ORIGINAL ARTICLE

Assessing decision of inpatient or outpatient care in community acquired pneumonia: APT care study

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Abstract

Objective: To estimate the proportion of community-acquired pneumonia patients with disagreement between Confusion, Uraemia, Respiratory rate, Blood pressure, age ≥ 65 years recommendation and physician's decision to hospitalise or not.

Methods: This cross-sectional nation-wide, non-interventional, cross-sectional study was carried out across 10 cities of Pakistan from December 2011 to May 2012, and recruited consenting adult patients with confirmatory diagnosis of community-acquired pneumonia on chest X-ray. Confusion, Uraemia, Respiratory rate, Blood pressure, age ≥ 65 years recommendation for each patient was determined at the time of analysis. This recommendation was compared with treatment decision made by the physician. Disagreement was considered when the physician's decision did not match with the recommendation. SPSS 18 was used for data analysis.

Results: Of the 352 patients, 201(57.10%) were males. The overall mean age was 50.67±18.45 years. In 140(39.77%) patients there was disagreement between Confusion, Uraemia, Respiratory rate, Blood pressure, age ≥ 65 years recommendation and physician's decision regarding hospitalisation or outpatient care. Of the 352 cases 132(37.50%) were hospitalised despite the recommendation of outpatient treatment.

Conclusion: In almost four out of every 10 patients there was disagreement between Confusion, Uraemia, Respiratory rate, Blood pressure, age ≥ 65 years recommendation and the physician's decision regarding hospitalisation of community-acquired pneumonia patients.

Keywords: Pakistan, Community acquired, Pneumonia, CURB65. (JPMA 67: 380; 2017)

Introduction

Community acquired pneumonia (CAP) is a common infectious disease worldwide. It is a serious condition associated with significant morbidity and potential long-term mortality.[1] Each year in the United States, about 1 million people are hospitalised with pneumonia, and about 50,000 people die from the disease.[2] An analysis of the data from the National Health Survey of Pakistan 1990-94 indicates that prevalence for lifetime pneumonia was 10% (95% confidence interval [CI] 8%, 12%).[3] Due to the high rate of hospitalisation, CAP causes substantial economic burden; this can be reduced by treating low-risk patients as outpatients with effective antimicrobial treatment.[4,5]

Medical practitioners come across different severity levels of CAP — from mild non-severe to severe fatal — associated with different mortality rates. Earlier studies demonstrated that medical practitioners either overestimated the risk in CAP patients and hospitalised them instead of treating them at home, or underestimated the severity and treated them as outpatients.[6,7] The decision about the site-of-care i.e., home, hospital or emergency department, is very important, since it has an impact on the quality and cost of treatment.[8] The decision of hospital admission is very crucial, as even a relatively small decrease in hospital stay can decrease the hospitalisation cost substantially.[9]

CAP is diagnosed by recording history, physical examination of clinical features (cough, fever, pleuritic chest pain, etc.), radiological examination (chest X-ray), and laboratory testing (blood culture, sputum culture, etc.).[10,11] In patients with suspected or diagnosed CAP, medical practitioners should identify high-risk and low-risk patients, and decide the need for hospitalisation versus outpatient management, respectively.[10] The Confusion, Uraemia, Respiratory rate, Blood pressure, age ≥ 65 years (CURB65) score, with one point for each of Confusion, Urea >7 mmol/l, Respiratory rate ≥30/min, low systolic (<90 mm Hg) or diastolic (≤60 mm Hg) Blood pressure, age ≥65 years (CURB65 score), based on information available at initial assessment, enables patients to be stratified according to increasing risk of mortality.[10] International guidelines, including the British Thoracic Society (BTS) and the Infectious Diseases Society of America/American Thoracic Society (IDSA/ATS),

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recommend determination of CURB65 score along with clinical judgment.[12,13]

In general, emergency department (ED) physicians appear to use clinical judgement to assess the severity of CAP rather than using severity assessment tools.[11] In Pakistan, physicians are likely to rely on subjective impressions of patients' clinical presentation in making the initial decision about the site-of-care. To the best of our knowledge, there is no data available in Pakistan on the site-of-care decision for patients with CAP.

