Utility of follow-up recommendations for patients discharged with community-acquired pneumonia

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ABSTRACT

Introduction: The joint Canadian Infectious Diseases Society and Canadian Thoracic Society guidelines for community-acquired pneumonia (CAP) recommend 48–72 hour telephone follow-up of patients discharged from the emergency department (ED). The guidelines provide no evidence supporting this practice, and neither the clinical utility nor the effectiveness of such recommendations has been assessed. Our objective was to assess the utility of a 48–72 hour telephone follow-up protocol for patients discharged from the ED with CAP.

Methods: This was a retrospective chart audit covering a 2-year period (Jan. 3, 1999 to Jan. 3, 2001) after the introduction of a clinical practice guideline (CPG) that included routine 48–72 hour telephone follow-up of patients discharged from the ED with CAP. Eligible patients were identified in the ED database, rates of referral for telephone follow-up were recorded, and 30-day outcomes (death and readmission) for patients referred versus not referred were compared.

Results: During the study period, 867 patients were identified as being eligible for the study. The mean age was 55.7 years (range 16–98 yr), and mean pneumonia severity index (PSI) was 68.9 (range 6–187). Despite the CPG, only 148 patients (17.1%) were referred for telephone follow-up. Age, demographics, comorbidity, clinical status and pneumonia severity were similar for referred and non-referred patients. Thirty-day death (2.5%) and readmission rates (3%) were strongly related to PSI score, but did not differ significantly in the 2 comparison groups.

Conclusion: In this setting, physicians were poorly compliant with a routine telephone follow-up protocol. The likelihood of referral for follow-up did not correlate with pneumonia severity, and follow-up referral did not appear to affect patient outcome. These findings do not support recommendations for routine early follow-up mechanisms beyond those already existing in the community.

Key words: pneumonia; outpatient; follow-up; clinical practice guideline

RÉSUMÉ

Introduction : Les lignes directrices de la Société canadienne des maladies infectieuses et de la Société canadienne de thoracologie concernant la pneumonie acquise dans la communauté ont recommandé un suivi téléphonique de 48 à 72 heures pour les patients ayant reçu leur congé du département d'urgence (DU). Les lignes directrices ne fournissent aucune preuve appuyant cette pratique et ni l'utilité clinique ni l'efficacité de telles recommandations n'ont été évaluées. Notre

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objectif était d'évaluer l'utilité d'un protocole de suivi téléphonique de 48 à 72 heures pour les patients ayant reçu leur congé du DU avec une pneumonie acquise dans la communauté.
Méthodes : La présente étude consistait en une vérification rétrospective de dossiers couvrant une période de deux ans (3 janvier 1999 au 3 janvier 2001) ayant suivi l'implantation d'une ligne directrice en matière de pratique clinique qui incluait un suivi téléphonique de 48 à 72 heures pour les patients ayant reçu leur congé du DU avec une pneumonie acquise dans la communauté. Les patients admissibles furent identifiés à partir de la banque de données du DU, le taux de patients dirigés vers un suivi téléphonique fut noté et le devenir des patients après 30 jours (décès et réadmission) fut comparé entre les patients dirigés vers le suivi téléphonique et ceux qui ne le furent pas.
Résultats : Au cours de la période d'étude, 867 patients admissibles furent identifiés. L'âge moyen était de 55,7 ans (éventail 16–98 ans) et l'indice moyen de gravité de la pneumonie était de 68,9 (éventail 6–187). Malgré la ligne directrice en matière de pratique clinique, seulement 148 patients (17,1 %) furent dirigés vers un suivi téléphonique. L'âge, le profil démographique, la comorbidité, le statut clinique et la gravité de la pneumonie étaient semblables pour les patients dirigés vers un suivi téléphonique et pour les autres. Le décès après trente jours (2,5 %) et le taux de réadmission (3 %) étaient fortement liés au score de l'indice de gravité de la pneumonie, mais n'étaient pas très différents entre les deux groupes de référence.
Conclusion : Dans le cadre de cette étude, le respect du protocole de suivi téléphonique de routine par les médecins était médiocre. La probabilité que les médecins dirigent les patients vers un suivi téléphonique n'avait pas de rapport avec la gravité de la pneumonie et la demande de suivi ne semble pas avoir affecté le devenir des patients. Ces constatations ne justifient pas les recommandations de mise en place de mécanismes de suivi de routine précoce au-delà de celles qui existent déjà au sein de la communauté.

