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Improving the Quality of Pneumonia Care that Patients Experience

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Abstract

PURPOSE—Although many hospitals have reported attempts to reduce length of stay for patients hospitalized with community-acquired pneumonia, few have included efforts to educate patients to prepare them for earlier discharges. We aimed to improve patients' knowledge about pneumonia and their experiences with inpatient care as part of a multifaceted intervention that included attempts to reduce unnecessary time on intravenous antibiotics and length of hospital stay.

METHODS—We developed guidelines for the appropriate duration of intravenous antibiotics in patients with community-acquired pneumonia and collected baseline data retrospectively on patients discharged from October 1996 through April 1997. We surveyed these patients to assess knowledge and experience with care. Beginning in July 1997, we conducted a series of physician and nurse educational interventions (lectures, feedback of performance data, one-on-one education by peers). Patients received education about pneumonia from their nurses and a specially developed educational brochure. Following the interventions, we collected clinical and survey data on patients with pneumonia discharged from October 1997 through April 1998.

RESULTS—Among patients who responded to the survey (163 in the preintervention period; 114 in the postintervention period), fewer reported that no one went out of the way to help them (preintervention, 37% [n = 60]; postintervention, 6% [n = 7]; $P = 0.001$), more reported that they received all the information they needed to recover (75% [n = 122] vs. 94% [n = 107], $P = 0.02$), and more reported that they were told about danger signals of relapse (46% [n = 75] vs. 60% [n = 68], $P = 0.03$). Mean ($\pm$ SD) time on intravenous antibiotics decreased from 5.0 ± 3.7 days to 4.3 ± 3.3 days ($P = 0.04$).

CONCLUSION—The interventions improved patients' knowledge and experiences with care, while decreasing time on intravenous antibiotics.

More than 4 million adults in the United States are diagnosed with community-acquired pneumonia each year, including more than 1 million who are hospitalized (1,2). Many reports have documented the success of efforts to decrease time on intravenous antibiotics, length of stay, and overall costs for pneumonia patients, without adversely affecting

outcomes (3–11). However, these studies have rarely addressed patients' knowledge about their condition or their experiences with care (12). Patients usually report that they do not receive sufficient teaching or preparation for discharge before they leave the hospital (13,14). To optimize adherence and recovery, patients with pneumonia should know about their illness, its treatment, how long it might take them to recuperate, and what symptoms merit seeking medical attention after hospital discharge. We were concerned that with accelerated hospital courses, patients might be less likely to receive and understand this important information.

We attempted to improve patients' knowledge about and experiences with pneumonia care, while decreasing unnecessary time on intravenous antibiotics and days in the hospital. We assessed the effects of these interventions by comparing consecutive cohorts of patients in two time periods who were hospitalized for community-acquired pneumonia at an urban academic medical center.

METHODS

Collecting Baseline Data

We convened a multidisciplinary committee to develop and oversee implementation of evidence-based guidelines to improve the quality of pneumonia care. The committee adapted clinical criteria from national data (15) to define when patients have become sufficiently stable to permit switching from intravenous to oral antibiotics and consideration for discharge, unless they have conditions unrelated to pneumonia that require continued intravenous antibiotic treatment or hospitalization. Patients were considered stable when they met the following criteria twice consecutively and at least 8 hours apart: heart rate ≤ 100 beats per minute, respiratory rate ≤ 24 breaths per minute, temperature $\leq 37.5^{\circ}\text{C}$ (99.5°F), partial pressure of oxygen ≥ 60 mm Hg (or oxygen saturation $\geq 90\%$) on room air, able to maintain oral intake, and normal or baseline mental status. We excluded patients initially requiring intensive care; who had empyema or fungal, mycobacterial, or pneumocystis pneumonia; who had non-human immunodeficiency virus-related immunodeficiency; or who had nosocomial or recurrent pneumonia. For the remaining patients who were considered to have uncomplicated pneumonia, the committee recommended that switching to oral antibiotics should occur within 12 hours of reaching clinical stability, and that hospital discharge should occur within 24 hours of clinical stability.

