

Physician Awareness and Self-reported Use of Local and National Guidelines for Community-acquired Pneumonia

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OBJECTIVES: To assess physician awareness and reported use of medical guidelines for community-acquired pneumonia (CAP), and to identify factors associated with variations in awareness and use of these guidelines.

DESIGN: A questionnaire was administered during the pre-intervention phase of a randomized clinical trial of a pneumonia guideline implementation strategy.

PARTICIPANTS: Three hundred and fifty-two physicians who managed CAP patients at 7 Pittsburgh, PA hospitals completed the questionnaire. Physician and practice setting characteristics, and physician awareness and reported use of national American Thoracic Society (ATS) and local (hospital-developed) guidelines for CAP were assessed.

RESULTS: Overall, 48% reported being influenced by ATS guidelines and 20% reported using these guidelines; 48% were uncertain whether a local pneumonia guideline existed. Only 28% of physicians who knew a local guideline existed reported frequently using the guideline. Use of national ATS guidelines was independently associated with practice as an infectious disease or pulmonary medicine specialist, nonpatient care-related professional activities, and intellect personality score. Use of local guidelines was independently negatively associated with practice as an infectious disease or pulmonary medicine specialist, and positively associated with positive attitudes toward practice guidelines.

CONCLUSIONS: Results indicate low levels of awareness and use of guidelines for the management of CAP. Key indicators (e.g., medical specialty, fewer clinical duties, and positive attitudes about guidelines) were associated with greater use of national and local guidelines. If replicated with data on actual physician management practices, more effective guideline implementation strategies will be necessary to encourage compliance with practice guidelines for the management of CAP.

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KEY WORDS: community-acquired pneumonia; medical practice guidelines.

J GEN INTERN MED 2003; 18:816–823.

During the past two decades, widespread variation in the treatment of specific medical conditions has been documented. This variation is reflected in differences in hospital admissions rates,¹ in the use of procedures,² and in length of hospital stay (LOS).^{3,4} It has also been an important contributing factor to the rise of utilization management⁵ and the development of medical practice guidelines as tools to improve the quality and cost-efficacy of health care.^{6–10}

Previous investigations suggest that there is large variation in the success of guideline implementation.^{11–13} In examining this variation, most previous guideline implementation studies have controlled for the effects of physician and practice characteristics on guideline use rather than examining their effects systematically—despite the fact that such characteristics have been identified as key components in effective adoption of guidelines.^{14,15} Our goal in the current investigation was to focus on two key elements of guideline adherence¹⁵—awareness and adoption of guidelines—and physician and practice setting characteristics associated with these elements in the context of community-acquired pneumonia (CAP).

We focused on CAP as a model for several reasons. First, it is a major contributor to morbidity and mortality in the United States, causing 4 million episodes of illness and more than 1 million hospitalizations annually.¹⁶ Second, the considerable geographic variation in hospital admission rates and processes of care for CAP^{2,3,17–20} have led to the development of numerous national and local medical practice guidelines for CAP—for example, the American Thoracic Society (ATS) in 1993 and 2001,^{7,8} the Infectious Disease Society of America (IDSA) in 1998 and 2000,^{9,10} and numerous healthcare organizations on a local level. Finally, little is known about physician awareness and use of guidelines for CAP and factors associated with guideline use. Thus, the goals of the current study were (1) to assess physician awareness and use of nationally developed ATS and locally developed hospital guidelines for CAP, and (2) to identify hospital and physician characteristics associated with awareness and reported use of these guidelines.

Although more than 80% of patients with CAP are treated by primary care physicians (e.g., internal medicine, family medicine), the two national guidelines were developed

by pulmonary medicine and infectious disease specialists. Thus, we were particularly interested in comparing the awareness and use of CAP guidelines among generalist physicians and medical specialists. In addition to characteristics of the practice setting, we also expected that other physician demographic, professional practice (e.g., workload, continuing medical education), and personality characteristics (e.g., self-rated "intellectualism" and "agreeableness"), might be related to reported awareness and use of guidelines.

METHODS

During the preintervention phase of a randomized clinical trial of a guideline dissemination strategy to reduce duration of parenteral antibiotic therapy and length of hospital stay for patients with CAP,^{21,22} a questionnaire examining physicians' awareness and use of national and local guidelines for the management of patients hospitalized with CAP was administered.