Introduction

Clinical practice guidelines (CPGs) have been shown to decrease admission rates and hospital lengths of stay for community-acquired pneumonia (CAP).[1–3] They are well accepted by physicians and improve process measures associated with improved outcomes.[4–7] Most contemporary guidelines recommend the Pneumonia Severity Index (PSI) scoring system to guide emergency department (ED) disposition decisions; however, Fine and colleagues, the PSI authors, cautioned that their prediction rule required validation in prospective trials to confirm its effectiveness and safety.[8] As a result, the current joint Canadian Infectious Diseases Society and Canadian Thoracic Society guidelines for CAP suggest that patients treated in the outpatient setting "must be carefully monitored to ensure compliance and clinical improvement" and that "follow-up by telephone with the patient or a return clinic visit within 48–72 h is strongly suggested."[9] These practices have time and resource costs, and their clinical utility has not been assessed.

In January 1999, a multidisciplinary committee with ED representation developed a CPG for patients with CAP. All stakeholder groups were invited to provide input, and an intensive campaign to educate staff and residents about the guideline was carried out. The CPG defined eligible patients as those with evidence of consolidation on physical examination (crackles, dullness to percussion, or egophony), a new pulmonary infiltrate on x-ray compatible with pneumonia AND at least 2 of the following: fever, cough, pleuritic chest pain or shortness of breath. Exclusion criteria included HIV/AIDS with a CD4 count <200, a history of solid organ or bone marrow transplantation, immunosuppressive drug use (including prednisone >10 mg/d for >2 months), hematological malignancy, suspicion or diagnosis of tuberculosis, cystic fibrosis, hospitalization within 14 days, or admission to the intensive care unit. Among the recommendations of the CPG are disposition directions (Appendix 1) advising discharge for all patients with a PSI <90, (Fine risk Classes I–III[8]) who met 4 additional discharge criteria. The CPG also specified a first dose of antibiotic in the ED before discharge for patients with PSI scores from 71–90. The protocol included instructions for all patients to be referred to the Discharge Planning Service (DPS) for telephone follow-up in 48–72 hours. DPS is a group of registered nurses who facilitate the transit of complex cases between the ED and community.

Our objective in this study was to assess the utility of the 48–72 hour follow-up call protocol in patients discharged from the ED with CAP.

Methods

Setting and patients

This retrospective audit was performed at the Queen Elizabeth II Health Sciences Centre, Halifax, a 978-bed adult teaching hospital with 70 000 ED visits/year.

The ED's shadow billing database was used to identify all patients discharged with a diagnosis of pneumonia between Jan. 3, 1999, and Jan. 3, 2001. Eligible patients included those with discharge ICD-9 (International Classification of Diseases, 9th rev) codes 480–486, or 514.* Patients were excluded if the visit was for pneumonia already under treatment and no change in medication was made during the ED visit.

Data collection

Before data collection began, a pre-defined audit procedure was developed. This included specific guidelines for where in the chart each data element was to be gathered, an algorithm for locating missing data, and guidelines for processing imprecise or unclear data (the latter based on the definitions of coexisting disease described by Fine and colleagues[8]). Data elements that did not clearly fit into the audit guidelines were clarified by consensus. Prior to actual data collection, the 3 data abstractors (S.G.C., D.D.M. and A.H.) piloted the abstraction procedures on samples of 30 medical records to ensure that there was no variability in the quality or interpretation of data obtained by each abstractor. After every 10 records, results were compared for variation, and reasons for the variation were addressed. By the last 30 records, no differences occurred in the data collected from each record. During data collection, periodic meetings were held with the abstractors and study coordinator to review abstraction rules and to identify aspects of data that were not clearly addressed in the audit protocol. To minimize transcription errors, data were entered directly into a computerized data abstraction form at the time of the chart audit.

