

Original Research Article

CLINICAL PROFILE OF PATIENTS WITH PNEUMONIA ADMITTED IN INTENSIVE CARE UNIT

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Received : 05/07/2026
Received in revised form : 07/08/2026
Accepted : 11/08/2026

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DOI: 10.70034/ijmedph.2026.3.498

Source of Support: Nil,
Conflict of Interest: None declared

Int J Med Pub Health
2026; 16 (3); 3195-3200

ABSTRACT

Background: When the word 'pneumonia' is used in medical practice, it almost always refers to a syndrome caused by acute infection, usually bacterial, characterized by clinical and /or radiographic signs of consolidation of a part or parts of one or both lungs. However, the use of the term has been greatly extended to include non-bacterial infection of the lungs caused by variety of microorganisms. The objective is to study the clinical spectrum and aetiology of pneumonia patients admitted in ICU of a tertiary care centre.

Materials and Methods: A prospective clinical observational study was conducted on 70 cases of pneumonia admitted in intensive care unit in the Department of Medicine at tertiary care hospital to study clinical profile of patients with pneumonia admitted in intensive care unit. Prior approval for the study and protocol was obtained from the institutional ethical committee.

Results: In our study, smoking was the most common risk factor for mortality followed by diabetes mellitus and alcoholism. Mortality was higher among patients having bilateral involvement. Right lung involvement was associated with better prognosis. Patients requiring invasive ventilation had poor prognosis. 50% of patients with Dengue shock syndrome succumbed due to ARDS. This attributes to fulminant progression of ARDS in these patients. Following dengue, H1N1 pneumonia was the next attributable cause of mortality (37.5%) followed by 35.29% among bacterial pneumonia patients.

Conclusion: Bacteria was the most common causative organism in patients admitted. Causative organisms were isolated on sputum culture in 50% patients; of which streptococcus pneumoniae was most common. Unilateral lung involvement was most common radiological finding, in which right sided lung involvement had better prognosis. Severe the Pneumonia severity index, longer was the hospital stay. ARDS was the most common complication, followed by AKI and septic shock. Dengue ARDS had the worst prognosis.

Keywords: Clinical Profile, Pneumonia, Intensive Care Unit.

INTRODUCTION

Records from the early part of the twentieth century show a steady decline in the reported mortality from pneumonia that antedated the arrival of antibiotics. At around 1950 and coinciding with the beginning of antibiotic era, the mortality rate leveled off and remained fairly constant. This mortality rate is heavily weighted against the elderly, so that death rates were 35 and 21 per 100,000 for men and women respectively aged 55-64 compared with 775 and 572 per 100,000 for those aged 75-80 years.

William Osler in year 1898 had described pneumonia in the elderly as 'The friend of the aged', allowing them a merciful relief from 'those cold gradations of decay that make the last state of all so distressing.'^[1]

The Infectious Diseases Society of America (IDSA) defines community-acquired pneumonia (CAP) as "an acute infection of the pulmonary parenchyma, i.e., associated with at least some symptoms of acute infection, accompanied by the presence of an acute infiltrate on a chest radiograph or auscultatory findings consistent with pneumonia (such as altered

breath sounds and or localized rales), in a patient not hospitalized or residing in a long-term care facility for more than 14 days before onset of symptoms.^[2]

Community acquired pneumonia is an acute illness acquired in the community with symptoms suggestive of LRTI. Together with presence of a chest radiograph of intra pulmonary shadowing which is likely to be new and has no clear alternative cause. The reported incidence rates of radiologically confirmed community acquired pneumonia in different populations varied between 1.3 – 11.6 cases per 1000 inhabitant - year with highest rates in elderly adults that is 13-15 cases per 1000 inhabitant-year. In developed countries almost one half of total hospitalization for pneumonia occurs in patients over 65 years and pneumonia is a leading cause of death in this age group.^[3]

