were found to be impractical or less than CAP specific tools<sup>(4)</sup>. Subsequent studies used three main approaches to development of CAP specific tools often directed towards management decisions. The important ones are British Thoracic Society (BTS) rules, the American Thoracic Society (ATS) rules and Pneumonia Severity index (PSI)<sup>(2)</sup>. The PSI is based on 20 criteria and was developed to identify less severely ill patients who might safely be managed at home. The Pennsylvania Medis Group data based study confirmed to prognostic importance of old age, vital sign abnormalities and altered mental status<sup>(5)</sup>.

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Fine et al (1993)<sup>(4)</sup> added further twelve more factors and included nursing home residence, history of liver disease, history of congestive cardiac failure, cerebrovascular episode, renal disease, temperature  $<35^{\circ}\text{C}$  or  $>40^{\circ}\text{C}$ , pulse rate  $>125$  per minute, arterial pH  $<7.35$ , serum sodium  $<130\text{mEq/liter}$ , blood Glucose  $>250\text{mg/DL}$ , hematocrit  $<30\%$  and pleural effusion on chest X-Ray.

Thus clinicians are faced with diagnostic and prognostic challenges in the initial management of Community Acquired Pneumonia<sup>(3)</sup>.

The present study is thus undertaken to study clinical variables in CAP using Pneumonia Patient Outcome Research Team (PORT) severity index and to correlate the PORT severity with final outcome of patients of pneumonia.

#### AIMS

The present study is undertaken to evaluate clinical variables in community acquired pneumonias (CAP) and to evaluate hospital outcome in patients with CAP using pneumonia patient outcome research team (PORT) severity index.

#### STUDY DESIGN

This is a prospective cross sectional study.

#### STUDY PERIOD

The study is carried out from October 2006 to September 2010.

#### INCLUSION CRITERIA

The study included all cases of CAP admitted at department of Medicine, Acharya Vinoba Bhave Rural Hospital and Jawaharlal Nehru Medical College, sawangi (Meghe), wardha, under Datta Meghe Institute of Medical Sciences (Deemed) university.

#### EXCLUSION CRITERIA

The study excluded a) all cases who were immunocomprised hosts b) All cases with sputum smear positivity for Acid Fast Bacilli and c) Cases with aspiration pneumonia acquired during hospitalization.

#### MATERIALS & METHODS

The present study included 90 cases of CAP admitted in department of Medicine, AVBR Hospital, Sawangi (Meghe), Wardha. All cases included in the study were examined. A detail clinical history, and general and systemic examination was carried out in all cases. A special stress was given on altered mental status, record of temperature, pulse rate, blood pressure, respiratory rate and signs of congestive cardiac failure. Efforts were also made to find out associated neoplastic disease, liver disease, renal disease or cerebrovascular episode. Systemic examination included localization of pneumonia and any evidence of pleural effusion.

All cases were investigated after clinical examination. These included sputum examination for gram stain, sputum culture and sensitivity and sputum for AFB. Hematocrit, Blood sugar estimation, blood urea Nitrogen (Blood urea/2.14) and serum sodium were also estimated. Arterial blood gas analysis was done in all cases to find out arterial pH and partial pressure of arterial oxygen (PPaO<sub>2</sub>). X Ray chest was done to localize pneumonia and any evidence of pleural effusion.

The PORT severity index was calculated in all cases<sup>(6)</sup>. The various parameters used in assessing PORT severity index are given in table number 1.

The different classes of severity were grouped as class I to class V based on PORT class of severity<sup>(6)</sup>. This is shown in table number 2.

All cases were followed up to discharge or death and outcome in these cases was evaluated. The various outcomes evaluated included length of stay in hospital, various complications and mortality. These outcomes were correlated with PORT severity index.

The data obtained was analyzed using the Z value and chi square tests<sup>(7)</sup>.

#### RESULTS

The present study included 90 cases of CAP admitted in Medicine wards of AVBR Hospital, sawangi (Meghe),

Wardha. The mean age of the cases studied was 41.95 years in males and 37.50 years in females. The male to female ratio was 7:3. Cough with or without expectoration and fever were the commonest presenting symptoms being noticed in 88.88% and 80% cases respectively. Sputum was muco purulent in most cases and was rusty only in 5.55% cases.

