

Case Report

Assessment of Pneumonia Severity

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ABSTRACT

Pneumonia remains an important cause of hospital admission and carries an appreciative mortality. The diagnosis of pneumonia is based on certain clinical manifestations and chest radiograph. There is considerable variability in rates of hospitalization of patients with

community-acquired pneumonia, in part because of physicians' uncertainty in assessing the severity of illness at presentation. We present a case of pneumonia with certain severity and discuss the methods of assessing severity.

KEY WORDS: community acquired pneumonia, pneumonia, radiograph

INTRODUCTION

Hospital admission rates for pneumonia vary markedly from one geographic region to the next, suggesting that the criteria used for hospitalization are inconsistent. Physicians often rely on their subjective impressions of a patient's clinical appearance in making the initial decision about the site of care. Physicians tend to overestimate the risk of death in patients with pneumonia and these overestimates are associated with the decision to hospitalize patients at low risk.

Accurate, objective models of prognosis for community-acquired pneumonia (CAP) could help physicians assess patients' risks and improve the decisions about hospitalization. Previous models have been limited by retrospective design, the use of predictor variables about which information is not readily available to physicians when patients present and dependence on complex calculations that are difficult to apply in the clinical setting^[1,2]. The general applicability of these studies has been limited by the evaluations of performance at single study sites, failure to validate findings in independent patient populations and a nearly exclusive focus on hospitalized patients. Finally, clinical relevance has been compromised by a reliance on mortality as the sole measure of patient outcomes. We will use this case report to discuss how to assess the severity of pneumonia and which patient requires admission to hospital.

CASE REPORT

A 60-year-old man was admitted to our hospital with three days history of fever, chills and productive cough of yellow sputum. He denied any history of chest pain and gave no history of recent traveling. He was a known case of well-controlled hypertension and diabetes but otherwise healthy.

On physical examination, his heart rate was 120/minute, BP 130/70 mmHg, respiratory rate 28 breath per minute and temperature 38° Celsius. He had no signs of confusion. His chest had right basal crackles. His heart and abdominal examination were normal. His white blood cell count was $23 \times 10^9/l$, with a hemoglobin of 120 gram/l and a hematocrit of 38%. His blood urea nitrogen was 14 mg per dl, blood sugar was 200 mg per dl and serum sodium 135 mmol/l. His arterial oxygen tension was 80 mmHg, arterial carbon dioxide tension 40 mmHg and arterial pH was 7.45. Chest X-ray showed right sided air-space disease (Fig. 2). Blood and sputum cultures were negative. He was diagnosed as right lower lobe CAP and was started on cefotaxime and erythromycin intravenously. Two days later, he became afebrile with improvement of his general condition. On the third day oral antibiotics were started and the patient was discharged home after four days of hospitalization on oral clarithromycin. Chest X-ray follow-up after two weeks showed resolution of the pneumonia with no pleural effusion. A chest X-ray two months later revealed complete resolution of the pneumonia.

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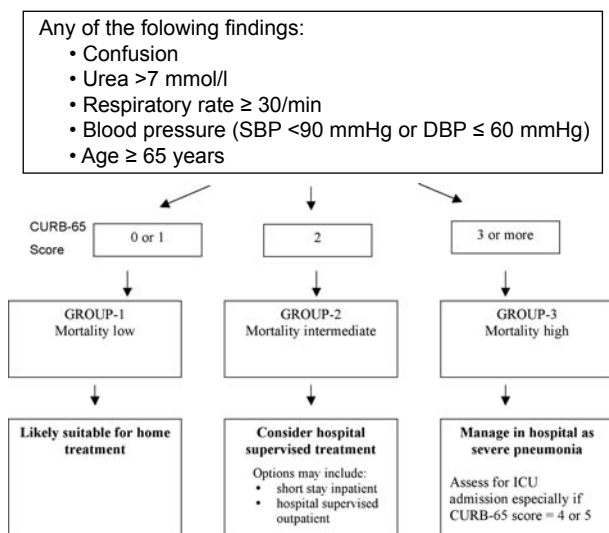