Key variables and outcomes

Pneumonia severity scores were calculated automatically by a program built into the database using clinical information abstracted from the hospital chart. In cases where the treating physician had recorded a PSI score that differed from the study calculation, the physician's real-time score was used. Readers are referred to Fine and colleagues[8] for a more detailed description of the PSI. Abstractors were blinded as to patient outcome and to which patients had been identified as referred for audit on the DPS database.

The DPS database was used to identify which of the patients with pneumonia had been referred for the 48–72 hour follow-up call protocol. Predictor and outcome variables were compared in the 2 pre-specified groups (referred v. not referred).

Thirty-day readmission and mortality rates were determined by searching databases from the only 2 hospitals in the area with inpatient facilities and from the provincial coroner, respectively. These outcomes were independently gathered by an investigator blinded to the results of the chart audit (D.M.M.).

Data analysis

Outcome differences between patients who were referred and those not referred to the DPS were compared using a chi-squared test for categorical data. In cases where the cell frequency was less than 5, a one-sided Fisher's exact test was performed. Continuous data were compared using an unpaired *t* test for normally distributed data and a Mann–Whitney U test for data that were not normally distributed.

Results

A total of 888 cases were identified for review, 858 from the ED shadow billing database and 30 from the DPS records. Of these, 21 (2.4%) were excluded, including 18 who had "resolving" pneumonia and 3 for whom charts could not be found.

Table 1 summarizes baseline characteristics and outcomes for the 867 patients discharged with CAP. In the study group, 71 patients (8.2%) were discharged to nursing homes and 148 (17.1%) were referred for 48–72 hour DPS follow-up. Of the 867 patients discharged, 685 (79%) met the hospital CPG discharge criteria defined above, including a PSI score <91. Of these, 13 (1.9%) were readmitted, and 5 (0.76%) died within 30 days. In the group of 182 patients (21.0%) who were discharged with PSI scores >90 (against CPG recommendations), 13 (7.1%) required readmission and 17 (9.3%) died.

Overall, 22 patients (2.5%) died, and 26 (3%) were readmitted. Mean age among the 22 patients who died was 77.9 years (range 21–98 yr, standard deviation [SD] 17.9) and mean PSI score was 114.9 (SD 32.7). Fourteen of the 22 deaths occurred outside hospital, and 8 occurred after readmission. Four of the 22 deaths had been referred for

*480 (viral pneumonia), 481(pneumococcal pneumonia), 482 (other bacterial pneumonias), 483 (pneumonias due to other specified organisms), 484 (pneumonia in infectious diseases classified elsewhere), 485 (bronchopneumonia, organism unspecified), 486 (pneumonia, organism unspecified), 514 (pulmonary congestion and hypostasis).

DPS follow-up, and only one was readmitted prior to death (this patient was readmitted prior to the follow-up call). Ten (45.5%) of the 22 patients who died had been discharged to nursing homes, and only 1 had a PSI score <91. At least 8 of the 22 patients who died (36.3%) were not expected to survive, based on documented discussions with next-of-kin regarding the poor prognosis, and on written orders limiting interventions to "comfort care" only.

Table 2 summarizes 30-day mortality and DPS referral rates stratified by Fine Class,[9] showing that referral rate was not statistically associated with pneumonia severity ($p = 0.13$). Table 1 shows that demographics, comorbidity and clinical status were similar for referred and non-referred patients, and that there were no significant differences in 30-day death (2.7% v. 2.5%; $p = 0.5$) or readmission rates (4.7% v. 2.6%; $p = 0.18$) between the groups. Of note, none of the readmissions resulted from a DPS follow-up call advising the patient to return to hospital.