The current study is the first of its kind in Pakistan and was planned to estimate the proportion of patients in whom there is disagreement between the recommendation of CURB65 and the physician's decision of inpatient or outpatient care. The secondary objectives of the study were to describe the profile of patients in whom discordant decisions were made, to identify reasons for the discordant decisions, and to document the empirical antibiotic management of CAP patients.

Patients and Methods

The nation-wide, non-interventional, cross-sectional study was carried out between December 2011 and May 2012 across 10 cities of Pakistan. The study was conducted according to the guidelines of Good Epidemiological Practice (International Epidemiological Association, 2007),[14] the principles of the Declaration of Helsinki (2008)[15] and all local laws and regulations. It was approved by the Ethical Review Committee of the Aga Khan University, Karachi, and written informed consent was obtained from all the participants.

There were 22 investigators selected through convenience sampling from Lahore, Multan, Faisalabad, Karachi, Hyderabad, Tando Allah Yar, Kotri, Sukkur, Islamabad and Peshawar. These were medical internists who provided care to ambulatory patients in a hospital setting.

Consecutive adult patients, of either gender meeting the inclusion criteria were enrolled. These patients had new or increased cough or sputum production, fever >100°F (>37.8°C), and pulmonary infiltrate on chest X-ray to confirm the CAP diagnosis.

Those excluded had one or more of the following conditions: hospitalisation within the preceding 10 days (suspected hospital-acquired pneumonia), presence of an emerging alternative diagnosis (e.g. pulmonary or septic emboli, pulmonary oedema, or malignancy), clinical or radiological feature strongly indicative of tuberculosis, or post-obstructive pneumonia due to lung cancer.

A case report form (CRF) was filled during consultation for each patient meeting the inclusion criteria. The details collected included patient's characteristics, clinical features, co-morbid conditions, radiographic findings, laboratory test of blood urea nitrogen (BUN), reasons for decision on inpatient admission or outpatient treatment, and the empiric antibiotics prescribed.

The CURB65 prediction tool was administered at the time of data analysis to determine the recommendation for each individual patient. The following criteria of the tool were evaluated: age $\geq$65 years, presence of confusion, BUN >20 mg/dL (7.14 mmol/L), respiratory rate $\geq$30 breaths per minute, and blood pressure (systolic <90 mm Hg or diastolic $\leq$60 mm Hg). For each positive criterion, a score of one was assigned. Total score was determined by summation. The recommendations according to the CURB65 prediction tool are: for a score of 0 or 1 point, treat as outpatient; for $\geq$2 points treat as inpatient.[10]

Physician's decisions were recorded as categorical variable (inpatient/outpatient). CURB65 recommendation was compared with the treatment decision made by the physician. Disagreement was considered when the physician's decision did not match with the CURB65 recommendation.

The proportion of patients with a disagreement between CURB65 recommendation and physician's decision of inpatient or outpatient treatment was documented.

For primary and secondary analyses, all categorical variables were analysed as frequencies and percentages. Continuous variables were reported as means with standard deviations (SD). SPSS 18 was used to analyse the data.

Since there is no information available in Pakistan on the proportion of patients with disagreement between CURB65 recommendation and physician's decision, it was assumed that 50% of patients would have a discordant decision. For a 95% confidence level, a margin of error of 5%, and accounting for approximately 10% inaccurate completion of CRFs, the sample size required was estimated as 425.

Results

There were 466 eligible patients, but for the purpose of analysis, only 352(75.5%) patients were available for whom BUN test was done at consultation.

The overall mean age of these 352 patients was 50.67±18.45 years and 201(57.10%) of them were men. Patients reported having fever for a mean duration of 6.76±4.39 days. There were 74(21.02%) current smokers

Table-1: Patient Characteristics.