Fig. 1: BTS guidelines for the management of community acquired pneumonia in adults-2004^[6]

Table 1: Pneumonia severity index for community acquired pneumonia^[3]

Risk factor	Points
Demographics	
Men	Age (years)
Women	Age (Years) -10
Nursing home resident	+10
Co-morbidities	
Neoplasm	+30
Liver disease	+20
Heart failure	+10
Stroke	+10
Renal failure	+10
Physical examination findings	
Altered mental status	+20
Respiratory rate ≥ 30 breaths per minute	+20
Systolic blood pressure < 90 mmHg	+20
Temperature < 95 °F (35 °C) or ≥ 104 °F (40 °C)	+15
Pulse rate ≥ 125 beats per minute	+10
Laboratory and radiographic findings	
Arterial pH < 7.35	+30
Blood urea nitrogen > 30 mg per dl	+20
Sodium < 130 mmol per l	+20
Glucose ≥ 250 mg per dl	+10
Hematocrit < 30 percent	+10
Partial pressure of arterial oxygen < 60 mmHg	+10
Pleural effusion	+10
Total points	
Risk Class I *	< 51
Risk Class - II*	51 - 70
Risk Class - III*	71 - 90
Risk Class - IV**	91 - 130
Risk Class - V**	> 130

* Outpatient therapy should be considered for these patients

** Patients should be hospitalized

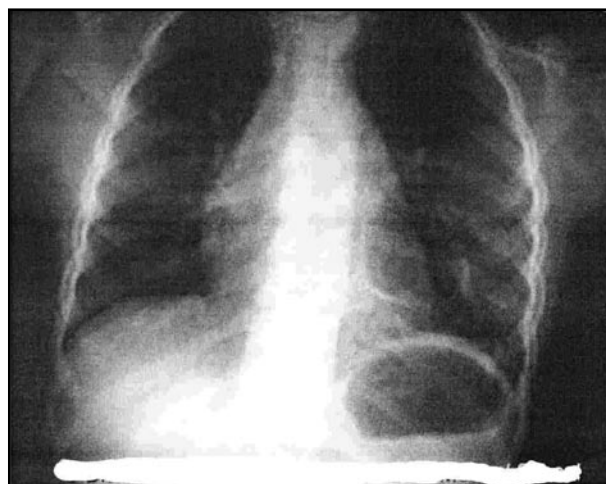


Fig. 2: Right lower lobe pneumonia

DISCUSSION

CAP is often managed outside the hospital, an approach endorsed by evidence-based guidelines from the American Thoracic Society (ATS) and the Infectious Diseases Society of America (IDSA)^[1,2]. These guidelines however, recommended that physicians make an objective risk assessment using a prospectively validated clinical prediction tool to help guide them when deciding on inpatient or outpatient treatment. The most notable of these tools are the Pneumonia Severity Index (PSI) and several variations of the British Thoracic Society (BTS) rule, such as the CURB-65 (Confusion, Urea nitrogen, Respiratory rate, Blood pressure, 65 years of age and older) score.

The PSI (Table 1) identifies three distinct risk classes (I, II and III) of patients who are at sufficiently low risk for death and other adverse medical outcomes that physicians can consider outpatient treatment or an abbreviated course of inpatient care for them. All patients 50 years of age or less who have none of the coexisting illnesses or physical-examination abnormalities identified (class I) should be candidates for outpatient treatment. Many patients in risk classes II and III are also potential candidate for outpatient treatment. This strategy should apply to the majority of patients assigned to these two risk classes by virtue of age alone or the presence of a single pertinent coexisting illness or abnormal finding on physical examination or laboratory testing. For the remaining patients in classes II and III for whom treatment at home with oral antimicrobial therapy is judged to be unsuitable, there are alternatives to traditional inpatient care. These include parenteral antimicrobial therapy at home or a short stay (< 24 hours) in a hospital observation unit. Previous studies have suggested that one fifth of all patients hospitalized with pneumonia remain in the hospital after becoming