An analysis of physician referrals showed no association between the number of CAP cases treated and the rate of

Table 1. Key predictor and outcome variables in the study sample

	No. (and %) of patients*		
Variables	Referred *n* = 148	Non-referred *n* = 719	Total *n* = 867
Demographics			
Mean age, yr	59.1	54.9	55.7
Male gender	80 (54.1)	356 (49.5)	436 (50.3)
Nursing home resident	6 (4.1)	65 (9.0)	71 (8.2)
Comorbidity†			
Asthma	19 (12.8)	63 (8.8)	82 (9.5)
Congestive heart failure	4 (2.7)	36 (5.0)	40 (4.6)
COPD	17 (11.5)	89 (12.4)	106 (12.2)
CVA/TIA	5 (3.4)	30 (4.2)	35 (4.0)
Diabetes	10 (6.8)	65 (9.0)	75 (8.7)
Ischemic heart disease	23 (15.5)	107 (14.9)	130 (15.0)
Current malignancy	6 (4.1)	17 (2.4)	23 (2.7)
Prior malignancy	13 (8.8)	42 (5.8)	55 (6.3)
Clinical status			
Mean PSI score	66.1	69.5	68.9
Altered mental state	6 (4.1)	34 (4.7)	40 (4.6)
Respiratory rate ≥30 breaths/min	10 (6.8)	30 (4.2)	40 (4.6)
Systolic BP <90 mm Hg	1 (0.7)	15 (2.1)	16 (1.8)
Temperature <35°C or ≥40°C	2 (1.4)	13 (1.8)	15 (1.7)
Pulse ≥125 beats/min	14 (9.5)	43 (6.0)	57 (6.6)
Urea >11 mmol/L	5 (3.4)	37 (5.1)	42 (4.8)
Sodium <130 mmol/L	2 (1.4)	5 (0.7)	7 (0.8)
Glucose ≥14 mmol/L	4 (2.7)	13 (1.8)	17 (2.0)
Hypoxia (0_2 sat <90%)	9 (6.1)	37 (5.1)	46 (5.3)
Pleural effusion	7 (4.7)	36 (5.0)	43 (5.0)
Outcomes			
Readmit within 30 days	7 (4.7)	19 (2.6)	26 (3.0)
Death within 30 days	4 (2.7)	18 (2.5)	22 (2.5)

*Unless otherwise specified.
†Conditions with <2.0% prevalence eliminated.
COPD = chronic obstructive pulmonary disease; CVA = cerebrovascular accident; TIA = transient ischemic attack;; BP = blood pressure

DPS referral. Rather, it showed that 4 physicians (14% of the EP group) who saw 24.5% of CAP patients accounted for 56.1% of all DPS referrals.

Discussion

Evidence supporting clinical practice is often lacking, and many recommendations found in national guidelines are based largely on expert opinion. Given that 80% of CAP patients are managed as outpatients,[1] it is likely that the experts who develop clinical guidelines are not the same people who treat most of these ambulatory patients and it is also likely that guideline developers may have an incomplete understanding of the practicality of their recommendations. Compliance with clinical pathways is often challenging,[10–12] and recommendations that are difficult to follow will further reduce the uptake of CPGs. Clinical guidelines should be reviewed regularly, and where evidence for recommendations is lacking, such evidence should be sought.

In this cohort, the institution's CAP guideline was not well followed, as evidenced by the fact that 21% of patients with PSI scores >90 were discharged against protocol recommendations and that only 17% of eligible CAP patients were referred for DPS follow-up. There are several possible explanations for this noncompliance. First, in the study sample, there were 390 patients (45%) with PSI scores <71 (Fine Classes I and II) and expected mortality of less than 0.6%.[9] It may be that the physicians treating these patients were not particularly concerned about the likelihood of bad outcomes, and therefore neglected or forgot to refer them for DPS follow-up. Interestingly, DPS follow-up referral was not significantly associated with age or pneumonia severity (Table 1), raising the possibility that physicians were unconvinced of its utility, even in higher risk patients. Interestingly, of 26 patients readmitted within 30 days of ED discharge, 7 (26.9%) had been referred to the DPS and none were readmitted as a result of a follow-up call. For patients that were referred for 48–72 hour follow-up, we found no evidence that the practice improved outcome.