The bacteriological profile of community-acquired pneumonia is different in different countries and changing with time within the same country, probably due to frequent use of antibiotics, changes in environmental pollution, increased awareness of the disease and changes in life expectancy. For instance Streptococcus pneumonia remains the commonest organism leading to community acquired pneumonia in most parts of Europe, United States, Britain, Iraq and Delhi.^[4] Klebsiella pneumoniae is the most common pathogen leading to admission to a medical intensive care unit in Singapore. The problem is much greater in the developing countries where pneumonia is the most common cause of hospital attendance in adults.⁴ In India also the etiological agent of CAP varies with geographical distribution.^[4,5] The overall mortality rate of pneumonia patients in out-patient settings is low, in the range of one to five per cent, but among patients who require admissions to ICU it approaches 25%. Also the mode of presentation and clinical spectrum of patients requiring admission in ICU is different from other pneumonia cases.^[6,7]

The present hospital based research was thus conducted to study the clinical spectrum and aetiology of pneumonia patients admitted in ICU of a tertiary care centre.

MATERIALS AND METHODS

A prospective clinical observational study was conducted on 70 cases of pneumonia admitted in intensive care unit in the Department of Medicine at tertiary care hospital to study clinical profile of patients with pneumonia admitted in intensive care unit. Prior approval for the study and protocol was obtained from the institutional ethical committee. After explaining the need of the investigations and the treatment options available, all the cases were included in the study. Informed written consent was obtained from responsible attendant before actual study was performed.

Inclusion Criteria

1. Patients with age >12 years,

2. Patients with clinical symptoms like fever, cough with or without expectoration, chest pain, breathlessness, haemoptysis.
3. Patients with clinical signs like tachypnoea, reduced chest movements, bronchial breath sounds, increased vocal fremitus and vocal resonance, crepitation's,
4. Patients with radiological evidence of pneumonia

Exclusion Criteria

1. Patients with age <12 years,
2. Hospital acquired pneumonia that is patient hospitalised in previous 14 days,
3. Lung malignancies,
4. Aspiration pneumonia.

Method of collection of data: Patient demographic features were recorded according to a predesigned and pretested questionnaire. A detailed clinical history was taken. History for comorbid illness and habits like smoking and alcoholism was noted. Comorbid illnesses were defined as presence of coexisting cardiac failure, ischaemic heart disease, chronic lung disease(COPD), hypertension, diabetes mellitus. A detailed clinical examination was carried out including general physical examination, vital signs, and respiratory system examination, mainly for signs of consolidation and other systemic examination for the comorbid conditions. Patients with clinical and radiological diagnosis of pneumonia underwent following investigations- Complete blood count, Chest radiograph, ECG, Arterial blood gas analysis. RFT, LFT, Serum electrolytes, Sputum for Acid fast bacilli, gram staining and culture, Random blood sugar, Throat swab for H1N1, Urine routine and microscopy Below investigations as necessary

- Dengue IgM, NS1, Malaria antigen, Leptospira IgM, HIV ELISA and Blood culture

The diagnosis made in each of these cases was noted down. The patients were classified according to PSI score classification. The patients were given a different group of antibiotics according to their general condition and had given supportive treatment according to their investigation. Antibiotic was subsequently changed if necessary based on clinical response and culture and sensitivity reports. The primary outcome was defined as death. The secondary outcome was identified as O2 support, NIV/IPPV, complication, duration of hospital stay.

Statistical analysis: The collected data was analysed and compared with previous studies on same topic. The data was analysed by percentage and Chi-square test (P-value <0.05 was considered significant).

RESULTS

In this study, the age group of patients varied from 14-76 years. The most common age group amongst study population was 21 to 30 years (27.1%) followed by 31 to 40 years (22.9%). While the least

common age group was 71 to 80 years (2.9 %). 7(10 %) patients were less than 20 years of age. 10(14.3 %) patients belonged to age group of 41 to 50 years, 9(12.9 %) belonged to age group of 51 to 60 years, 7(10 %) were from 61 to 70 years. Out of the 70 patients studied, 36(51 %) were females and 34(49 %) were males with male to female ratio 1:1.05. Out of 70 patients studied most common group was of unskilled personnel 21(30 %) followed by group of skilled personnel 19(27.1 %). 17(24.3 %) were housewife and remaining 13 (5.6 %) were students. In this study, 32(45.7%) patients were residing in rural area and remaining 38 (54.3%) patients were from urban area.