Table 2: CURB-65 and CRB-65 severity scores for community acquired pneumonia^[6]

Clinical factors:	Points	Remarks
Confusion	1	
Blood urea nitrogen > 19 mg per dl	1	
Respiratory rate > 30 breaths per minute	1	
Systolic blood pressure < 90 mmHg or diastolic blood pressure < 60 mmHg	1	
Age ≥ 65 years	1	
Total points:		
CURB-65 score	≤ 1	Low risk, consider home treatment.
"	2	Short inpatient hospitalization or closely supervised outpatient treatment.
"	3-5	Severe pneumonia, hospitalize and consider admitting to intensive care
CRB-65 score	0	Very low risk of death, usually does not require hospitalization
"	1 & 2	Increased risk of death; consider hospitalization
"	3 & 4	High risk of death, urgent hospitalization

medically stable^[3]. The risk stratification provided by this rule could also help target low-risk patients at the time of admission for whom rapid conversion from intravenous to oral antimicrobial therapy and early discharge might be appropriate^[4]. Traditional inpatient care for all patients in class IV and V would have reduced the proportion of patients receiving traditional inpatient care by 31 percent and meant a brief observational hospital stay for an additional 19 percent of those who were treated as inpatients. An additional margin of safety could be provided by amending this strategy to include traditional inpatient care for all patients in classes, I, II, and III who have hypoxemia at presentation (*i.e.*, who have an oxygen saturation of less than 90% or a partial pressure of oxygen of less than 60 mmHg while breathing room air). Special attention to oxygen status is consistent with published criteria for hospitalization and with actual clinical practice^[5].

The CURB-65 and CRB-65 scores (Table 2, Fig. 1) are easier than the PSI to calculate and interpret at the point of care. CURB-65 includes only five variables (compared with up to 20 in the PSI), and the CRB-65 score provides a four variable substitute for use where blood testing is not immediately available^[6].

The authors of the PSI recommend outpatient therapy for patients in PSI risks classes I and II, physician judgment for those in risk class III and hospitalization for those in risks classes IV and V. The IDAS guideline recommends physicians consider home therapy for patient in PSI risk classes I, II and III. The BTS guide line recommends physicians use the CURB-65 or the CRB-65 when deciding

on inpatient or outpatient treatment. The ATS recommends that physicians use validated clinical decision rules such as the PSI or the CURB-65 tool for judgment but does not define a recommended cut off for hospital admission.

BTS guide line recommend the following:

- Patients who have a CRB-65 score of 0 are at low risk of death and do not normally require hospitalization for clinical reasons.
- Patients who have a CRB-65 score of 1 or 2 are at increased risks of death and hospital referral and assessment should be considered, particularly with score 2.
- Patients who have a CRB-65 of 3 or more are at high risk of death and require urgent hospital admission.
- Patient who have a CURB-65 core of 3 or more are at high risk of death and should be managed as having severe pneumonia.
- Patient who have a CURB-65 score of 2 are at increased risk of death. They should be considered for short stay inpatient treatment or hospital supervised outpatient treatment. This decision is a matter of clinical judgment.
- Patient who have a CURB-65 score of 0-1 are at low risk of death. They can be treated as having non-severe pneumonia and may be suitable for home treatment.

Our patient's CURB-65 score was 0 which makes him a very low risk for death, usually does not require hospitalization and can be treated with oral antibiotics. Also, his calculated PSI is less than

51 which is risk class I. This also confirms that our patient was at of low risk for death and the physician could have considered outpatient treatment.

CONCLUSION

In this case report, we illustrate the usefulness of utilizing easy-to-use and validated prediction rules for assessment of severity of pneumonia and to make decisions about the need for hospitalization. We encourage physicians to use these simple rules, especially the CURB-65 or CRB-65, in the assessment of patients with CAP.

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