Study Sites and Participants

Seven hospitals in Pittsburgh, PA (1 university, 3 community teaching, and 3 community nonteaching) participated in the study. Six hundred and twenty-one physicians with staff privileges at one or more of the 7 hospitals were identified as meeting one of the following inclusion criteria: (1) practice in a primary care medical specialty; (2) practice in an internal medicine subspecialty of pulmonary medicine or infectious diseases; or (3) practice in another internal medicine subspecialty and documentation of two or more pneumonia admissions at their primary study site hospital in 1996 based on claims data (DRGs 79, 80, 89, 90).

Questionnaire and Measures

A questionnaire (available from the authors upon request) was developed to assess physician demographic, professional, and psychosocial characteristics. Information about hospital characteristics was gathered from each hospital. Finally, study outcomes about physician awareness and use of ATS and local guidelines for CAP were assessed.

Physician Characteristics

Physician demographic characteristics included gender, age, and years since medical school graduation. Physician professional characteristics included medical specialty; hours/week in direct outpatient care, direct inpatient care, total patient care, total nonpatient activities (e.g., teaching, administration, research), and total job-related activities; number of CAP inpatients treated per year; percent income from salary; frequency of journal reading; hours/month spent on quality assurance (QA) activities; hours/month spent on continuing medical education (CME) activities; satisfaction with practice autonomy; and general career satisfaction. Medical specialties were characterized as (1) generalists (i.e., general internal medicine, family practice,

geriatrics, community medicine), (2) pulmonary medicine and infectious diseases specialists, and (3) other specialists (e.g., cardiology, gastroenterology, rheumatology).

Physician psychosocial characteristics included 3 risk avoidance items from the Jackson Personality Inventory,²³ (e.g., "I rarely take risks when there is another alternative"). Response categories ranged from 0 (strongly disagree) to 4 (strongly agree). Items were averaged to form a scale ranging from 0 (low risk avoidance) to 4 (high risk avoidance). Two personality traits, "agreeableness" and "intellectualism," from the Goldberg Personality Scale²⁴ were assessed with 10 items each. The scale consists of sets of adjectives (e.g., cooperative, harsh for "agreeableness", and introspective, uncreative for "intellectualism") rated on a 5-point scale ranging from 0 (not at all accurate) to 4 (extremely accurate). Items were averaged to form two composite scales, ranging from 0 (low on trait) to 4 (high on trait). Finally, general attitudes about guidelines were assessed with the 9-item Tunis General Guideline Experience and Attitudes scale.²⁵ The Tunis scale includes items asking whether guidelines are "good educational tools," and "a challenge to physician autonomy." Responses were rated on a 5-point scale ranging from 0 (strongly disagree) to 4 (strongly agree). Items were summed to form a composite scale ranging from 0 (negative attitudes) to 40 (positive attitudes).

Hospital Characteristics

Hospital characteristics included size (small, <200 beds, $n = 1$; medium, 200 to 500 beds, $n = 5$; large, >500 beds, $n = 1$), teaching versus nonteaching, and university-affiliated versus nonuniversity-affiliated. It was also known for each study site, whether or not local pneumonia guidelines existed at the time the survey was conducted.

Dependent Variables

Guideline awareness and reported use were assessed with two items concerning ATS guidelines and two items concerning local guidelines. Questions were based on the ATS guidelines because the IDSA pneumonia guidelines had not been published or were broadly disseminated at the time our survey was designed. Questions about ATS guidelines were "How familiar are you with the American Thoracic Society guidelines for the management of community-acquired pneumonia?" (1 = not at all familiar, 2 = I've seen them, 3 = I've read them, 4 = I use them), and "How influential have the American Thoracic Society guidelines been on your management of patients with community-acquired pneumonia?" (1 = not influential to 4 = very influential). Questions about locally developed guidelines were "Is there a medical practice guideline (or critical pathway, care map, or algorithm) for the management of community-acquired pneumonia at your hospital?" (yes, no), and if yes, "Please estimate the percentage of community-acquired pneumonia patients you treated over the past 12 months using the hospital's guideline." Original response categories

for this variable ($\leq 25\%$, 26% to 50%, 51% to 75%, $>75\%$) were dichotomized ($\leq 50\%$, $>50\%$).