Parameters	Total patients (N = 352)	Patients with discordant decisions (N = 140)
Age (years), mean ± SD	50.67 ± 18.45	51.14 ± 16.31
Height (cm), mean ± SD	160.64 ± 11.49	160.43 ± 10.99
Weight (kg), mean ± SD	66.27 ± 16.82	70.04 ± 18.98
Body temperature (°F), mean ± SD	101.71 ± 1.22	101.51 ± 1.07
Duration of fever (days), mean ± SD	6.76 ± 4.39	7.02 ± 4.78
Gender, n (%)		
Male	201 (57.10)	82 (58.57)
Female	148 (42.04)	57 (40.71)
Missing	3 (0.85)	1 (0.71)
Respiratory rate (breaths per minute), mean ± SD	24.89 ± 5.54	24.55 ± 4.77
SBP (mm Hg), mean ± SD	119.38 ± 20.12	125.22 ± 20.60
DBP (mm Hg), mean ± SD	74.72 ± 11.58	77.44 ± 10.41
Blood urea nitrogen (mg/dL), mean ± SD	20.00 ± 15.87	17.46 ± 13.21
Current smoker, n (%)	74 (21.02)	28 (20.00)
Former smoker, n (%)	77 (21.87)	30 (21.42)

DBP: Diastolic blood pressure
SBP: Systolic blood pressure
SD: Standard deviation.

Table-2: Comparison between CURB65 recommendation and physician's decision (N = 352).

Physician's decisions	CURB-65 Recommendation	
	Inpatient	Outpatients
Inpatient	106	132
Outpatient	8	106

CURB65: Confusion, Uremia, Respiratory rate, Blood pressure, age ≥65 years.

(Table-1). Based on the CURB65 criteria, there were 100(28.40%) patients aged ≥65 years; confusion was present in 63(17.89%) patients; BUN was >20 mg/dL in 109(30.96%); respiratory rate was ≥30 breaths per minute in 67(19.03%); systolic blood pressure (SBP) was <90 mmHg or diastolic blood pressure (DBP) ≤60 mm Hg in 57(16.19%) patients.

In 140(39.77%) patients there was a disagreement between CURB65 recommendation and the physician's decision of inpatient or outpatient care. Among these, 132 (37.50%) cases were admitted despite CURB65 recommendation of outpatient treatment. According to CURB65 criteria, 8(2.27%) patients were at intermediate or high risk of mortality and needed inpatient care. However, these patients' risks were underestimated by the physicians (Table-2).

Of the 140 patients with discordant decisions, 82(58.57%) were men. The mean age of these patients was 51.14±16.31 years, and 27(19.28%) were ≥65 years of age.

Table-3: Clinical presentation and comorbid diseases in patients with discordant decisions (N = 140).

Clinical features	N (%)
Fatigue	110 (78.57)
Dyspnoea	107 (76.42)
Malaise	92 (65.71)
Myalgia	90 (64.28)
Chills	89 (63.57)
Pleuritic Chest Pain	80 (57.14)
Dullness on percussion	63 (45.00)
Gastrointestinal Symptoms (nausea, vomiting or diarrhoea)	25 (17.85)
Haemoptysis	14 (10.00)
Others	3 (2.14)
Auscultatory findings	
Normal breath sounds	19 (13.57)
Bronchial breath sounds	69 (49.28)
Decreased breath sounds	78 (55.71)
Crackles	118 (84.28)
Wheezes	57 (40.71)
Egophony	21 (15.00)
Radiographic findings	
Pulmonary infiltrate	140 (100.00)
Lobar consolidation	95 (67.85)
Patchy infiltrates	41 (29.28)
Pleural effusion	41 (29.28)
Atelectasis	2 (1.42)
Extent of Pneumonia	
Confined to 1 lobe	87 (62.14)
>1 lobe	42 (30.00)
Comorbid diseases	
Diabetes mellitus	49 (35.00)
Hypertension	43 (30.71)
Chronic obstructive pulmonary disease	26 (18.57)
Ischaemic heart disease	23 (16.42)
Asthma	18 (12.85)
Pulmonary Fibrosis	8 (5.71)
Others	17 (12.14)

Confusion was present in 3.57% (5/140) of patients. The mean respiratory rate was 24.55±4.77 breaths/minute, and 14(10.00%) patients had a respiratory rate of ≥30 breaths/minute. The mean SBP was 125.22±20.60mmHg, and DBP was 77.44±10.41mmHg, with 10(7.14%) patients having either SBP<90 mmHg or DBP ≤60 mmHg or both. The mean BUN was 17.46±13.21mg/dL with 30(21.42%) patients having BUN of >20 mg/dL. Patients reported having fever for a mean duration of 7.02±4.78 days. There were 28(20%) current smokers.

