

Healthcare reconsultation in working-age adults following hospitalisation for community-acquired pneumonia

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ABSTRACT

Community-acquired pneumonia (CAP) is associated with prolonged symptom persistence during recovery. However, the effect of the residual symptom load on healthcare utilisation is unknown. The aim of this study was to quantify healthcare reconsultation within 28 days of hospital discharge for an index episode of CAP, and explore reasons for these reconsultations. Adults of working age admitted to any of four hospitals in the UK, with a primary diagnosis of CAP, were prospectively studied. Of 108 patients, 71 (65.7%) reconsulted healthcare services within 28 days of discharge; of these, 90.1% consulted their GP. Men were less likely to reconsult than women (adjusted odds ratio [aOR] 0.34, 95% confidence interval 0.13–0.91, $p=0.032$). Persistence of respiratory symptoms accounted for the majority of these reconsultations. Healthcare utilisation is high in working-age adults after an episode of hospitalised CAP and, in most cases, is due to failure to resolve index symptoms.

KEYWORDS: Pneumonia, adults, reconsultation, symptoms, recovery

Introduction

Morbidity resulting from community-acquired pneumonia (CAP) can persist long after physician-determined recovery or ‘clinical cure’.¹ Recovery is further prolonged in individuals requiring hospital admission for treatment of their illness.^{2,3} Previous studies have shown that between 35–86% of patients report at least one CAP-related symptom 1 month after their index hospital admission.^{4,5} Symptom persistence is recognised to

impact subsequent healthcare reconsultation; even in patients with low-severity CAP, higher symptom loads during recovery were associated with increased rates of pneumonia-related healthcare reconsultations.⁶

Therefore, rates of healthcare reconsultation can be used as a surrogate for gauging significant residual morbidity after an episode of CAP requiring hospital admission. Hospital readmission rates are easily measured and have been extensively reported.^{7,8} However, these rates alone are likely to underestimate the overall burden of healthcare utilisation following an index admission of CAP. Primary care consultation rates following hospital discharge remain relatively unknown. An analysis using the US Medicare database reported that over 70% of patients over the age of 65 years required further healthcare follow-up within 30 days of discharge for a hospitalised episode of CAP, with 4–12% requiring either a visit to the emergency department or re-admission.⁹ Younger working-age adults without significant comorbidity have lower rates of adverse outcomes and thus, healthcare reconsultation rates might be expected to be lower and potentially modifiable.^{10,11} However, there are currently no data on either overall rates of healthcare utilisation or reasons for these reconsultations in these younger individuals.

This study was designed to quantify overall healthcare reconsultation rates following hospital discharge for an index episode of CAP, and to describe reasons underpinning these healthcare reconsultations in working-age adults.

Methods

Study design

A prospective cohort study was conducted across four hospitals in the East Midlands, between February 2015 and April 2016. Adults, aged 18–65 years inclusive, admitted to hospital and treated for a primary diagnosis of CAP were eligible for study enrolment. Community-acquired pneumonia was defined as the presence of consolidation on the admission chest radiograph and one or more symptoms of acute lower respiratory tract infection (ie dyspnea, cough, fever and/or sputum production). Exclusion criteria included a hospital admission in the 10 days preceding the index admission, postobstructive pneumonia because of bronchogenic tumour, tuberculosis, aspiration pneumonia and the inability to obtain informed consent in English.

Treatment of the illness occurred at the discretion of the patient’s clinical team. Patient demographics and clinical

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information, including results of radiological and microbiological investigations, were collected by the study team after informed consent was obtained. Twenty-eight day readmission and mortality data were collected by interrogation of hospital clinical records. Between 4 and 6 weeks following hospital discharge, study participants were contacted by telephone to complete a further structured questionnaire regarding healthcare consultations, residual symptoms and return to normal activities. For those participants that were not contactable at follow-up, primary health care providers (GPs) were contacted to obtain data regarding consultation that occurred within 4 weeks of hospital discharge. All study procedures were approved by the East Midlands – Derby Research Ethics Committee.

Statistical considerations

Sample size

Statistical analyses were performed using Stata/IC 13.1 (©StataCorp., 2013). The primary outcome of this study was the frequency of healthcare consultation within 4 weeks of hospital discharge. Healthcare consultation was defined as an episode of contact for any cause, subsequent to hospital discharge, with either of the following: primary care physicians or emergency care services (comprising accident and emergency (A&E) departments, healthcare walk-in centres, emergency care advice via telephone ['NHS 111 helpline'] or hospital readmission). Sample size calculations were estimated based on a consultation rate of 49% reported by Metlay *et al* in patients with low-severity CAP.⁶ For a precision of $\pm 1\%$ with a two-sided 95% confidence interval (CI) for a single proportion, a minimum of 96 patients was required for this study.