Questionnaire Administration

The questionnaire was pilot-tested with 24 physicians. Questionnaires were mailed to the 621 eligible physicians in January 1998. A second questionnaire was mailed to nonresponders 2 weeks later, and telephone calls were placed to nonresponders 10 days after the second mailing. A local opinion leader serving as the local study investigator at each site personally distributed a third questionnaire to those who did not respond to the first two mailings and telephone contact. All questionnaire data were collected between January 13, 1998 and June 11, 1998.

Analysis

The relationship of study variables and guideline use was examined with χ^2 tests for categorical variables and nonparametric, two-sample Mann-Whitney tests for continuous variables. All tests were two-tailed, and an alpha of $P \leq .05$ was considered statistically significant. Variables that had bivariate associations with their respective outcomes of alpha $\leq .10$ were entered stepwise into a multivariate logistic regression analysis. The following variables were not significantly related to use of ATS or local guidelines in bivariate analyses, and were not included in the summary of findings or in Tables 1–4: gender, age, years since graduation from medical school, university hospital affiliation, percent of income from salary, total patient care hours per week, CME hours per month, and personality trait “agreeable.”

RESULTS

Response Rates and Respondent Characteristics

Three hundred and forty-five physicians completed the questionnaire (56% response rate). The majority of respondents were generalists (79%), white (78%), and male (81%). The mean age of respondents was 47.6 years (SD = 11.6), and the mean years since completing medical school was 20.4 (SD = 12.2). The majority of respondents practiced at medium-sized hospitals (70%) versus small (6%) and large (24), teaching hospitals (65%), and nonuniversity hospitals (75%). Response rates differed by hospital site (range 42% to 68%), hospital size (range 52% to 68%), university affiliation (52% vs 68%), and physician medical specialty (range 42% to 60%).

Self-Reported Use of National ATS Guidelines

Twenty-one percent of respondents (range 11% to 42% by site) reported being not at all familiar with ATS guidelines, 29% (18% to 42% by site) reported having seen the guidelines, 30% (16% to 39% by site) reported having read the guidelines, and 20% (8% to 28% by site) reported using the guidelines. This variable was dichotomized (use guide-

lines vs do not use guidelines) for subsequent analyses; the 75 physicians who were not familiar with ATS guidelines were excluded from the analyses presented in Tables 1 and 2.

No hospital characteristics were associated with use of ATS guidelines. Physicians who reported using ATS guidelines were more likely to be pulmonary and ID specialists (57% vs 23% generalists and 15% other specialists, $P < .001$), to spend fewer hours/week in direct outpatient care (23.4 ± 13.0 vs 30.2 ± 15.4 , $P = .001$), and to spend more hours/week in nonpatient-related activities (17.9 ± 15.5 vs 10.6 ± 12.0 , $P < .001$). In addition, physicians who reported using ATS guidelines read journals more frequently (31% vs 19%, $P < .05$), were higher on personality trait “intellect” (2.99 ± 0.55 vs 2.82 ± 0.50 , $P = .01$), and had more positive attitudes about guidelines in general (18.6 ± 4.8 vs 16.9 ± 4.7 , $P < .05$). Multivariate analyses indicated that three variables—practicing as a pulmonary or ID specialist (OR = 4.51; 95% CI, 1.71 to 11.90), spending more time in nonpatient-related activities (OR = 1.02; 95% CI, 1.00 to 1.05), and scoring higher on the personality “intellect” score (OR = 2.18; 95% CI, 1.07 to 4.40)—were independently associated with reported use of ATS guidelines.

Influence of ATS Guidelines

Of physicians familiar with ATS guidelines, 48% reported that the guidelines were moderately/very influential on their management of patients. As indicated in Table 2, physicians practicing at large and medium-sized hospitals (60% and 64% vs 27%, $P = .06$) were marginally significantly more likely to report being influenced by ATS guidelines. In addition, physicians more likely to report being influenced by ATS spent fewer hours/week in direct outpatient care (27.0 ± 14.8 vs 30.8 ± 15.4 , $P < .05$), and spent more hours/week in nonpatient activities (13.6 ± 13.6 vs 11.2 ± 13.2 , $P = .06$). In multivariate analyses, being influenced by ATS guidelines was associated with fewer hours/week in direct outpatient care (OR = 0.98; 95% CI, 0.96 to 1.00) only marginally significant, and more positive attitudes about guidelines (OR = 1.05; 95% CI, 0.99 to 1.11).