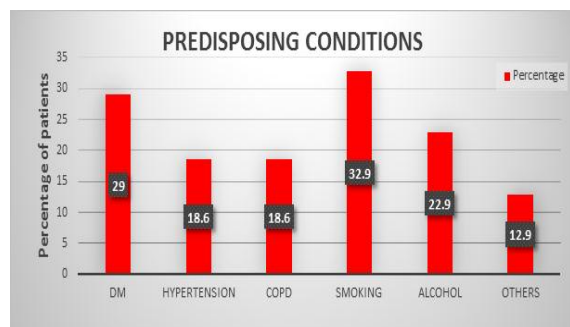


Figure 1: Distribution of subjects based on predisposing conditions

Among study population 23(32.9 %) were smokers, 20(29 %) were diabetic and 16(22.9 %) were alcoholic. 13 (18.6 %) each had hypertension and COPD.

The most common clinical feature amongst study population was Breathlessness (90 %) followed by Cough (80 %) and Fever (70 %). The least common complaint was haemoptysis (10 %).

General physical examination of the patients showed cyanosis and pallor in 16(22.85 %) each, rash in 14(20 %) patients, icterus in 9(12.86 %) patients,

pedal oedema in 7(10 %) patients and clubbing in 2(2.86 %) patients.

Crackles was the most common respiratory examination finding in this study group noted in 68 (97.14 %) patients. Other findings like reduced chest movements, bronchial breathing, increased vocal fremitus and vocal resonance and pleural rub were present in less than 1/3rd of patients.

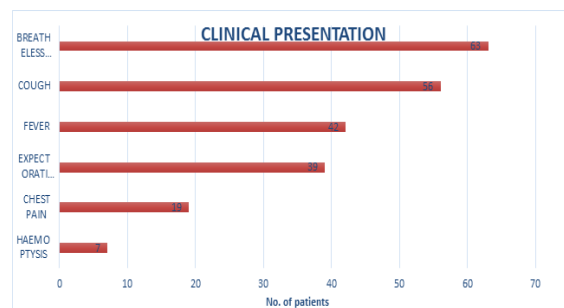


Figure 2: Distribution of subjects based on clinical presentation

In this study, pulse rate > 124/min was noted in 50(71.4 %) patients (out of remaining 20 patients 19 had pulse rate in range of 100-124/min; one presented with complete heart block). Hypotension defined as systolic blood pressure ≤ 90 mmHg was noted in 23(32.9 %) patients and diastolic blood pressure ≤ 60 mmHg was noted in 23(32.9 %) patients. Respiratory rate > 29 /min was noted in 66(94.3 %) patients. Raised temperature > 39 C was noted in 20(28.6 %) patients.

Leucocytosis defined as total leucocyte count > 11000/mm³ was noted in patients. Leukopenia defined as total leucocyte count < 4000/mm³ was noted in patients. Serum creatinine > 1.5 mg/dL was noted in patients while raised serum BUN > 20 mg/dL was noted in patients. Deranged liver function tests were noted in patients. Platelets less than 1 lakh were noted in patients.

Table 1: Distribution of subjects based on aetiology

Aetiological Classification			
Sr. No	Class	No of patients	Percentage
1	Bacterial	34	48.57
2	H1 N1	16	22.86
3	Dengue	10	14.29
4	Others	10	14.29

Out of the 70 patients admitted with pneumonia studied in this study, 34(48.6 %) patients had bacterial pneumonia. H1N1 was isolated in 16(22.9 %) patients while Dengue was the cause of ARDS in 10(14.29 %) patients. Other organisms causing pneumonia like Pneumocystis carinii, HAV, Malaria, Leptospira, Mycobacterium tuberculosis, Varicella zoster, Mycoplasma were found in 10(14.3 %) patients. Amongst the bacterial group Streptococcus pneumoniae was the most common followed by klebsiella.

