

Comparison of Hospitalists and Nonhospitalists Regarding Core Measures of Pneumonia Care

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The hospitalist model of inpatient care has grown rapidly in the United States over the past decade.¹ Much of the literature supporting benefits of this model centered on examinations of inpatient length of stay (LOS) and hospital costs.²⁻¹¹ Two studies examined inpatient and follow-up mortality,^{12,13} and 2 other studies examined complication rates in patients whose treatment was comanaged with orthopedists.^{14,15} Although generally demonstrating benefits of the hospitalist model, these studies did not examine specific practices that may have conferred the observed benefits.

An alternative way to examine quality of care is to measure compliance with accepted core measures of care. The use of such measures is attractive as control of case mix among groups is not necessary if all patients should receive the examined core measures.¹⁶ Inpatients admitted with community-acquired pneumonia offer such an opportunity. In addition to standard recommendations for prevention of deep venous thrombosis (DVT) common to all inpatients,¹⁷ inpatients with pneumonia should be offered certain processes of care that have been found to reduce mortality and morbidity.^{18,19} These measures, endorsed by the Joint Commission on Accreditation of Healthcare Organizations (JCAHO) and the Centers for Medicare & Medicaid Services, include pneumococcal vaccination in patients more than 64 years of age, blood cultures before the first antibiotic administration, and receipt of antibiotics within 4 hours of presentation.^{18,19} The present analysis compares hospitalists and nonhospitalists with respect to compliance with these core measures.

METHODS

At a community teaching hospital from September 2004 through January 2005, professional chart abstractors identified the first 75 patients each month with a principal diagnosis-related group (DRG) corresponding to a diagnosis of community-acquired pneumonia. (DRG 79, 80, 87, 89, or 90). Some months, fewer than 75 cases were identified. Variables extracted included patient age, LOS, time from registration to antibiotic administration, time of blood cultures if done, use of DVT prophylaxis, administration of pneumococcal vaccine or documentation of ineligibility, smoker status, smoking cessation counseling, and name of attending physician. Timing of antibiotic admin-

Objective: To examine whether compliance with national indicators of care differed amongst hospitalists and nonhospitalists.

Study Design: Retrospective, observational cohort study.

Methods: Patients admitted from September 2004 through January 2005 to a community teaching hospital with a principal diagnosis of community-acquired pneumonia were included. Patient exclusions were any immunosuppressive illness or therapy within the past 3 months, comfort care only, or care provided by house staff. Patient variables of age, length of stay (LOS), time to initial antibiotic therapy, blood cultures drawn, use of deep venous thrombosis (DVT) prophylaxis, administration of pneumococcal vaccine or documentation of ineligibility for it, and name of attending physician were collected. Dichotomous variables were compared using χ^2 -analysis, and continuous variables were compared using the Student *t* test.

Results: A total of 158 patients were treated by 58 physicians; 68 patients by 12 hospitalists and 90 patients by 46 nonhospitalists. Patients did not differ in age, LOS, likelihood of receiving timely antibiotics, or having blood cultures drawn before antibiotics. Hospitalist patients were more likely to have been given inpatient DVT prophylaxis (96.9% vs 61.9%; $P < .001$) and to have had a pneumococcal vaccine administered or a documented reason why it was not given (88.2% vs 65.6%; $P = .001$).

Conclusion: This is the first study to suggest that pneumonia patients cared for by hospitalists were more likely to receive 2 important quality care processes.

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In this issue
Take-away Points / p132
www.ajmc.com
Full text and PDF

For author information and disclosures, see end of text.

■ TRENDS FROM THE FIELD ■

istration and blood cultures and whether oxygenation was assessed were determined from nursing notations in the emergency department. Acceptable forms of DVT prophylaxis included subcutaneous unfractionated heparin, low-molecular-weight heparin, systemic anticoagulation, intermittent compression devices, or compression stockings. Documentation of vaccination was taken from physician orders for administration. Accepted rationales for ineligibility included notation of vaccine received in the past, vaccination refused, allergy to vaccine, age less than 65 years, or vaccine contraindicated because of bone marrow transplant within past 12 months. Accepted forms of oxygenation assessment were documented results of arterial blood gas or pulse oximeter saturation. Smoker status and counseling notation were accepted from all involved clinicians.