Knowledge Accuracy About Local Hospital Pneumonia Guidelines

Six of the 7 study hospitals had local CAP guidelines. Less than half of respondents (42%) were accurate about whether their primary hospital had a practice guideline for CAP. For the 290 respondents from the 6 hospitals with a CAP guideline, 41% reported that no local guideline existed; for the 48 respondents from the hospital with no guideline, 14% reported that one did exist. Physicians from nonteaching hospitals were more accurate in their knowledge about the existence of a local guideline (50% vs 39%, $P < .05$). Physicians with accurate knowledge about local guidelines spent more hours/week in direct inpatient care (16.5 ± 14.5 vs 14.4 ± 14.3 , $P < .05$), and saw more CAP inpatients per year (25.3 ± 32.3 vs 18.4 ± 25.4 , $P < .05$).

Table 1. Factors Related to Self-Reported Use of American Thoracic Society Guidelines for the Management of Community-acquired Pneumonia

Hospital and Physician Characteristics*	Total N	Report Not Using ATS Guidelines†	Report Using ATS Guidelines†	Bivariate P Value	Multiple Stepwise Odds Ratio (95% CI)‡
Hospital characteristics					
Hospital size, %				.34	
Small (<200 beds)	11	82	18		
Medium (200–500 beds)	181	76	24		
Large (>500 beds)	72	68	32		
Teaching status, %				.27	
Teaching	180	79	21		
Nonteaching	84	72	28		
Physician characteristics					
Specialty, %				<.001	
Generalist	210	77	23		1.00
Pulmonary or ID specialist	28	43	57		4.51*** (1.71 to 11.90)
Other specialist	26	85	15		0.80* (0.25 to 2.58)
Direct inpatient care, h/wk ± SD	259	14.4 ± 13.4	18.0 ± 16.8	.24	
Direct outpatient care, h/wk ± SD	260	30.2 ± 15.4	23.4 ± 13.0	.001	–
Total nonpatient activities, h/wk ± SD	235	10.6 ± 12.0	17.9 ± 15.5	<.001	1.02** (1.00 to 1.05)
Percent of total time on inpatient care ± SD	248	25.1 ± 20.9	29.5 ± 24.5	.32	
Total work, h/wk ± SD	250	56.1 ± 13.1	57.8 ± 12.6	.44	
Number of CAP inpatients per year ± SD	259	22.4 ± 31.6	27.0 ± 28.3	.07	–
Journal reading, %				.02	–
Do not read or skim articles	125	81	19		
Read ≥1 article in most issues	137	69	31		
Quality assurance hours, %				.26	
<1 h per month	155	77	23		
≥1 h per month	109	71	29		
Intellect personality score (0–4 = high) [§] ± SD	232	2.82 ± 0.50	2.99 ± 0.55	.01	2.18** (1.07 to 4.40)
Attitudes about guidelines (0–40 = pos) ± SD	258	16.9 ± 4.7	18.6 ± 4.8	.02	–
Risk avoidance (0–4 = high) ± SD	257	3.67 ± 0.82	3.76 ± 0.92	.45	

* Gender, age, years since graduation from medical school, university hospital affiliation, percent of income from salary, total patient care hours per week, continuing medical education hours per month, and personality trait "agreeable" were not significantly related to awareness and use of guidelines or any of the other guideline outcomes presented in Tables 1–4.

† Percentages are calculated within each row.

‡* P value < .10 but ≥ .05, ** P value < .05 but ≥ 0.01, *** P value < .01.

§ The Goldberg Personality Scale is self-rated on a 5-point response scale ranging from 0 (not at all accurate) to 4 (extremely accurate). Items were averaged to form a composite scale ranging from 0 (low personality trait intellectualism) to 4 (high personality trait intellectualism).

|| Attitudes about guidelines in general were assessed with the 9-item Tunis General Guideline Experience and Attitudes scale. Items were averaged to form a composite scale ranging from 0 (negative attitudes) to 4 (positive attitudes).

CAP, community-acquired pneumonia.

