Hospitalised Low-risk Community-acquired Pneumonia: Outcome and Potential for Cost-savings

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Abstract

Fine et al from USA have identified a sub-group ofpatients with community-acquiredpneumonia (CAP) with a low risk of mortality and suggested that it may be cost-effective to manage them as outpatients. The aims of this study were: to evaluate the outcome of low risk CAP patients that were hospitalised in our local setting, and to gauge the number of such patients in order to estimate the potential cost-savings by treating them as outpatients, as well as the safety of such an approach.

Allpatients with CAP admitted to our hospitalfrom 1 April 1997 to 1 March 1998 were enrolled into this prospective cohort study. Low-risk patients were identified, and their hospital outcome compared with other patients. Hospitalisation charges were obtained from the Finance Department.

There were 226patients with CAP. The average age was 64 years with a range of 12 to 96 years. The median hospital stay was 6 days. Mortality was 13.7%. 16.8% required admission to the ICU; none of these were low-risk patients. There were 47 (21%) low-risk patients, and there was no mortality in this group. They had significantly shorter hospital stay (6.4 days versus 10 days) and lower hospitalisation charges ($2,160 versus $5,770) compared to other CAP patients. Only one low-risk patient had a positive blood culture.

In conclusion, nearly one-fifth of our CAP admissions consisted of low-risk patients that experienced no mortality, and required a significantly shorter hospitalisation. The management of such patients who are young (≤50 years), with no serious co-morbidities in an outpatient setting may be a cost-effective strategy and this group ofpatients consumed 9% of the total hospitalisation charges for CAP.

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Key words: Hospitalisation, Intensive care unit, Mortality

Introduction

Community-acquired pneumonia (CAP) is a common illness with nearly 4 million adults diagnosed each year in USA with more than 600,000 hospitalisations.[1] The associated cost of hospitalisation is enormous and approaches nearly US$4 billion per year.[2] But outpatient care is nearly 15 times cheaper.[3] Defining the necessary criteria for hospitalisation is a current area of interest in this era of cost containment. In order to identify the group of CAP patients that can be safely managed as outpatients, Fine et al[4] have proposed a prediction rule, which purports to define a group of low-risk CAP patients with 0.1% mortality. They suggested that these patients may be managed safely as outpatients with consequent cost-savings. Such clinical practice guidelines require further evaluation as the management of pneumonia is frequently taken as a benchmark for quality assurance/improvement programmes.[5]

Our study was thus conducted prospectively to study hospitalised low-risk CAP. We wanted to define their outcomes and associated hospitalisation charges, with the goal of making policy decisions about hospitalisation criteria with respect to cost-savings potential.

Patients and Methods

All CAP patients admitted to our institution between 1 April 1997 and 1 March 1998 were entered prospectively into the study. CAP was diagnosed based on clinical symptomatology (cough, purulent sputum, and fever), and a chest radiograph with a new infiltrate (within 48 hours of admission). Patients that were recently in hospital within the last 1 month were excluded. Immunocompromised patients were included. Patients were treated routinely by their physicians with no set antibiotic or discharge protocol.

Low-risk CAP patients were identified according to

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the Fine's class I definition[4]: 150 years; no neoplastic disease, congestive heart failure, cerebrovascular disease, renal disease, or liver disease; physical examination-no altered mental status, pulse <125/minute, respiratory rate <30/minute, systolic blood pressure ≥90 mmHg, temperature 235°C or <40°C.

Hospital outcome and hospitalisation charges were collected along with the standard microbiological cultures (sputum culture, gram-stain, and blood cultures) and paired serologies (Mycoplasma and Legionella). Patients with *Mycobacterium* tuberculosis were excluded.

Data are presented as mean ± standard deviation. Analysis was performed using Excel program (version 5.0), and a P value of <0.05 was regarded as significant.

Results

During the period of study, a total of 226 patients were recruited. The overall mortality was 13.7%, with 16.8% having severe CAP (requiring admission to the intensive care unit). The average age was 64 years with a range of 12 to 96 years (32% ≤50 years) (Fig. 1). The median length of hospital stay was 6 days (Fig. 2).

Low-risk patients formed 21% of all CAP admissions and there was no hospital mortality in this group, or requirement for ICU admission. Compared to the other patients with CAP, the low-risk group had a significantly shorter hospital length of stay and lower hospitalisation charges (Table I). Only one of the low-risk patient was bacteraemic (*Burkholderia pseudomallei*), and none of the low-risk CAP patients required mechanical ventilatory support for respiratory failure. Overall, the low-risk patients were responsible for nearly 9% of total hospitalisation charges for all CAP patients.

Fifty-two per cent (16 patients) of those that died were not admitted to ICU. Two patients had carcinomas, and 6 were bed-bound from chronic illness and were elderly (>75 years old). For those requiring ICU admission (severe CAP), the mean age was 73 (±8) years, and the average length of hospital stay was 7 (± 6) days.

Microbiological studies identified a positive organism in 39% of cases, and overall, 7.5% were bacteraemic (10 gram-positive organisms, and 7 gram-negative organisms). Two patients had bacteraemic melioidosis (*Burkholderia pseudomallei). S treptococcus pneumoniae* was isolated in sputum and blood cultures in 16 patients (7.1%); *Haemophilus influenzae* in 11 patients (5%); *Staphylococcus aureus* in 8 patients (3.5%); Mycoplasma serology was positive in 6 patients (2.7%); *Klebsiella pneumoniae* in 18 patients *(8%); Pseudomonas aeruginosa* in 6 patients *(2.7%); Eschevichia coli* in 4 patients (1.8%); and *Pneumocyctis carinii* in 2 patients with HIV. The remaining cultures were gram-positive in 4 cases (1.8%), and gram-negative in 11 cases (5%).