Statistical methods

The secondary objectives of this study were to examine the post-discharge morbidity of these working-age adults as measured by symptom persistence, antibiotic represcription rates, return to work and return to normal activity at follow-up. Loss to follow-up was defined as incomplete ascertainment of the primary outcome. Baseline demographics and comorbid diseases of adults who were consulted were compared to those who did not consult. Baseline performance status was defined as the patient's self-reported level of functioning prior to the onset of symptoms that precipitated the hospital admission, and graded by the World Health Organization (WHO) classification.¹² Pearson's chi-square or Fisher's tests were used to compare categorical variables. The independent association between patient characteristics and need for healthcare consultation were examined using a multivariable logistic regression model; age and the presence of comorbid disease (Charlson comorbidity index [CCI]) were included *a priori*. The variables included in the final model were those associated with healthcare consultation during univariate analysis ($p \leq 0.2$).

Results

Study population

In total, 126 patients met the study eligibility criteria and were enrolled into the study. Of these, four patients were found to have an alternative diagnosis and were subsequently excluded. Of the remaining 122 patients, 14 were lost to follow-up, leaving a

study population of 108 patients. Direct contact was made with 91 patients within 4–6 weeks of discharge to obtain symptom persistence and recovery to baseline data.

Baseline characteristics

The median age of the study population was 50.0 years (interquartile range [IQR]: 38.3–57.8) and 52 patients (48.2%) were male. Most patients had a baseline WHO performance status (PS) of 0 ($n=56$, 52.8%) or 1 ($n=43$, 40.6%). Overall, 54 adults (50.0%) had visited their GP in the month prior to their hospital admission for CAP; of these, 22 (40.7%) had received antibiotics in the community for treatment of their illness.

Most patients had no underlying comorbid disease; the median CCI was 0 (IQR 0–1). The severity of CAP illness was low in 96 (88.9%), moderate in 10 (9.3%) and high in 2 (1.9%) individuals (Table 1). *Streptococcus pneumoniae* was the most commonly isolated pathogen ($n=18$), representing 72.0% of cases where a causative pathogen was isolated and 16.7% of cases overall. Four patients (3.7%) developed secondary pulmonary complications of CAP consisting of an empyema ($n=3$) or a lung abscess ($n=1$). Critical-care admission was required for 10 individuals (9.3%) and no patients died within 28 days of admission. The median length of stay was 5 days (IQR 3–8).

Healthcare consultation

Healthcare consultation was reported in 71 patients (65.7%, 95% CI 56.2–74.2%) in the 4 weeks following hospital discharge. Of these, 64 patients (90.1%) consulted their GP and 13 patients (18.3%) made contact with the emergency care services; six patients had contact with both their GP and emergency care services. Five patients (4.6%) were readmitted to hospital within 4 weeks of discharge; of these, three individuals had seen a GP between discharge and readmission. Nine patients visited their GP on more than one occasion. Most patients who sought healthcare advice, did so within the first 2 weeks of discharge, both at the GP and with emergency care services (Table 2). In a multivariable logistical regression model, with adjustment for age, comorbidity level and baseline PS, men were 66% less likely to consult compared to women (adjusted odds ratio [aOR] 0.34, 95% CI 0.13–0.91, $p=0.032$). No other variables were associated with healthcare consultation.

Of the 64 patients who consulted their GP following hospital discharge, respiratory symptoms of cough, dyspnoea, chest pain and sputum production were the most common complaints. Respiratory symptoms were reported by 44 (68.8%) patients; these symptoms persisted from the index episode of CAP in 37 (57.8%) of patients and were new in onset in 11 patients (17.2%). Slow recovery was the second most common reason for GP consultation (Table 3). Further antibiotic treatment was commenced in 22 patients (37.3%) at the time of the GP consultation; the presence of new-onset respiratory symptoms was associated with the receipt of further antibiotic treatment (OR 5.29, 95% CI 1.10–25.4, $p=0.020$). Of the 13 patients who had contact with emergency care services following hospital discharge, 11 presented with respiratory symptoms; these symptoms were persistent from the index episode of CAP in seven patients. Further antibiotic treatment was prescribed for patients (37.5%).