Sputum examination showed that Gram positive cocci in chains/pairs were isolated in 21.67% cases, Gram positive cocci in clusters in 18.33% cases and Gram negative rods in 16.67% cases. Gram staining did not show any organisms in 43.33% cases. Further staphylococcus aureus was isolated in 18.33% cases, alpha hemolytic streptococci in 8.33% cases, klebsiella pneumonia in 8.33% cases, P. aeruginosa in 6.67%, Group D streptococci in 3.33% and E. coli in 1.11% cases. The 53.33% cases did not show any growth.

Pneumonia patient outcome research team (PORT) severity index was calculated in all 90 cases. Table number 3 depicts these findings.

Radiological examination showed that 51.66% cases had right lung involvement, 41.67% cases had left lung involvement and 6.67% cases had bilateral lung involvement.

#### PORT SEVERITY INDEX

In the present study, out of 90 cases studied, severity index was calculated in all cases after obtaining PORT severity index. It was observed that out of 90 cases, stage I severity index was noticed in 26.67% cases, stage II severity index was present in 36.67% cases, stage III severity index was present in 25.55% cases and stage IV severity index was noticed in 11.11% cases. There was no case in stage V.

#### OUTCOME

The outcome was evaluated in all 90 cases. The mortality was noticed in 2 cases (2.22%). The remaining 88 cases (97.78%) recovered. The various complications developed included syn pneumonic effusion in 6 cases (6.66%), type I respiratory failure in 5 cases (5.55%), multi organ dysfunction syndrome in 4 cases (4.44%) and acute respiratory distress syndrome

in 2 cases (2.22%). ICU admissions were required in 11 cases (11.11%).

#### CORRELATION OF PORT SEVERITY INDEX WITH COMPLICATIONS

An attempt was made to correlate PORT severity index with complications. Various complications were noticed in 17 cases (17.77%). Table number 4 shows this correlation. It was observed that the complications were highest with stage IV severity (80%) and this was statistically significant. No case from stage I had any complications.

#### CORRELATION OF PORT SEVERITY INDEX WITH LENGTH OF STAY

The length of stay in the cases studied varied from 4 to 27 days with an average of 12.43 days. The average length of stay was variable with class of severity. Table number 5 depicts the findings. The average length of stay in cases with class IV severity was highest (14.40 days) compared with cases from class I severity (10.78 days). This was however statistically not significant.

#### CORRELATION OF PORT SEVERITY INDEX WITH MORTALITY

It was observed while correlating PORT severity index with mortality that out of 10 cases with stage IV severity, 2 cases (20%) died. The mortality was not associated with other class of severity.

#### DISCUSSION

The present study included 90 cases of CAP admitted in AVBR Hospital, sawangi (Meghe), Wardha. In the study various variables of pneumonia were measured with special interest on pneumonia patient outcome research team (PORT) severity classification.

The mean age of the cases studied was 41.95 years in males and 37.50 years in females. Marie et al (2002)<sup>(8)</sup> noticed mean age of 65.84 years while Bansal et al (2001)<sup>(9)</sup> notices 52.77 years as mean age. The male to female ratio in the present study was 7:3. This finding is contrary to those of Marie et al<sup>(8)</sup> and Lim et al (1999)<sup>(10)</sup> who had lower population of male cases.

The PORT severity scoring was calculated in all 90 cases. The range of PORT severity scoring was 7 to 125.

All cases were grouped in five classes of severity based on PORT score. It was observed that maximum cases i.e. 36.67% cases had class II severity while 26.67% cases had class I severity. Class III severity was observed in 25.55% cases while class IV severity was present in 11.11% cases. No case had class V severity. Marie et al<sup>(8)</sup> noticed 40% cases in class IV severity. Similar observations were also noticed by Lim et al<sup>(10)</sup> and Marras et al<sup>(11)</sup> who noticed 34% and 41.4% cases I class IV severity. The finding of 36.67% cases in class II severity was well comparable with Halm et al<sup>(12)</sup>.

The average length of stay was different in different classes of severity. It was 10.78 days in class I severity, 12.14 days in class II severity, 13.36 days in class III severity and 14.40 days in class IV severity. Thus the average length of stay was directly proportional to severity class of disease, but this was not statistically significant.