Finally, physicians with accurate knowledge were marginally more likely to spend more time on inpatient care (27.8 ± 21.7 vs 25.0 ± 22.6 , $P = .06$), spend more total hours/week working (57.9 ± 13.2 vs 55.2 ± 12.7 , $P = .06$), and were more risk avoidant (3.81 ± 0.80 vs 3.62 ± 0.85 , $P = .06$). In multivariate analyses, accurate knowledge about local guidelines was associated with more total work hours/week (OR = 1.01; 95% CI, 1.00 to 1.02), more positive attitudes about CAP guidelines (OR = 1.06; 95% CI, 1.01 to 1.11), and risk avoidance (OR = 1.29; 95% CI, 0.96 to 1.72).

Use of Local Hospital Pneumonia Guidelines

We next examined the determinants of local guideline use among the 117 physicians who accurately identified their hospital as having a local CAP guideline (see Table 4). Only 30% of respondents from hospitals with a local guide-

line reported that they used the guideline more than half of the time in management of their CAP patients (range 0% to 58% by site for sites with more than one physician). Physicians who reported using local CAP guidelines more than half of the time were more likely to be generalists (36% vs 8% pulmonary/ID and 8% other specialists, $P < .05$), and to report more positive attitudes about guidelines (20.5 ± 3.6 vs 16.9 ± 4.7 , $P < .001$). In multivariate analyses, use of local CAP guidelines was associated with practicing as a generalist (OR = 0.10 and 0.11 specialist groups vs generalists), and more positive attitudes about guidelines (OR = 1.29; 95% CI, 1.09 to 1.47).

DISCUSSION

Our goals in the current study were to assess physician awareness and use of national and local CAP guidelines,

Table 2. Factors Related to the Influence of American Thoracic Society Guidelines on the Management of Community-acquired Pneumonia

Hospital and Physician Characteristics*	Total N	Not/Slightly Influenced†	Moderately/Very Influenced†	Bivariate P Value	Multiple Stepwise Odds Ratio (95% CI)‡
Hospital characteristics					
Hospital size, %				.06	–
Small (<200 beds)	11	73	27		
Medium (200–500 beds)	181	36	64		
Large (>500 beds)	70	40	60		
Teaching status, %				.53	
Teaching	178	42	58		
Nonteaching	84	38	62		
Physician characteristics					
Specialty, %				.10	–
Generalist	208	42	58		
Pulmonary or ID specialist	28	21	79		
Other specialist, %	26	35	65		
Direct inpatient care, h/wk ± SD	257	13.4 ± 13.0	16.6 ± 15.2	.09	–
Direct outpatient care, h/wk ± SD	258	30.8 ± 15.4	27.0 ± 14.8	.02	0.98** (0.96 to 1.00)
Total nonpatient activities, h/wk ± SD	233	11.2 ± 13.2	13.6 ± 13.6	.06	–
Percent of total time on inpatient care	246	23.2 ± 19.3	28.3 ± 23.3	.10	–
Total work, h/wk ± SD	248	56.4 ± 12.5	56.9 ± 12.9	.75	
Number of CAP inpatients per year ± SD	257	21.6 ± 30.8	25.1 ± 30.9	.20	
Journal reading					
Do not read or skim articles	124	43	57		
Read ≥1 article in most issues	136	35	65		
Quality assurance hours, %				.10	–
<1 h per month	153	43	57		
≥1 h per month	109	33	67		
Intellect personality score (0–4 = high) ± SD	230	2.79 ± 0.52	2.91 ± 0.51	.19	
Attitudes about guidelines (0–40 = pos) ± SD	256	16.5 ± 5.1	17.8 ± 4.5	.08	1.05* (0.99 to 1.11)
Risk avoidance (0–4 = high) ± SD	255	3.66 ± 0.79	3.72 ± 0.88	.46	

* Gender, age, years since graduation from medical school, university hospital affiliation, percent of income from salary, total patient care h/wk, continuing medical education hours per month, and personality trait “agreeable” were not significantly related to awareness and use of guidelines or any of the other guideline outcomes presented in Tables 1–4.

† Percentages are calculated within each row.

‡* P value < .10 but ≥ .05, ** P value < .05 but ≥ .01, *** P value < .01.