Table 1. Baseline characteristics and outcomes of atients who reconsulted healthcare services compared to those who did not

| | Healthcare reconsultation (n=71) | No healthcare reconsultation (n=37) | OR (95%CI) | p-value |
|--|----------------------------------|-------------------------------------|------------------|--------------|
| Baseline demographics | | | | |
| Age | | | | |
| 18–35 years | 15 (21.1) | 10 (27.0) | Reference | 0.437 |
| 36–50 years | 27 (38.0) | 5 (13.5) | 3.6 (0.97–13.30) | |
| 51–65 years | 29 (40.9) | 22 (59.5) | 0.88 (0.33–2.34) | |
| Male | 28 (39.4) | 24 (64.9) | 0.35 (0.15–0.83) | 0.013 |
| Smoking status | | | | |
| Never | 27 (38.0) | 13 (35.1) | Reference | 0.748 |
| Ex | 21 (29.6) | 9 (24.3) | 1.12 (0.40–3.15) | |
| Current | 23 (32.4) | 13 (35.1) | 0.85 (0.33–2.22) | |
| Baseline Performance Status^a | | | | |
| 0 | 32 (45.1) | 24 (64.9) | Reference | 0.149 |
| 1 | 34 (47.9) | 9 (24.3) | 2.83 (1.11–7.22) | |
| 2–4 | 4 (5.6) | 3 (8.1) | 1.00 (0.20–4.96) | |
| In employment^b | 49 (83.1) | 22 (68.8) | 2.23 (0.79–6.24) | 0.118 |
| Comorbid conditions | | | | |
| Charlson comorbidity index ^a | 0 (0–1) | 1 (0–1) | 0.94 (0.64–1.38) | 0.368 |
| Chronic respiratory disease | 15 (21.1) | 9 (24.3) | 0.83 (0.32–2.15) | 0.706 |
| Diabetes | 11 (15.5) | 4 (10.8) | 1.51 (0.44–5.17) | 0.506 |
| Ischaemic heart disease | 2 (2.8) | 4 (10.8) | 0.24 (0.04–1.42) | 0.178 |
| Congestive heart failure | 1 (1.4) | 0 (0.0) | n/a | - |
| Chronic renal disease | 3 (4.2) | 2 (5.4) | 0.75 (0.12–4.75) | 1.000 |
| Liver disease | 1 (1.4) | 0 (0.0) | n/a | - |
| Cerebrovascular disease | 0 (0.0) | 1 (2.7) | n/a | - |
| Active malignancy | 4 (5.6) | 4 (10.8) | 0.49 (0.11–2.12) | 0.442 |
| Severity of disease | | | | |
| Low severity (CURB65≤1) | 63 (88.7) | 33 (89.2) | Reference | 0.915 |
| Moderate severity (CURB65=2) | 7 (9.9) | 3 (8.1) | 1.22 (0.29–5.08) | |
| High severity (CURB65≥3) | 1 (1.4) | 1 (2.7) | 0.52 (0.03–8.80) | |
| Patient symptoms at admission | | | | |
| CAP symptom score ^c | 30.2 (18.3–53.3) | 34.0 (18.9–45.6) | 0.99 (0.96–1.02) | 0.607 |
| Radiographic findings | | | | |
| Multilobar pneumonia | 23 (32.4) | 10 (27.0) | 1.17 (0.48–2.88) | 0.725 |
| In-hospital outcomes | | | | |
| Complication due to CAP | 2 (2.8) | 2 (5.4) | 0.46 (0.06–3.49) | 0.593 |
| ICU admission | 6 (8.5) | 4 (10.8) | 0.79 (0.21–3.00) | 0.737 |
| Length of stay | 5 (3–8) | 5 (3–8) | 1.01 (0.96–1.07) | 0.623 |

Data as n (%) unless otherwise specified. ^aMedian (Interquartile range). ^bData available for 91 patients. ^cComplete data available for 45 patients. ICU = intensive care unit; OR = odds ratio

Table 2. Timing of healthcare reconsultation after hospital discharge

| Time after hospital discharge | Frequency of healthcare reconsultation visits ^a | |
|-------------------------------|--|-------------------------------|
| | GP (n=59) | Emergency care service (n=13) |
| Week 1 | 20 (33.9) | 4 (30.8) |
| Week 2 | 21 (35.6) | 6 (46.2) |
| Week 3 | 4 (6.8) | 2 (15.4) |
| Week 4 | 12 (20.3) | 1 (7.7) |
| ≥Week 5 | 2 (3.4) | 0 (0.0) |

^aNine patients visited their GP on more than one occasion and six patients required visits to both their GP and emergency care services

Secondary study objectives

Symptom persistence and recovery

Of the 91 patients that completed a telephone follow-up, 53 (58.2%) reported persistent symptoms; these symptoms included cough (n=29, 31.9%), dyspnoea (n=25, 27.5%), chest pain (n=15, 16.5%), fatigue (n=11, 12.1%) and sputum production (n=10, 11.0%).