To assess our practices before an intervention, trained nurses abstracted the medical records of the 628 patients over 18 years of age who had been discharged with a principal or secondary *International Classification of Diseases, Ninth Revision* diagnosis of pneumonia from October 1996 through April 1997. They excluded 160 patients with complicated pneumonia and 120 with normal chest radiographs or no fever or other clinical evidence of pneumonia. They evaluated the clinical course of the remaining 348 patients. Pneumonia severity was graded by the pneumonia severity index (16). One investigator (CRH) reviewed all abstracted records to ensure accuracy of coding for clinical stability and switch and discharge decisions. Deaths and emergency visits were ascertained through a combination of surveys of patients and proxies, and review of hospital databases at this academic institution.

We also developed a survey in English and Spanish. We used the Picker/Commonwealth Patient-Centered Care Survey (13) (items scored as yes/no/sometimes) to explore patients' views of the information and education they received about pneumonia, as well as the emotional support and discharge preparation provided to them. In addition, we asked about their postdischarge pneumonia-related symptoms using the Pneumonia Symptom Checklist (17) (items scored as yes/no and on 5-point severity scales) and ascertained which symptoms they would seek help for and their perceptions about their length of stay. We surveyed patients 4 to 7 weeks after their discharge. When patients were not competent to answer questions, a modified survey was administered to a proxy, such as a family member, nurse in nursing home, or home health aide. Nurses in nursing homes were asked an abbreviated list of questions, excluding the Picker and length-of-stay questions.

Developing Interventions

Following analysis of these data, we developed a series of interventions to improve patients' knowledge and experience with care. We also designed interventions to reduce the times from clinical stability to the switch to oral antibiotics and to discharge.

We developed a bilingual patient education handout advising patients what to expect and how to care for their pneumonia once home. The handout explains that it takes time to recover from pneumonia and recommends taking prescribed medications, eating healthy foods, avoiding tobacco products, and seeking medical help for specific warning signs, such as fever. We also educated attending physicians and house staff about the guidelines and our preintervention findings through one-on-one discussions with respected peers, lectures, and distribution of individualized data. Finally, 2 nurses educated all nurses and social workers on all shifts in all units that care for pneumonia patients in small, interactive groups. The nurses shared our findings and discussed ways to educate patients about pneumonia and postdischarge care, including using the brochure as a teaching aide. The interventions were conducted on the general medical inpatient units between July and November of 1997, and the patient education materials remained available from that time.

Assessing the Effects of Interventions

Using methods identical to those employed during the baseline data collection, we abstracted the medical records and surveyed patients discharged with pneumonia from October 1997 through April 1998. The primary endpoints for comparison in the preintervention and postintervention groups were patient knowledge and experience, time on intravenous antibiotics, and length of hospital stay. Patient characteristics and outcomes were compared between the two groups using the Fisher exact test for dichotomous outcomes and the Student *t* test for continuous variables. Lengths of stay, which had a skewed distribution, were compared using the Wilcoxon rank sum test. The hospital's institutional review board approved the study protocol.

RESULTS

Patients in both study periods were similar in age, race and ethnicity, insurance status, and burden of coexisting conditions, but patients in the postintervention period were less likely

to be female and to live unassisted, and more likely to use alcohol or drugs (Table 1). Pneumonia severity was not different between the two groups. The groups had a similar proportion of patients who never became clinically stable (16% [56/348] in the preintervention period; 14% [29/201] in the postintervention period). Patients who never became stable had a high inpatient mortality (39% [22/56] and 41% [12/29]); inpatient mortality was low among those who did become stable (2% [6/292] and 3% [5/172]). There were no inpatient deaths among patients to whom our guidelines for expedited switching to oral antibiotics and discharge applied (i.e., those who became stable and did not have a documented reason for continued hospitalization).