The average length of hospital stay is variable and is related to class of severity in most cases. The length of hospital stay is more with higher class of severity. In the present study the average length of stay was 12.43 days and it was highest i.e. 14.40 days with class IV severity. The average length of stay in all classes of severity was much higher in the study population compared to other workers (R. Menedoz (2001)<sup>(13)</sup>). Although this finding is similar to Marrie et al<sup>(8)</sup> who noticed 12.2 days as average length of stay of patients, most of the other workers noticed shorter hospital stay ranging from 7.25 days to 9.8 days (Yogish Pai<sup>(14)</sup>, Halm et al<sup>(12)</sup> and Menendez et al (2003)<sup>(15)</sup>). The probable explanations for longer mean length of stay in the present work are firstly, the patients were more seriously ill and secondly, most cases in the present work came from rural population with poor mode of transport and hence increased severity of disease in such cases.

The various complications were observed in class II, III and class IV severity. These included type I respiratory failure, acute respiratory distress syndrome and multi organ dysfunction syndromes. The numbers of complications were more with class IV PORT severity class IV. Class I did not show any complications. The

various complications occurred in 17.77% cases and included synpneumonic pleural effusion in 6.66% cases, type I respiratory failure in 5.55%, MODS in 4.44% and ARDS in 2.22% cases. The ICU admissions were required in 11.11% cases. Further of all the complications, 80% occurred in class IV severity and was statistically significant. The complications occurred in 26.08% cases from class III and 9.09% in class II severity however this was statistically not significant. The occurrence of various complications was also higher in present work compared to the work of Espana et al<sup>(16)</sup> who noticed very low occurrence of complications. This can be explained on the basis of more prolonged course and duration of stay in the study population in the present work.

### CONCLUSIONS

The community acquired pneumonia is a reversible process if treated promptly. The severity of the disease is difficult to predict and no single criteria is useful in predicting outcome in these cases. The PORT scoring system is useful to access severity of pneumonia. The grading of the disease is based on the severity index and assessing outcome of community acquired pneumonia.

The PORT severity index is also useful to assess hospital stay, complications and mortality in community acquired pneumonia.

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**Table 1: various parameters used for PORT severity Index**

Parameters	Parameters	Score
<b>AGE IN YEARS</b>	age in years >65	+10
	age in years <65	-10
<b>COEXISTING ILLNESS</b>	Neoplastic Disease	30
	Liver disease	20
	Cong. Heart failure	20
	Cerebrovasc. disease	10
	Renal disease	10
<b>PHYSICAL EXAMINATION</b>	Altered mental status	20
	Resp. Rate > 30/min	20
	Systolic BP <90 mm Hg	20
	Temp. <35 <sup>0</sup> c or >40 <sup>0</sup> c	15
	Pulse rate >125/ minute	10
<b>LABORATORY AND</b>	Arterial pH <7.35	30
<b>RADIOGRAPHIC FINDINGS</b>	Blood urea Nitrogen >30mg/dl	20
	Serum Sodium <130mEq/L	20
	Blood Glucose >250 mg/dl	
	Hematocrit <30%	10
	PPaO <sub>2</sub> < 60 mm Hg	10
	Pleural effusion	10

**Table 2: PORT class of severity**

Severity class	Score
Class I	<50
Class II	51 to 70
Class III	71 to 90
Class IV	91 to 130
Class V	>131

**Table 3 : Class of severity in patients studied based on PORT severity Index**

Class	No. of cases	percentage
Class I	24	26.67
Class II	33	36.67
Class III	23	25.55
Class IV	10	11.11
Class V	00	00
Total	90	100

**Table 4 : Correlation of PORT severity Index with complications**

Severity class	No. of cases	Complications	Percentage	Z - value
Class I	24	00	00	0.00
Class II	33	03	9.09	1.85 NS
Class III	23	62	6.08	1.96 NS
Class IV	10	8	80	3.46 Significant
Class V	00	00	00	00

**Table 5 : Correlation of PORT severity index with length of hospital stay**

PORT severity class	No. of cases	Length of stay	F - value
Class I	24	10.78 days	0.935
Class II	33	12.14 days	P value 0.430 NS
Class III	23	13.36	P value 0.44 NS
Class IV	10	14.40 days	P= >0.05
Class V	00	00	00

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