Return to work and activities of daily living

In total, 70 patients were known to be in employment at the time of the study; of these, 46 (65.7%) had returned to work by 4 weeks. Data regarding return to activities of daily living (ADL) were obtained for 88 patients; 43 (48.9%) reported full return to baseline ADL.

Discussion

Summary of results

The main finding of this study was that, in working-age adults, overall healthcare reconsultation rates were high following hospitalisation

for a diagnosis of CAP, with nearly two-thirds seeking further healthcare advice following discharge. Over 90% of healthcare utilisation occurred primarily at the primary care interface and within the first 2 weeks after discharge. Concern about persistent respiratory symptoms was the main reason for reconsultations.

Comparison with existing literature

The full extent of healthcare reconsultation after an episode of CAP requiring hospitalisation is poorly reported. In a single-centre study conducted in Spain, Adamuz *et al* reported that 34% of patients discharged with CAP had an episode of healthcare reconsultation within 30 days of discharge.¹³ In contrast to our study, most of these episodes were A&E visits (63%) with GP visits only representing over 52.8% of healthcare reconsultation episodes. A Dutch study using coding-derived data showed an even smaller proportion of patients (8%) requiring GP consultations in the month following discharge from hospital.¹⁴ The US Pneumonia Patient Outcomes Research Team (PORT) reported that 59% of patients had a pneumonia-related ambulatory care visit in the month following a diagnosis of CAP.⁶ However, in that multicenter study, over 60% of patients were treated in the community for their index diagnosis of CAP and no data are reported regarding rates of healthcare reconsultation in the hospitalised cohort alone.

An unexpected result arising from this study was that the single independent predictor of healthcare reconsultation was female gender, with women being over three times more likely to seek healthcare advice after discharge.¹⁵ This association in patients with CAP has not been observed previously. Differences in healthcare-seeking behaviour between women and men, most marked in younger adults, may account for this result.¹⁶ Although the appropriateness of GP or hospital reconsultation was not specifically assessed, only seven of the 64 patients who reconsulted their GP reported doing so solely for 'routine' reasons (eg sick notes, medication reviews and reassurance). All other patients described symptoms that prompted healthcare review. Antibiotic treatment was commenced in over one-third of all patients who reconsulted at the GP. Although it would be convenient to ascribe the prescription of further antibiotics as a measure of

Table 3. Patient-reported reasons for healthcare reconsultation

| Symptoms necessitating healthcare reconsultations at primary or emergency care | GP (n=64) | | | Emergency care services (n=13) | | |
|--|-----------|---------|------------|--------------------------------|----------|------------|
| | All | New | Persisting | All | New | Persisting |
| Shortness of breath | 31 (48.4) | 3 (4.7) | 28 (43.8) | 4 (30.8) | 2 (15.4) | 2 (15.4) |
| Cough | 26 (40.6) | 5 (7.8) | 21 (32.8) | 6 (46.2) | 2 (15.4) | 4 (30.8) |
| Sputum production | 17 (26.6) | 2 (3.1) | 15 (23.4) | 3 (23.1) | 1 (7.7) | 2 (15.4) |
| Chest pain | 8 (12.5) | 3 (4.7) | 5 (7.8) | 5 (38.5) | 1 (7.7) | 4 (30.8) |
| Slow recovery | 27 (42.2) | | | 3 (23.1) | | |
| Other reason* | 35 (54.7) | | | 7 (53.9) | | |

Data presented as n (%)

*Other reasons for reconsultation at GP: seven patients, sick note; four patients, fever; three patients, fatigue; two patients, medication review; one patient for each of: anxiety, hearing loss, anorexia, rash, sciatica symptoms, 'shaking' episode, wheeze, coryzal symptoms, haemoglobin check, aphonia, oral candidiasis, reassurance, return-to-work check, rhinitis, tonsillitis, gastrointestinal reflux disease, shoulder pain; at emergency care services: two patients, fatigue; two patients, diarrhoea or vomiting; one patient for each of: paraesthesia, autoimmune disorder, weight loss, dehydration, dysphonia.

appropriateness of reconsultation, reasons for antibiotic prescribing in primary care vary¹⁷ and reconsultation for reassurance (without antibiotic prescription) may still be appropriate. These findings suggest that there is scope for improvements in the management of patients discharge from hospital with the aim of reducing both reconsultation rates and antibiotic use.