We surveyed 60% (184/306) of patients or proxies who were alive after discharge in the preintervention period, and 70% (126/180) of those who were alive after discharge in the postintervention period. This excludes 14 patients who died after discharge in the preintervention period and 4 in the postintervention period. Proxies responded for 55 (30%) preintervention patients and 37 (29%) postintervention patients. The main reasons for inability to survey patients included absence of a telephone or no response to a telephone call (preintervention, $n=67$; postintervention, $n=30$), refusal ($n=31$; $n=10$), and failure to identify the patient until more than 7 weeks after discharge ($n=16$; $n=5$); the remaining patients were not competent, had no next of kin, or spoke neither English nor Spanish. Patients who were not surveyed did not have a significantly different severity of illness as graded by the pneumonia severity index than did those who were surveyed ($P=0.4$ for preintervention; $P=0.3$ for postintervention).

Patients in the postintervention period reported that they were more likely to have been taught relevant information before discharge (Table 2). More stated that they received all the information they needed to recover, that they were told about medication side effects, and that they knew which danger signals of relapse to watch for after discharge. When asked in an open-ended manner which symptoms they would report, significantly more patients after the intervention would report a fever or a worsening or bloody cough. The frequency of pneumonia-related symptoms, including cough (67/184;36% pre and 44/126;35% post), shortness of breath (76/184;41% pre and 50/126;40% post) and fatigue (92/184;50% pre and 62/126;49% post) was no different in the two groups. After the intervention, more patients stated that they knew how long it would take them to feel better. Patients' perceptions of the appropriateness of the length of their hospital stays were similar in the two periods.

Patients also reported significantly better experiences with care after the intervention (Table 2), trust and confidence in doctors and nurses increased, and fewer patients reported that no one went out of the way to help them or make them feel better. Although similar proportions of patients were worried about problems they might have had after discharge, fewer said that they were not helped with these worries.

Following the intervention, there were significant decreases in time on intravenous antibiotics and the time from clinical stability to switch to oral antibiotics (Table 3). Of all patients, only 4% (14/348) in the preintervention period and 4% (9/201) in the postintervention period were treated with quinolones. The mean time from stability to discharge did not change significantly, nor did the mean total length of stay. Reasons for

delayed discharges did not change significantly before and after the intervention. The most common reasons for delay at baseline included pulmonary disease (23%), awaiting negative tuberculosis smears (23%), cardiac disease (11%) and social-service related problems (7%).

Among patients who became stable and who did not have a documented reason to stay in the hospital, none subsequently developed a temperature $>37.9^{\circ}\text{C}$, a new worsening of mental status, the inability to maintain oral intake, or respiratory decompensation.

DISCUSSION

The multifaceted intervention improved patients' experiences with inpatient care, as well as their understanding of pneumonia and their role in postdischarge self-care, while decreasing time on intravenous antibiotics. Although the new quinolones have high oral bioavailability, these were prescribed to fewer than 5% of patients and therefore did not likely influence switch decisions.

We hypothesize that these improvements were due to several factors. First, we used effective techniques to change clinician behavior, which included developing evidence-based guidelines, using physician and nurse opinion leaders to disseminate these guidelines to clinicians, giving clinicians specific feedback on their practices and the practices of their peers, and reinforcing the messages (18–21). Second, we believe that clinicians were motivated by the preintervention survey data, which demonstrated how often patients found their receipt of necessary information and support to be inadequate. Although we did not survey clinicians, we received informal feedback that nurses and social workers were discussing discharge preparation with patients and felt rewarded by these patient encounters.

Our study has several important limitations. It was not a randomized trial, and chart review was not blinded. Although we are unaware of any extraneous initiatives that targeted these patients, factors outside our intervention may have affected patients' knowledge about pneumonia. For example, patients in the postintervention period may have entered the hospital with more knowledge about pneumonia. Nonrespondents to the survey may also have answered the survey questions differently.