The most common symptoms were fatigue in 110(78.57%) patients and dyspnoea in 107(76.42%). On auscultation crackles were heard in 118(84.28%) patients, with decreased breath sounds in 78(55.71%). Chest X-ray revealed lobar consolidation in 95(67.85%) patients, and

Table-4: Reasons for discordant decisions (N = 140).

Reasons	N (%)
Clinical judgment	127 (90.71)
Patient's clinical appearance	118 (84.28)
Very sick	80/118 (57.14)
Not too sick	38/118 (27.14)
Comorbid condition(s)	85 (60.71)
Prediction tools (Inappropriate application)	40 (28.57)
Failure of outpatient antibiotic therapy	36 (25.71)
Lack of access to medication	4 (2.85)
Lack of compliance to medication	20 (14.28)
Others	8 (5.71)
Patients with >1 reasons	123 (87.85)
Missing information	1 (0.71)

Table-5: Empirical antibiotic treatment (N=352).

Antibiotics	N (%)
Monotherapy	135 (38.35)
Levofloxacin	52 (14.77)
Moxifloxacin	31 (8.80)
Clarithromycin	12 (3.40)
Other	40 (11.36)
Combination drugs	217 (61.64)
Ceftriaxone + clarithromycin	52 (14.77)
Ceftriaxone + levofloxacin	17 (4.82)
Ceftriaxone + moxifloxacin	17 (4.82)
Ceftriaxone + other antibiotics	21 (5.96)
Amoxicillin/clavulanate + clarithromycin	28 (7.95)
Clarithromycin + moxifloxacin	13 (3.69)
Amoxicillin/clavulanate + levofloxacin	12 (3.40)
Other combinations	56 (15.90)
Missing information	1 (0.28)

pneumonia confined to one lobe in 87(62.14%). The most common comorbid disease was diabetes mellitus in 49(35%), followed by hypertension in 43(30.71%) (Table-3).

The three common reasons identified in patients with discordant decisions were clinical judgment in 127(90.71%), patient's clinical appearance in 118(84.28%) and comorbid conditions in 85(60.71%) cases. In 36(25.71%) patients, physicians reported failure of outpatient antibiotic therapy as the reason for their decision to admit (Table-4).

Of the 352 CAP patients, 99(28.12%) were already on antibiotics at the time of presentation. Of these, 36(36%) did not respond to the antibiotics initially prescribed.

At consultation, 135(38.35%) patients were prescribed monotherapy, the most common being fluoroquinolone: levofloxacin in 52(14.77%) patients and moxifloxacin in 31(8.80%). Among combination antibiotics, ceftriaxone was most commonly prescribed to 107 (30.39%) patients, followed by clarithromycin in 93(26.42%) (Table-5).

Discussion

This cross-sectional study evaluated the physicians' decision on site-of-care in adult patients suffering from CAP. We found that in almost 4 out of every 10 cases, there was disagreement between CURB65 recommendation and physician's decision of inpatient or outpatient care. Most of these patients (132/140; 94.28%), who should have received outpatient treatment, were hospitalised.

In an earlier study in low-risk CAP patients, 36.7% were inpatients.[6] Another study in hospitalised patients revealed that 14% of low-risk patients with mild CAP without comorbidities were admitted in spite of CURB65 recommendation for outpatient management.[16] In another study in 1199 hospitalised patients, 46.5% patients had discordant decisions despite objective severity assessment as outpatients.[17] These earlier studies were in line with the present study, in which 238 patients were at low risk (CURB65 score 0 or 1), of whom as many as 132 (55.5%) patients were hospitalised.

This high rate of discordant decisions by physicians might be explained by physicians' reliability on clinical judgment rather than using severity assessment tools.[17] An earlier study demonstrated that physicians relied on respiratory status, comorbid illness, clinical appearance, lung involvement of >1 lobe, and oral intake, in hospitalisation decision for low-risk patients.[6] The present study also demonstrated that discordant site-of-care decisions by the medical practitioners are influenced by clinical judgment (90.7%), patient's clinical appearance (84.3%), and comorbid conditions (60.7%).