Out of 70 patients studied sputum sample was not sent in 11 patients because of death within first 48

hrs. While there was no growth in 24 sputum culture samples. Positive sputum culture was obtained in 35(50 %) patients in this study group. Streptococcus pneumoniae was the most common organism isolated, obtained in 13 (37.15%) sputum cultures, followed by Klebsiella pneumoniae in 11(31.4 %) cultures. E.coli and Pseudomonas were obtained in 5(14.3 %) cultures each.

In this study, lobar pneumonia was the most common radiological finding, out of 70 patients studied 30(42.9 %) patients had bilateral pneumonia. 17(24.3 %) patients had left lower lobe

consolidation and remaining 23(32.8 %) patients

had right sided distribution.

Table 2: Distribution of subjects based on Pneumonia Severity Index

Pneumonia Severity Index	Frequency	Percent
Class II	10	14.3
Class III	9	12.9
Class IV	33	47.1
Class V	18	25.7
Total	70	100

Pneumonia severity index was used to determine severity of pneumonia. Out of 70 patients in this study group, maximum came under PSI class IV consisting of 33(47.1 %) patients followed by class V consisting of about 18(25.7 %) patients. 10(14.3 %) patients came under class II and 9(12.9 %) patients under class III.

Out of 70 patients admitted in intensive care unit, 29(41.4 %) patients required invasive ventilation, 24(34.3 %) patients were on non-invasive ventilation and remaining 17(24.3 %) were on nasal oxygen.

In this study, out of 70 patients studied, about 40(57.1 %) patients were admitted for duration of 1-2 weeks. 26(37.2 %) patients were admitted upto 7 days and 4(5.7 %) were admitted for more than 2 weeks.

The most common complication noted was ARDS in 22(31.4 %) patients, followed by acute kidney injury, septic shock and respiratory failure in 8 each (11.4 %). The other complications noted were MODS and complete heart block. No complication occurred in 19(27.1 %) patients.

Table 3: Outcome

Outcome	Frequency	Percent
DAMA	3	4.3
Death	27	38.6
Discharge	40	57.1
Total	70	100

In this study, out of 70 patients studied 40(57.1 %) patients improved and 27(38.6 %) patients died. 3(4.3 %) patients took DAMA discharge.

In this study, there were 20 diabetic patients, out of which complications occurred in 15 patients. Death occurred in 7 diabetic patients. 12 Out of 13 patients with COPD in this study, developed complications, of which 5 died. 5 of 13 hypertensive patients died due to complications which were developed in 10 patients. Maximum deaths occurred in smokers. There were 23 smokers of which 18 developed complications, and 12 died of it. Out of 16 alcoholics, 13 developed complications and 9 were discharged after improvement.

Out of 30 patients with bilateral lung involvement 27 developed complications of which 20 died. 23 patients had right lung involvement of which 12 patients developed complications and 3 patients died of it. Left lower lobe was involved in 17 patients, 11 of them developed complications and 4 died of those complications.

Out of 70 patients in study group, 29 patients required invasive ventilation; three of which were discharged.

In this study, 27 patients died. In these patients bacterial pneumonia was the main cause of mortality (44.44 %) followed by H1N1 and dengue constituting 22.22 % each. (p value < 0.05)

Out of total patients with dengue fever 50% succumbed during hospital course, reflecting its high incidence and associated respiratory system involvement. Percentage mortality of each causative

organism was similarly calculated. Bacterial pneumonia had a mortality of 35% whereas H1N1 caused 37.5% mortality.

DISCUSSION

In this study the median age of patients admitted with pneumonia in intensive care unit was 38.17 yrs. In the study by Nicolas Mongardon et al,^[8] they found that the mean age of patients with pneumonia in intensive care set up was 60yrs. In the study by Hadil A A Lotair et al,^[9] the mean age of the study group was 66 yrs (12 to 100 yrs)

In our study, 36 patients (51%) were females and 34(49%) were males with male:female ratio 1:1.05, whereas in the study by Nicolas Mongardon et al,^[8] there was male preponderance in that study (66%).