Exclusion criteria were based on those used by JCAHO¹⁸ and included documentation of HIV/AIDS, systemic chemotherapy or immunosuppression, leukemia/lymphoma within 3 months, bronchiectasis, malnutrition, status as comfort care only, and care provided by house staff. Only patients with a LOS of at least 3 days were included in the DVT prophylaxis analysis.

Hospitalists were employed by the hospital and dedicated at least 25% of their clinical practice to inpatient care. Of the 12 hospitalists, 9 were board-certified internists, 1 was a family practitioner, and 2 were not board certified. None held subspecialty board certification. Nine of the 12 were within 3 years of completion of their residency training. All the nonhospitalists were community-based practitioners, none of whom spent more than 25% of their clinical time on inpatients. No patients crossed over between services. All patients were cared for on the same medical floors, by the same nurses, and with the same hospitalwide paper-based DVT prophylaxis and pneumococcal vaccine reminders in place. Because this study was a retrospective examination, neither the hospitalists nor the nonhospitalists were aware that their behaviors were being observed. The study received exemption from the institution's institutional review board as presenting minimal risk to patients.

Dichotomous variables were compared using χ^2 analysis, and continuous variables were compared using the Student *t* test. Comparisons were considered significant at the $P = .05$ level. The unit of analysis was the patient. This is acceptable when the number of patients per physician is small.²⁰

RESULTS

A total of 158 patients were included in the analysis: 68 patients cared for by 1 of 12 hospitalists and 90 patients cared

for by 1 of 46 nonhospitalists. Mean age for hospitalist and nonhospitalist patients did not differ (72.3 years vs 74.0 years; $P = .50$). In addition, the mean LOS did not differ (6.1 days vs 6.8 days; $P = .36$) (Table 1).

Processes of care under the control of the emergency department did not differ between groups. Specifically, the proportion of patients receiving antibiotics within 4 hours of presentation (69.1% vs 75.6%; $P = .37$) and the number who had blood cultures drawn before antibiotic administration (60.3% vs 56.7%; $P = .65$) and had oxygenation assessed (100% vs 100%; $P = .55$) were similar. Current smoker status was documented in 19% of hospitalist patients and 12% of nonhospitalist patients ($P = .28$). Among patients who were smokers, 85% of hospitalist patients and 91% of nonhospitalist patients were counseled to stop ($P = .57$) (Table 2).

Hospitalists and nonhospitalists did differ in regard to core measures of care directly under their control. Hospitalist patients were more likely to receive pneumococcal vaccination or to have a documented reason for ineligibility (88.2% vs 65.6%; $P = .001$) and were more likely to receive any form of DVT prophylaxis (96.9% vs 61.9%, $P < .001$) (Table 2).

DISCUSSION AND CONCLUSION

Patients admitted with a principal diagnosis of community-acquired pneumonia were more likely to receive recommended core measures of quality care from hospitalists than from nonhospitalists. Differences in care were not seen in those domains under the purview of the emergency department physicians, suggesting that the noted differences were due to inpatient intervention by the attending physician.

These differences were not likely to be due to variance in the systems of care within the hospital, as patients were cared for by the same nurses and the same charting and paper-based reminder systems were used. There were no explicit educational cointerventions for either group. Only patients for whom these basic measures of care were indicated were included. Although it is possible that office-based physicians had reason to believe that their patients were vaccinated in the office, full compliance necessitates documentation of such. Further, this would not explain the variance seen in DVT prophylaxis.

A more likely explanation would be hospitalist familiarity with the guidelines, closer notice paid to the chart-based reminders, and in the case of DVT prophylaxis, being more cognizant of the risks of not providing prophylaxis. The high rates of smoking cessation counseling were a product of

Comparison of Hospitalists and Nonhospitalists Regarding Core Measures of Pneumonia Care

the hospitalwide practice of having the respiratory therapists perform this aspect of care.