CAP, community-acquired pneumonia.

and to identify predictors of awareness and use. Only approximately half of physicians surveyed reported being influenced by ATS guidelines, and only 20% reported actually using ATS guidelines. Similarly, only half of physicians were correct about the existence of a local hospital CAP, and among these, only 28% reported using the local guideline in managing more than half of their CAP patients. Thus, for both national and local guidelines, simple awareness of the guideline was not sufficient to promote actual use of the guideline in caring for patients. The low rates of CAP guideline use is consistent with other studies of guideline compliance,^{26,27} and suggests that robust interventions aimed not only at disseminating but also encouraging the use of clinical guidelines should be used for guideline implementation.

Physicians who reported being influenced by or using national guidelines were more likely to be pulmonary or infectious diseases specialists, to spend less time in patient care, to have more CAP inpatients per year, to spend more time reading journals and participating in CME activities, to rate themselves higher on the intellect scale, and to practice at large university/teaching hospitals. Physicians with

accurate knowledge about whether a local guideline existed were more likely to practice at large university/teaching hospitals and to see more CAP inpatients per year. However, in contrast to our findings for national guidelines, use of local guidelines was associated with spending more time in patient care. Finally, generalists and physicians who had more positive attitudes about guidelines in general were more likely to use local guidelines.

A central theme of the multivariate findings is that greater reported use and influence of ATS guidelines is independently associated with practice as a pulmonary/infectious diseases specialist, and fewer clinical responsibilities. This is not necessarily surprising given that these specialists were responsible for developing national CAP guidelines, and may be more likely to encounter information about national guidelines in specialty journals or CME. In contrast, it was generalists with more clinical responsibilities who were more likely to use locally developed guidelines. It is possible that physicians who are nonspecialists and more likely to be the attending physician for patients with CAP are more likely to be the target of local—as opposed

Table 3. Factors Related to Physician Knowledge About Whether a Local Community-acquired Pneumonia Guideline Existed

Hospital and Physician Characteristics*	Total N	Not Accurate [†]	Accurate [†]	Bivariate P Value	Multiple Stepwise Odds Ratio (95% CI) [‡]
Hospital characteristics					
Hospital size, %				.32	
Small (<200 beds)	2	0	100		
Medium (200–500 beds)	236	56	44		
Large (>500 beds)	83	63	37		
Teaching status, %				.04	–
Teaching	218	61	39		
Nonteaching	103	50	50		
Physician characteristics					
Specialty, %				.35	
Generalist	251	57	43		
Pulmonary or ID specialist	28	50	50		
Other specialist	42	67	33		
Direct inpatient care, h/wk ± SD	314	14.4 ± 14.3	16.5 ± 14.5	.04	–
Direct outpatient care, h/wk ± SD	315	28.5 ± 14.5	29.3 ± 15.5	.83	
Total nonpatient activities, h/wk ± SD	287	11.5 ± 11.7	12.8 ± 14.6	.66	
Percent of total time on inpatient care ± SD	303	25.0 ± 22.6	27.8 ± 21.7	.06	–
Total work, h/wk ± SD	305	55.2 ± 12.7	57.9 ± 13.2	.06	1.01* (1.00 to 1.02)
Number of CAP inpatients per year ± SD	315	18.4 ± 25.4	25.3 ± 32.3	.02	–
Journal reading, %				.82	
Do not read or skim articles	158	58	42		
Read ≥1 article in most issues	158	57	43		
Quality assurance hours, %				.22	
<1 h per month	188	54	46		
≥1 h per month	131	62	38		
Intellect personality score (0–4 = high) ± SD	288	2.81 ± 0.56	2.86 ± 0.50	.51	
Attitudes about guidelines (0–40 = pos) ± SD	312	17.0 ± 5.09	17.9 ± 4.63	.09	1.06** (1.01 to 1.11)
Risk avoidance (0–4 = high) ± SD	314	3.62 ± 0.85	3.81 ± 0.80	.06	1.29* (0.96 to 1.72)

* Gender, age, years since graduation from medical school, university hospital affiliation, percent of income from salary, total patient care (h/wk), continuing medical education hours per month, and personality trait “agreeable” were not significantly related to awareness and use of guidelines or any of the other guideline outcomes presented in Tables 1 and 2–4.

[†] Percentages are calculated within each row.

[‡] * P value < .10 but ≥ .05, ** P value < .05 but ≥ .01, *** P value < .01.