Among the predisposing conditions Diabetes mellitus was the most common, seen in 20 patients (29%). In the study by Nicolas Mongardon et al,^[8] 40% patients were smokers and 29% were alcoholics. The most common co-morbid condition was found to be COPD (22%) whereas Diabetes mellitus was found in 14% patients.

In this study, patients presented with typical as well as atypical symptoms. In our study, breathlessness was the most common respiratory symptom noted in 63 patients (90%). In the study by Abdullah et al,^[10] cough was the most common respiratory symptom noted in 74% patients, which was productive in 58% patients.

In this study, majority of the patients had cyanosis and pallor on examination, in 16 patients each (22.9%). In the study by Abdullah et al,^[10] pallor was the most common finding on general examination seen in 26% patients followed by icterus (12%) followed by cyanosis and pedal edema (in 8% each). Clubbing was seen in 4% patients.

In our study, tachypnea was the most common sign seen in 66 patients (94.3%), followed by tachycardia seen in 50 patients (71.4%). Hypotension was present in 23 patients (32.9%), while fever was noted in 20 patients (28.6%). Similar results were found in the study conducted by Abdullah et al⁵⁰ and the study by Y. Kobashi et al.^[11]

The most common finding on respiratory examination in our study was crackles on auscultation present in 68 patients (97.1%). Respiratory system examination findings according to our study as well as study conducted by Abdullah et al.^[10]

Among the laboratory investigations in our study, leukocytosis was present in 22 patients (31.4%), whereas leucopenia was seen in 7 patients (10%).

In the study by Nicolas Mongardon et al,^[8] leucocytosis was present in 25 % of patients, while in the study conducted by Hadil A A Lotair et al,^[9] leucocytosis was seen in 56.2% patients and leucopenia was seen in 6.7% patients.

In the present study organisms were isolated from sputum culture in 35(50%) patients. The most common organism isolated on sputum culture was *Streptococcus Pneumoniae* (18.6%) followed by gram negative bacilli like *Klebsiella Pneumoniae* (15.7%), *Pseudomonas Aeruginosa* (7.1%), *E. Coli* (7.1%). In a similar study by Mythri et al (54) which included 100 cases of pneumonia, the isolation rate was 38%, the most common organism isolated was *Klebsiella*, followed by *Pseudomonas* and *Streptococcus Pneumoniae*.

The radiological data in our study showed a predominance of bilateral involvement in 30 patients (42.9%) while unilateral involvement was found in 40 patients (57.1%). In unilateral involvement, there was right sided predominance (32.8%).

In the study conducted by Aslam SM,^[12] lobar pneumonia was the most common radiological finding, seen in 72% of the patients.

In this study, 70 patients admitted with pneumonia were categorised as per PSI. Maximum patients were of PSI class IV (47.1%) followed by class V (25.7%).

In our study, mortality was maximum (77.7%) in patients with Class V PSI followed by Class IV PSI (36.4%). There was 1 death in Class III PSI category and none in Class II. Comparative to our study done by Shah BA et al.^[13]

The median hospital stay of patients of pneumonia in this study was 8.5 days, whereas the median hospital stay in a similar study by I. Suter-Widmer et al⁵⁸ was 9.8 days.

Most common complication noted in our study was ARDS (31.4%) followed by AKI and septic shock (11.4% each). Multi-organ failure syndrome was noted in 5.7 % of patients, while 75.7% patients required mechanical ventilation.

These findings closely matches with study conducted by Nicolas Mongardon et al⁸ including 222 patients admitted in ICU.

Out of the 70 patients of pneumonia in our study, 27 patients (38.6%) died, 40 patients (57.1%) improved. 3 patients took DAMA. In similar study by J. Gowardman et al¹⁴ the mortality in pneumonia patients admitted in ICU was 31%.