Table 2. No. of patients referred to DPS telephone follow-up, as categorized by Fine Class,[9] and 30-day mortality

		No. (and %) of patients		
Fine Class	PSI score	Total	Referred to DPS	Mortality
I–II	<71	482	81 (16.8)	1 (0.2)
III	71–90	203	42 (20.7)	4 (2.0)
IV	91–130	159	24 (15.1)	9 (5.7)
V	>130	23	1 (4.3)	8 (34.8)
Total (I–V)		867	148 (17.1)	22 (2.5)

DPS = Discharge Planning Service; PSI = Pneumonia Severity Index

Discharge planning nurses reported that the follow-up calls were well received by patients, but that the process added to their already significant duty load. This added workload would have been considerable if all 867 outpatients had been referred as per protocol. Given the lack of apparent benefit and the significant workload cost, it may be reasonable to restrict DPS referral to patients the discharging physician is particularly concerned about, although this is speculation not proven by our data.

We concluded that the benefit of routine DPS referral for 48–72 hour follow-up is unlikely to be worth the cost and effort involved in carrying out and auditing the protocol. The findings of this study prompted our institution to drop the recommendation for routine referral of discharged CAP patients. Given that DPS follow-up is unlikely to improve outcomes for the majority of patients (with PSI scores of <91), our institution now uses DPS referral primarily for patients in whom outpatient management might be expected to be challenging, even though no definite indication for admission exists.

Limitations

All retrospective audits have inherent limitations, mainly related to incomplete data. To mitigate these, we used recommended retrospective audit methodology, including standardized data capture protocols, explicit predictor and outcome definitions and appropriately blinded abstractors, although we did not assess interobserver reliability. The fact that 30 cases were identified by the DPS database but were missed by the shadow billing database suggests that some unreferrred cases may have been missed by both databases. In addition, some eligible patients may not have been identified by ICD-9 codes; however, given current information technology constraints, our study represents the most feasible way to retrospectively audit protocol utility.

Another limitation is that patients were not randomized to the intervention and control (referred v. not referred) groups, so it is possible that there were significant unmeasured differences between groups that influenced the study outcome. An important limitation is that we did not determine how often patients were advised to seek, and sought, alternate follow-up (e.g., with their family physician or nursing home doctor). Therefore we cannot conclude that follow-up is unimportant — only that routine post-discharge telephone follow-up does not appear to improve outcomes. In addition,

the small number of outcome events (deaths and readmissions) would limit the power of this study to prove lack of benefit. If access to primary care follow-up is important, and if this differs between geographic regions, our findings may or may not be generalizable to other settings.

Finally, we were only able to determine readmission rates for the 2 inpatient facilities in the region. It is conceivable that some patients may have been admitted to hospitals in neighbouring regions or even remote provinces. Similarly, in using the Nova Scotia coroner to access data on deaths, we may have missed deaths that occurred out of the province, although it is unlikely these numbers would have been high enough to change the study conclusions.

Conclusion

After introducing a protocol for routine 48–72 hour telephone follow-up of discharged patients with CAP (as strongly suggested by national guidelines), we found that physicians were poorly compliant with the protocol and that outcomes were not significantly different in patients referred for follow-up versus those not referred. These findings do not support recommendations for routine early follow-up mechanisms beyond those that already exist in the community.

Competing interests: None declared.