International guidelines, including BTS and IDSA/ATS guidelines, recommend using severity-of-illness scores, along with physician's determination of the patient's ability to maintain oral intake, availability of outpatient support resources for likelihood of compliance, patient's functional status, etc.[13] Severity of disease can be measured by various severity assessment tools, such as CURB65, CRB65 (same as CURB65 minus uraemia), Pneumonia Severity Index (PSI), modified ATS, modified BTS, and Systolic blood pressure, Multilobar involvement, Albumin, Respiratory rate, Tachycardia, Confusion, Oxygen level, pH (SMART-COP), depending on which patients the medical practitioners want to identify.[11] The CURB65 score is a simple tool based on five clinical features, with an ability to identify low-risk patients.[18,19] Implementing the guidelines has been shown to lower admission rates by using severity assessment score for determining disease severity.[20,21]

A recent prospective observational study conducted in Nigeria demonstrated that CURB65 score is a simple method of assessing and risk stratifying CAP patients, which helps to identify a reasonable proportion of low-risk patients for potential outpatient care.[22] However, low physician awareness and inconsistent recommendations have shown to be contributing factors for non-adherence to the CAP guidelines.[23,24] A recent retrospective descriptive study conducted in United Arab Emirates (UAE) reported that CURB65 was not optimally utilised in patients with CAP.[25] The present study also indicates that physicians overestimated the risk of their patients in 37.5% of cases. This suggests that physicians need to apply the CURB65 criteria more frequently and stringently to avoid irrational hospital admissions. This can help reduce unnecessary burden on healthcare systems and avoid contracting of nosocomial infection by patients otherwise at low risk.

Advanced age, and conditions such as heart failure, chronic obstructive pulmonary disease (COPD), chronic liver disease, chronic kidney disease, and diabetes are known to be the leading comorbidities in patients with CAP.[6.22.26] In an earlier study in Pakistan, the common comorbid conditions in hospitalised patients with CAP included hypertension (35.6%), diabetes (29.8%) and COPD (9.7%).[27] In another recent study in Pakistan, ischaemic heart disease (20%), diabetes (18%) and COPD (18%) were the common comorbid conditions.[28] In our study, among 140 patients with discordant decisions, the most common comorbid disease was diabetes mellitus (35.00%), followed by hypertension (30.71%) and COPD (18.57%). The fact that 94.3% of these patients were hospitalised despite being at low-risk could be attributed to presence of comorbid conditions.

The international guidelines, including the BTS and the IDSA/ATS, recommend empirical antibiotic treatment in patients with CAP, since the causative microorganism is not identified in all the patients. Although these guidelines are developed in the Western population, it has been shown that the core organisms causing CAP in Southeast Asia are similar to those in the Western countries.[29]

As per the IDSA/ATS 2007 guidelines, previously healthy outpatients should be treated with a macrolide or doxycycline, while outpatients with comorbidities should be prescribed fluoroquinolone or combination of -lactam and macrolide. Inpatients not admitted to intensive care unit should be prescribed fluoroquinolone or combination of -lactam and macrolide, and monotherapy is recommended in inpatients without severe disease or risk factors for infection.[13] In the present study, the majority (61.6%) of CAP patients were empirically prescribed combination therapy, with ceftriaxone being most common in 30% of patients. As monotherapy, levofloxacin was most commonly prescribed (14.8%), followed by moxifloxacin (8.8%).

This is the first study in Pakistan, to the best of our knowledge, to evaluate site-of-care decision by physicians for managing patients with CAP. The study used CURB65 criteria for evaluation, which is the BTS-recommended scoring tool. The consecutive patient recruitment limited bias in selecting patients. In this exploratory study, though the investigators were selected by convenience sampling, they represent consultants having predominant interest and practice in chest medicine. The study also represents a good mixture of public and private hospitals in the secondary and tertiary health care setup in 10 major cities of Pakistan. Information was collected on real-life clinical practice in Pakistan. However, the findings need to be cautiously interpreted as they may not be generalisable to the entire population. As this was a cross-sectional study, information on mortality and disease evolution of the patients were not captured. A prospective study may be designed to evaluate site-of-care decisions and correlate with clinically relevant outcomes.

Conclusion

In almost 4 out of every 10 CAP patients, there was a disagreement between CURB65 recommendation and the physician's decision of inpatient or outpatient care. Increased physician awareness and adherence to using guideline-recommended severity assessment tools for deciding site-of care would lead to decreased hospitalisation and economic burden.

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