Most previous examinations of hospitalists, including those involving pneumonia patients, used inpatient mortality and readmission rates as proxies for quality of care and found similar rates for hospitalists and nonhospitalists.²⁻¹⁰ To our knowledge, this analysis is the first to document differences in specific recommended processes of care that can be directly linked to patient outcomes. We did not examine influenza vaccination rates to avoid confounding due to vaccine availability and seasonal variation in recommendations.

Our results indicate that for every 4.4 patients cared for by a hospitalist rather than a community physician, 1 more patient will receive the pneumococcal vaccine or have a documented reason for ineligibility.

To be most inclusive, we considered only patients with a LOS of at least 3 days and accepted any recognized form of DVT prophylaxis (low-molecular-weight heparin, subcutaneous unfractionated heparin, compression devices), but excluded inadequate forms that are not accepted, such as aspirin alone. Our finding of an absolute difference of 35% means that for approximately every 3 patients cared for by a hospitalist rather than a nonhospitalist, 1 more will receive appropriate DVT prophylaxis.

This study was observational in design and has inherent limitations. Although we selected only those patients for whom the chosen core measures were indicated, it is possible that unmeasured differences in presentation or systems accounted for some of the noted variance. However, this explanation is unlikely as patients were cared for by the same nurses, with the same reminder systems.

Compliance with core measures is only a proxy for overall quality of care. It is possible that while performing better on some measured variables, hospitalists actually fared worse on other

■ **Table 1.** Comparison of Hospitalist and Nonhospitalist Patients

Characteristic	Hospitalists (n = 12)	Nonhospitalists (n = 46)	P
No. of patients	68	90	
Patient age, mean (SD), y	72.3 (14.6)	74.0 (16.3)	.50
Inpatient LOS, mean (SD), d	6.1 (4.2)	6.8 (5.2)	.36
LOS indicates length of stay; SD, standard deviations.			

unmeasured processes and outcomes. A related concern is that the hospitalists could have been narrowly focused on performance of core measures of care, not overall care. However, we have no reason to suspect this is true. The examined group had no financial or other incentive for such care performance. Subsequent examinations that randomly assign patients to be cared for by hospitalists and are adequately powered to examine hard clinical outcomes of importance will be able to best address these concerns.

Similar to most examinations of hospitalists, our study focused on only 1 group. Further study of groups practicing in various settings will address the concern that any given group studied is indeed representative of all hospitalists.

In summary, we demonstrated specific practice differences between hospitalists and nonhospitalists. Hospitalists treating inpatients with community-acquired pneumonia were more likely to give their patients pneumococcal vaccination or

■ **Table 2.** Performance on Core Measures by Hospitalist and Nonhospitalist

Core measure	No. (%)		P
	Hospitalist Patients (n = 68)	Nonhospitalist Patients (n = 90)	
Antibiotics within 4 h of presentation	47 (69.1)	68 (75.6)	.37
Oxygen assessment upon presentation	68 (100)	90 (100)	.55
Blood cultures before antibiotics	41 (60.3)	51 (56.7)	.65
Given pneumococcal vaccine or documented ineligibility	60 (88.2)	59 (65.6)	.001
Received DVT prophylaxis if LOS > 3 days (n = 148)	62 (96.9)	52 (61.9)	<.001
Documented as current smokers	13 (19)	11 (12)	.28
Smokers with documented cessation counseling	11 (85)	10 (91)	.57
DVT indicates deep venous thrombosis; LOS, length of stay.			

Take-away Points

- Hospitalists in the group examined were more likely to comply with expected national core measures of care for pneumonia in patients that were under their direct control than were nonhospitalists.
- If generalizable to other diagnoses and hospitalist groups, improved compliance could translate into improved patient outcomes.

document why the patients were ineligible, and were more likely to use DVT prophylaxis. The measured differences were substantial and if generalizable, they would translate to large benefits to patients.

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