

The Effect of a Community-Acquired Pneumonia Guideline on Duration of Intravenous Antibiotics and Length of Stay

Fine MJ, Stone RA, Lave JR, et al. Implementation of an evidence-based guideline to reduce duration of intravenous antibiotic therapy and length of stay for patients hospitalized with community-acquired pneumonia: a randomized controlled trial. Am J Med 2003;115:343–51.

Study Overview

Objective. To determine if an evidenced-based clinical guideline can reduce the duration of intravenous (IV) antibiotics and overall length of stay (LOS) for patients hospitalized with community-acquired pneumonia (CAP).

Design. Randomized controlled trial.

Setting and participants. The study involved 7 clinical sites and 116 physician groups in Pittsburgh, PA. Physician groups were invited to participate if they had medical privileges at a participating site and practiced in a generalist or internal medicine specialty. Randomization was performed at the physician group level. Patients were eligible for inclusion if they were treated by a participating physician, had a documented treatment plan for CAP, and had a chest radiograph report consistent with a new pulmonary infiltrate. Exclusion criteria included age less than 18 years, recent hospitalization (within 10 days), cystic fibrosis or active pulmonary tuberculosis, immunosuppression, current illicit drug use or alcohol use with end-organ damage, hospitalization for palliative care only, homelessness, hospital stay less than 2 days, infection with methicillin-resistant *Staphylococcus aureus*, or unresolved or incompletely treated pneumonia diagnosed within 30 days preceding the study.

Intervention. Both control and intervention physicians received educational mailings that included the guidelines. Additionally, in the intervention group, research nurses (starting at hospital day 3) assessed patients daily for stability and eligibility for conversion to oral antibiotics or hospital discharge. Once a patient met stability criteria, a detailed information sheet was placed with their medical record with guideline recommendations, follow-up recommendations, and an offer to arrange follow-up home care; attending physicians were then notified of the information sheet. Patients who did not meet stability criteria by hospital day 10 were no longer eligible for the study intervention.

Main outcome measures. The primary outcome was duration of IV antibiotic therapy and overall LOS. Patients transferred to a skilled nursing, rehabilitation, or subacute facility were considered discharged. Secondary outcomes included all-cause and pneumonia-related mortality, medical complications, rehospitalization rates, functional status, time to return to usual activities, and patient satisfaction with care. Patients were contacted at 30 days postdischarge. Time-to-event data (ie, duration of antibiotics) were compared between the control and intervention groups using hazard ratios. To account for clustering within physician groups, discrete proportional hazard models were calculated.

Main results. 1660 patients were eligible to participate, and the final sample included 283 patients randomized to the intervention arm and 325 patients randomized to the control arm. No statistically significant differences in baseline characteristics between the 2 groups were noted. There were no statistically significant differences between the intervention group and the control group with respect to time to reach stability (hazard ratio [HR], 0.99; $P = 0.96$) or the proportion of patients discharged before reaching stability (33% versus 31%; $P = 0.79$). The median duration of IV antibiotic therapy was 3 days in the intervention group and 4 days in the control group. IV antibiotics were discontinued more frequently in the intervention group as compared with the control group (HR, 1.23% [95% confidence interval {CI}, 1.00–1.52]; $P = 0.06$). The median LOS was 5 days in both groups. No difference was seen in LOS between the groups (HR, 1.16 [95% CI, 0.7–1.38]; $P = 0.11$). There were no differences in mortality rates, rehospitalization rates, functional status, return to usual activities, or satisfaction rates between the 2 groups. The intervention group had a slight decrease in in-hospital complications compared with the control group (55% versus 63%; $P = 0.04$).

Conclusion. An evidence-based pneumonia guideline may slightly reduce the duration of IV antibiotic use and has no effect on hospital LOS.

Commentary

CAP resulted in over 1 million hospitalizations in 1999 [1] and is the sixth leading cause of death in the United States [2]. Studies have indicated that the majority of patients admitted with CAP stay in the hospital longer than necessary based on clinical stability criteria [3]. As duration of therapy for IV antibiotics might directly affect overall LOS, several investigators have tried to evaluate a strategy of immediately switching from IV to oral medications once a patient reaches clinical stability [4,5]. However, there have been few studies that have evaluated this strategy in a randomized design and included potentially high-risk individuals.

The study by Fine et al is a large, randomized trial to evaluate the effect of an evidence-based guideline implemented into pneumonia care. There were no statistically significant differences in outcomes between the groups; however, the intervention group did have a slight reduction in duration of IV antibiotics. Although the lack of difference between the groups may be due to a lack of effect of the practice guidelines, there are other possible explanations as to why this intervention was ineffective. First, the study was designed to detect a difference in LOS of 1 day. With the average LOS for CAP in many facilities being only 3 to 4 days, the study might have been underpowered to see an effect. Second, some contamination might have occurred between intervention and control physicians working together in the same institution. This could have moved the results towards the null hypothesis of no effect.

One further notable finding in this study was that almost one quarter of providers randomized to the intervention group discharged their patients before meeting clinical stability. We are not presented with how often this occurred in the control group. How this might have influenced the results is unclear; however, it would suggest that many of the providers did not “buy in” to the guideline. Provider accep-

tance of clinical guidelines is crucial to ensure provider compliance with the guidelines. The authors did not survey the providers to determine their level of confidence in the guidelines, and this would have been important in improving the success of the intervention.

Applications for Clinical Practice

Using an evidence-based guideline to improve the quality of care in patients admitted with CAP had a slight but statistically insignificant effect on duration of IV antibiotic use and no effect on overall LOS. Until further studies can be performed, it seems unlikely that implementing this intervention would result in much improvements over the current standard of pneumonia care.

—Review by Harvey J. Murff, MD, MPH

References

1. Popovic JR. 1999 National Hospital Discharge Survey: annual summary with detailed diagnosis and procedure data. *Vital Health Stat* 13 2001;i-v,1–206.
2. Garibaldi RA. Epidemiology of community-acquired respiratory infections in adults. Incidence, etiology, and impact. *Am J Med* 1985;78:32–7.
3. Halm EA, Fine MJ, Marrie TJ, et al. Time to clinical stability in patients hospitalized with community-acquired pneumonia: implications for practice guidelines. *JAMA* 1998;279:1452–7.
4. Omidvari K, de Boisblanc BP, Karam G, et al. Early transition to oral antibiotic therapy for community-acquired pneumonia: duration of therapy, clinical outcomes, and cost analysis. *Respir Med* 1998;92:1032–9.
5. Ramirez JA, Vargas S, Ritter GW, et al. Early switch from intravenous to oral antibiotics and early hospital discharge: a prospective observational study of 200 consecutive patients with community-acquired pneumonia. *Arch Intern Med* 1999;159:2449–54.

Copyright 2004 by Turner White Communications Inc., Wayne, PA. All rights reserved.