CAP, community-acquired pneumonia.

to national—guideline dissemination efforts. Other studies of guideline implementation suggest that physicians who have less expertise or experience caring for a certain patient population are more likely to rely on guidelines.^{28,29}

These findings could provide an alternative explanation for higher reported local guideline use among generalists as compared to medical specialists. It is important to note that in certain circumstances, noncompliance may be the most appropriate course of action. Since we relied on self-reports of behavior, we have no way to know the extent to which the patients cared for by pulmonary/infectious diseases physicians were similar to those treated by generalists or other specialists or whether they were equally appropriate for guideline-recommended care.

The strengths of our study are that our sample included a broad range of medical specialties and a diverse group of hospitals, which suggests that these results may be generalizable. In addition, the dual focus on national and local guidelines provides a level of specificity about guideline awareness and use not available from previous studies. However, the cross-sectional, self-report nature of the data limit our ability to draw firm conclusions about

predictive links between physician and hospital characteristics, and actual physician behavior related to guideline compliance. It is conceivable that physicians manage patients in a manner consistent with guidelines without specific knowledge of the guideline principles. Another potential limitation is that because our survey was conducted prior to the full dissemination of other guidelines (e.g., IDSA), we focused solely on ATS guidelines. However, the current availability of multiple published guidelines could potentially lead to even greater lack of awareness of guidelines than was found in this study, and/or confusion over which guideline to use.

In conclusion, the low levels of reported guideline use—even among physicians who are familiar with the guidelines—and differences in the patterns of awareness and reported use for pulmonary/infectious diseases specialists versus generalists indicate that intensive and targeted intervention efforts may be necessary to encourage compliance with clinical guidelines for the management of CAP.

Table 4. Factors Related to Self-reported Use of Local Community-acquired Pneumonia Guidelines

Hospital and Physician Characteristics*	Total N	Use Local Guidelines for ≤50% of CAP Patients†	Use Local Guidelines for >50% of CAP Patients†	Bivariate P Value	Multiple Stepwise Odds Ratio (95% CI)‡
Hospital characteristics					
Hospital size, %				.28	
Small (<200 beds)	1	0	100		
Medium (200–500 beds)	82	70	30		
Large (>500 beds)	27	74	26		
Teaching status, %				.68	
Teaching	77	69	31		
Nonteaching	33	73	27		
Physician characteristics					
Specialty, %				.02	
Generalist	85	64	36		1.00
Pulmonary or ID specialist	13	92	8		0.10** (0.01 to 0.89)
Other specialist	12	92	8		0.11* (0.01 to 1.07)
Direct inpatient care, h/wk ± SD	106	17.4 ± 14.7	16.5 ± 14.7	.93	
Direct outpatient care, h/wk ± SD	107	27.9 ± 16.6	31.8 ± 13.2	.18	
Total nonpatient activities, h/wk ± SD	97	12.5 ± 14.7	13.5 ± 12.9	.43	
Percent of total time on inpatient care ± SD	101	29.9 ± 23.4	26.7 ± 20.0	.73	
Total work, h/wk ± SD	101	58.3 ± 12.3	58.3 ± 13.2	.95	
Number of CAP inpatients per year ± SD	108	24.7 ± 29.7	26.1 ± 33.1	.53	
Journal reading, %				.59	
Do not read or skim articles	55	73	27		
Read ≥1 article in most issues	52	68	32		
Quality assurance hours, %				.67	
<1 h per month	70	71	29		
≥1 h per month	40	68	32		
Intellect personality score (0–4 = high) ± SD	96	2.83 ± 0.52	3.02 ± 0.46	.09	–
Attitudes about guidelines (0–40 = pos) ± SD	108	16.9 ± 4.7	20.5 ± 3.6	<.001	1.29*** (1.09 to 1.47)
Risk avoidance (0–4 = high) ± SD	106	3.78 ± 0.80	3.85 ± 0.76	.67	

* Gender, age, years since graduation from medical school, university hospital affiliation, percent of income from salary, total patient care (h/wk), continuing medical education hours per month, and personality trait "agreeable" were not significantly related to awareness and use of guidelines or any of the other guideline outcomes presented in Tables 1–4.

† Percentages are calculated within each row.

‡* P value < .10 but ≥ .05, ** P value < .05 but ≥ .01, *** P value < .01.

CAP, community-acquired pneumonia.

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