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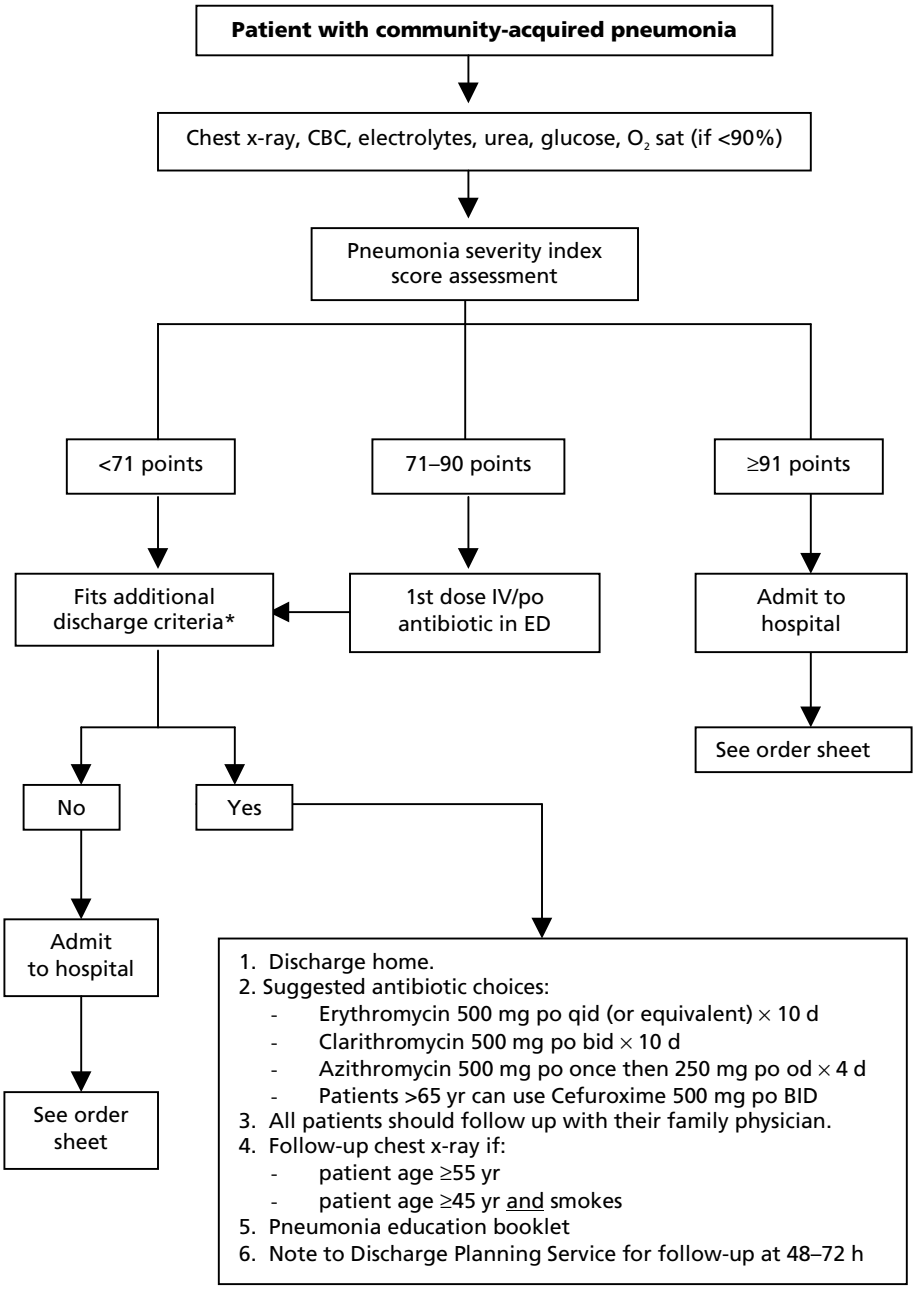

Appendix 1. Flow chart illustrating dispersal of patients with community-acquired pneumonia and list of additional discharge criteria used for present study.