Despite these limitations, our study demonstrates that it is feasible to combine an intervention to decrease unnecessary time on intravenous antibiotics for patients with community-acquired pneumonia with a program to improve patients' experiences and increase their understanding of postdischarge care. We recommend incorporating patient education into efforts to streamline inpatient care.

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Table 1

Characteristics of Patients with Community-Acquired Pneumonia

Characteristic	Preintervention Period (n = 348)	Postintervention Period (n = 201)	P Value
	Number (%) or Mean ± SD		
Age (years)	65 ± 22	68 ± 21	0.1
Female sex	212 (61)	109 (54)	0.05
Race			0.6
White	104 (30)	83 (41)	
Black	101 (29)	48 (24)	
Hispanic	122 (35)	68 (34)	
Other	21 (6)	2 (1)	
Preadmission living situation			0.05
Unassisted	272 (78)	127 (63)	
Home health aide/visiting nurse	24 (7)	42 (21)	
Nursing home	52 (15)	32 (16)	
Pneumonia severity index			0.8
Class 1	87 (25)	50 (25)	
Class 2	70 (20)	32 (16)	
Class 3	52 (15)	28 (14)	
Class 4	97 (28)	67 (33)	
Class 5	42 (12)	24 (12)	
Asthma/chronic obstructive pulmonary disease	80 (23)	54 (27)	0.9
AIDS/HIV positive	49 (14)	30 (15)	0.5
Heart failure	59 (17)	36 (18)	0.8
Diabetes	70 (20)	36 (18)	0.6
Impaired mental status	84 (24)	44 (22)	0.6
Alcohol/drug use	49 (14)	36 (18)	0.05

AIDS = acquired immunodeficiency syndrome; HIV = human immunodeficiency virus.

Table 2

Patients' Knowledge and Experiences with Care, Among Surveyed Patients *

Knowledge and Experience	Preintervention Period (n = 163)	Postintervention Period (n = 114)	P Value
	Number (%)		
Confidence/trust in doctors and nurses	143 (88)	108 (95)	0.03
No one went out of the way to help patient feel better	60 (37)	7 (6)	0.001
Worried about problems after discharge	26 (16)	18 (16)	0.5
Not helped with worries	57 (38)	7 (6)	0.01
Perceived length of stay “just right”	116 (71)	79 (69)	0.7
Got all information needed to recover	122 (75)	107 (94)	0.02
Told of medication side effects	93 (57)	96 (84)	0.001
Knew how long it would take to feel better	46 (28)	58 (51)	0.001
Told which danger signals of relapse to watch for after discharge	75 (46)	68 (60)	0.03
Danger signals would report			
Fever	69 (41)	62 (54)	0.04
Worsening or bloody cough	46 (28)	72 (63)	0.001
Did not know/would not call	44 (27)	18 (16)	0.06

* Includes patient and proxy responses, but not responses from nurses in nursing homes. This includes 89% (163/184) of patients in the preintervention period and 90% (114/126) of patients in the postintervention period.

Table 3

Time on Intravenous Antibiotics and Length of Stay*

	Preintervention Period (n = 292)	Postintervention Period (n = 172)	P Value
	Number (%) or Mean $\pm$ SD		
Overall time on intravenous antibiotics (days)	5.0 $\pm$ 3.7	4.3 $\pm$ 3.3	0.04
Time from stability to switch (days)	2.4 $\pm$ 3.0	0.9 $\pm$ 2.3	0.0001
Total length of stay (days)	7.0 $\pm$ 4.8	7.1 $\pm$ 5.7	0.7
Time from stability to discharge (days)	4.3 $\pm$ 3.8	3.9 $\pm$ 5.2	0.3

* Excludes 56 patients (16%) in the preintervention period and 29 patients (14%) in the postintervention period who never became clinically stable ($P = 0.8$ for comparison of periods).