Discussion

The study has an overall inpatient mortality of 13.7%. This fits very well with the combined data from a total of 127 studies (13.7%).[6] It is important to note that severe CAP patients who obviously have a higher mortality[7] were also included in this study, and may bias the overall mortality figures to be higher. However, they only represented a minority (16.8%) of the overall cases. Low-risk CAP patients formed nearly one-fifth of all our hospitalised CAP patients. These patients had no hospi-

TABLE I: COMPARISON OF LOW-RISK CAP PATIENTS WITH OTHER HOSPITALISED CAP PATIENTS

	Low risk	Others
Number of patients (%)	47 (21%)	179 (79%)
Age (years)	33 (± 10)	65 (± 19)
Mortality (%)	0	31 (17%)
Bacteraemic	1 (2%)	16 (9%)
Length of hospital stay (days)	6.4 (± 5.2)*	10 (± 11.5)
Hospitalisation charges	$2,160 (± $1,940)*	$5,770 (± $8,000)

CAP: community-acquired pneumonia; *P <0.05 on t-test.

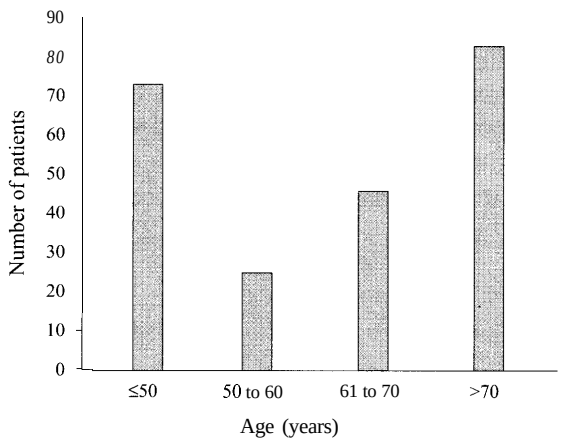

Fig. 1. Distribution of ages for hospitalised CAP

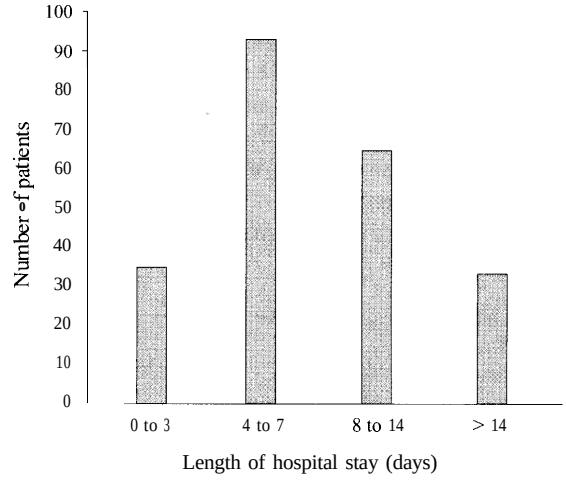

Fig. 2. Distribution of length of hospitalisation for CAP.

tal mortality and had significantly shorter length of hospital stay, and incurred consequently lower hospitalisation charges. In order to arrive at the true cost-savings for treating low-risk CAP as outpatient, we would require the outpatient treatment cost. One would, however, anticipate that the outpatient cost would be considerably less than the estimated average cost of a hospitalised low-risk CAP patient.

Other methods of cost savings have been employed by other investigators including antibiotic monotherapy,[8] and earlier usage of oral antibiotics.[9] In addition, current American Thoracic Society's recommendations[10] have stratified CAP patients into different severity groups, and have based initial empiric antimicrobial choice depending on the patient's clinical severity. Surprisingly, the implementation of this recommendation for outpatient therapy only resulted in a cost-saving (antimicrobial cost) for those aged 60 years or younger with no co-morbidity, while it appeared to cost more for those older than 60 years or those with co-morbidity." This may suggest that as patients become sicker, protocolised treatment, especially with regards to the choice of empiric antibiotics may be less useful resulting in more complications and higher overall costs. Other investigators have suggested that accuracy of diagnosis, choice of antibiotics and patient location in the hospital (ward versus ICU) may also impact on cost and outcome.[5]

The main costs of treating CAP are incurred in the hospitalised patient. In the United Kingdom, hospitalised CAP patients form 87% of the annual treatment cost, although they only form 38% of the total episodes of CAP.[12] An outpatient CAP patient would iccur cost of only 100 pounds on average, while it may cost up to 5,000 pounds if the patient is hospitalised.[12]

Outcome of outpatient treatment of low-risk patients remains to be defined prospectively, although there is data to suggest that there is no difference in outcome when admission rates vary because patients come from a rural address as opposed to an urban setting.'" In order to encourage more and safe outpatient treatment, facilities for outpatient intravenous antimicrobial therapy and home nursing care have to be improved, and CAP patients in the low-risk category have to be identified accurately.[14]

This current study has identified a potential group that may be managed as outpatients with significant cost-savings. However, further prospective studies will be required to validate the safety of such a policy and the actual cost-savings. Other potential areas of cost-savings are to facilitate earlier hospital discharge and standardisation of antimicrobial agents.

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