The most frequent reason for healthcare reconsultation was the presence of respiratory symptoms, particularly dyspnea and cough, occurring in 69% of patients that visited their GP. Furthermore, of the patients who reconsulted with respiratory symptoms, these symptoms were persistent from their index episode of CAP in 84% of cases. In other studies investigating healthcare reconsultation following a diagnosis of CAP, reasons for reconsultation were investigator assigned and, therefore, classification of reasons for healthcare utilisation were less specific than that reported by our study.^{6,13} Regardless, in keeping with our data, respiratory symptoms were the most frequently observed symptoms, and accounted for 75% of visits to primary care physicians.¹³

At 4 weeks following hospital discharge, nearly 50% of adults described themselves as being asymptomatic; this compares with rates of only 13–36% reported in other studies.^{5,18} The reasons for the lower residual symptom burden in this current analysis may be attributable to the younger age of our study population; younger age has been described as an independent predictor of CAP symptom resolution.¹⁸ Specifically, persistence at follow-up of respiratory symptoms (11.0–31.9%) and fatigue (12.1%) were less common in this study compared with previous data.^{5,6,19–21} Despite the lower prevalence of persistent symptoms at follow-up in this study, the proportion of employed patients who had returned to work were similar to that previously described elsewhere (42–69%).^{2,5,22,23}

Strengths and limitations of this analysis

This study has several strengths, including the detailed prospective collection of clinical data and the inclusion of four hospital sites, which allowed for diversity of patient population demographics across hospital catchment areas. Direct GP contact and the use of patient electronic healthcare records allowed for minimal loss to follow-up for healthcare utilisation. The main limitation of this analysis was that patients recruited into the study were not consecutive patients with a diagnosis of CAP and, as such, there might be sampling bias; patients with high-severity disease or high comorbidity levels might have been less likely to be enrolled. Given that we would expect patients who were more severely ill to be more likely to reconsult following hospital discharge, our estimates of healthcare reconsultation are likely to be conservative. A further limitation is that this study was not powered to investigate risk factors associated with healthcare reconsultation, and, therefore, there might be independent patient characteristics accounting for healthcare utilisation after discharge that we were unable to detect. Finally, we were unable to measure physiological parameters at healthcare reconsultation, such as respiratory rate and temperature. These objective measures might be of use in future studies to determine whether there are any differences between those who reconsult and those who do not.

Concluding remarks

Physician-rated clinical cure is commonly used as an outcome measure of CAP recovery.^{24,25} However, clinical cure does not

reflect patients' perspectives of recovery and, in reality, patient-reported symptomatic resolution lags significantly behind physician-rated clinical cure.^{1,5,26}

The frequency of healthcare reconsultation reported in this study is higher than expected, given the low disease severity and comorbidity of the study population of working-age adults. The principal reason for further healthcare utilisation in these adults was persistence of respiratory symptoms, and mainly occurred at the primary care level within 2 weeks of hospital discharge. Hospital readmission rates were low. All patients should be informed about the expected course of symptom resolution, as recommended by the National Institute for Health and Care Excellence.²⁷ The development of targeted interventions to improve patient understanding about the recovery process could help to decrease reconsultation rates and improve patient experience. However, randomised controlled trials are required to assess the cost-effectiveness of such interventions. ■

Funding

There was no funding obtained for the conduct of this study.

Ethical approval

Ethical approval was obtained prior to study commencement, from the Health Research Authority (previously National Research Ethics Service) Regional Ethics Committee East Midland – Derby. Approval reference number: 14/EM/1289.

Author contributions

TB, DA and WSL were involved in the study design and conception. PD, TB, DA, DS and LL were involved in data acquisition. PD, TB, TMM and WSL analysed and interpreted the data. PD, TB and WSL drafted the manuscript. All authors were involved in critically revising the manuscript.

Acknowledgments

The authors would like to thank Terri-Ann Sewell, Rebecca Boulton, Cheryl Heely and Victoria Moore at Kings Mill Hospital, and Alex Glover and Rosemary Sykes at the Royal Derby Hospital for their help with patient recruitment and data collection.

Conflicts of interest

PD and DA have received salaries derived from an unrestricted grant from Pfizer. WSL has received grants from the National Institute of Health Research and an investigator-initiated unrestricted grant from Pfizer.

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