CONCLUSION

Mean age of study group was 42 Years. Breathlessness was the most common presentation of patients admitted. Presence of predisposing conditions was associated with poor prognosis. Cyanosis and pallor were the most common clinical signs on general examination. Tachycardia, hypotension and tachypnea were indicators of poorer prognosis. Crackles was the most common clinical finding on detailed respiratory evaluation. Bacteria was the most common causative organism in patients admitted. Causative organisms were isolated on sputum culture in 50% patients; of which *Streptococcus pneumoniae* was most common. Atypical organisms like *Mycoplasma*, *Hepatitis A*, *PCP*, *Candida Albicans* and *varicella zoster* were isolated. Unilateral lung involvement was most common radiological finding, in which right sided lung involvement had better prognosis. Severe the Pneumonia severity index, longer was the hospital stay. ARDS was the most common complication, followed by AKI and septic shock. Dengue ARDS had the worst prognosis.

REFERENCES

1. Seaton D. Pneumonia. In: Seaton A, Seaton D, Leitch AG, editors. *Crofton & Douglas Respiratory Diseases* - Vol. 1. 5th ed. Blackwell Science Ltd.; Reprint 2012.
2. Bartlett JG, Dowell SF, Mandell LA, File TM Jr, Musher DM, Fine MJ. Practice guidelines for the management of community acquired pneumonia in adults. *Infectious Diseases Society of America. Clin Infect Dis* 2000 Aug;31(2):347-382.
3. Ochoa-Gondar O, Vila-Córcoles A, de Diego C, Arijia V, Maxenchs M, Grive M, et al. EVAN-65 Study Group: The burden of community-acquired pneumonia in the elderly: the Spanish EVAN-65 Study. *BMC Public Health* 2008; 8:222.
4. Shah BA, Singh G, Naik MA, Dhobi GN. Bacteriological and clinical profile of Community acquired pneumonia in hospitalized patients. *Lung India: official organ of Indian Chest Society*. 2010 Apr;27(2):54.
5. Capoor MR, Nair D, Aggarwal P, Gupta B. Rapid diagnosis of community acquired pneumonia using the Bac T/ alert 3 D system. *Braz J Infect Dis*. 2006;10:352-6.
6. Torres A, Serra-Batlles J, Ferrer A, Jimenez P, Cellis R, Cobo E, et al. Severe community acquired pneumonia; epidemiology and prognostic factors. *Am Rev Respir Dis*. 1991;144:312-8. [PubMed]
7. Panchon J, Pardos MD, Capote F, Cuella JA, Garnacho J, Veerano A. Severe community acquired pneumonia:

- Etiology, prognosis and treatment. *Am Rev Respir Dis*. 1990;142:369–73
8. Alotair HA, Hussein MA, Elhoseny MA, Alzeer AH, Khan MF. Severe pneumonia requiring ICU admission: Revisited. *J Taibah Univ Med Sci*. 2015;10(3):293–9.
 9. Torres A, El-Ebiary M, Riquelme R, Ruiz M, Celis R. Community-acquired pneumonia in the elderly. *Semin Respir Infect*. 1999;14(2):173–83.
 10. Kobashi Y, Okimoto N, Matsushima T, Soejima R. [Clinical analysis of community-acquired pneumonia and pulmonary tuberculosis in the elderly and advances in treatment]. *Nihon Ronen Igakkai Zasshi*. 2001;38(3):312–6.
 11. Huijskens EGW, Koopmans M, Palmen FMH, van Erkel AJM, Mulder PGH, Rossen JWA. The value of signs and symptoms in differentiating between bacterial, viral and mixed aetiology in patients with community-acquired pneumonia. *J Med Microbiol*. 2014;63(PART 3):441–52.
 12. Shah BA, Ahmed W, Dhobi GN, Shah NN, Khursheed SQ, Haq I. Validity of Pneumonia Severity Index and CURB-65 Severity Scoring Systems in Community Acquired Pneumonia in an Indian Setting. *Indian J Chest Dis Allied Sci*. 2010;52(1):9–17
 13. Suter-Widmer I, Christ-Crain M, Zimmerli W, Albrich W, Mueller B, Schuetz P, et al. Predictors for length of hospital stay in patients with community-acquired Pneumonia: Results from a Swiss Multicenter study. *BMC Pulm Med*. 2012;12.
 14. Yoshimoto A, Nakamura H, Fujimura M, Nakao S. Severe community-acquired pneumonia in an intensive care unit: risk factors for mortality. *Intern Med*. 2005;44(7):710–6