

**Ebbing Lautenbach,  
MD, MPH, MSCE**

*LDI Senior Fellow,  
Associate Professor of Medicine  
and Epidemiology  
Center for Education  
and Research on Therapeutics  
University of Pennsylvania*

**Ingi Lee, MD, MSCE**

*Assistant Professor of Medicine  
Center for Education and  
Research on Therapeutics  
University of Pennsylvania*

**Kevin T. Shiley, MD**

*Division of Infectious Diseases  
Catholic Health System of Buffalo*

## ***Treating Viral Respiratory Tract Infections with Antibiotics in Hospitals: No Longer a Case of Mistaken Identity***

Editor's note: Widespread use of antibiotics in hospitalized patients contributes to the development of multidrug resistant organisms that make many infections increasingly difficult to treat. Despite calls to prescribe antibiotics judiciously, many physicians continue to order antibiotics for inpatients who do not need them. This Issue Brief investigates antibiotic use in hospitalized adults with a confirmed viral infection, a group of patients that may not benefit from such therapy. Understanding the factors that lead to inappropriate antibiotic use may help change clinical practice and limit antibiotic resistance.

### ***Most patients in teaching hospitals receive at least one dose of antibiotics***

Widespread antibiotic use in the treatment of hospitalized patients promotes the development of antibiotic resistance. A recent study of U.S. teaching hospitals found that 63.5 % of patients discharged in 2006 had received at least one dose of an antibacterial drug. It is estimated that about 30% of antibiotic-days for hospitalized adults are unnecessary.

- One area where antibiotic use could be limited is in the treatment of patients with viral respiratory tract infections (RTIs). Patients who present with acute respiratory symptoms are often prescribed antibiotics on admission before it is clear whether their illness is viral or bacterial in origin. Antibiotics are not effective in treating viral infections.
- Recently, highly accurate tests have been developed to identify several respiratory infections, including influenza A and B, parainfluenza, adenovirus, and respiratory syncytial virus (RSV). These tests now make it possible for clinicians to confirm viral causes for illnesses that might otherwise be mistaken for bacterial infections.
- Despite this theoretical advantage, it is unclear whether improved diagnosis of viral RTIs has actually led to reduced antibiotic use in hospitalized adults.

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***Study investigates antibiotic use in hospitalized patients with viral respiratory infections***

The investigators conducted a retrospective analysis of antibiotic use among newly hospitalized patients admitted with acute respiratory symptoms who subsequently received a diagnosis of viral RTI.

- All patients were admitted to one of two hospitals affiliated with the University of Pennsylvania Health System between November 1, 2005 and August 1, 2007. Patients with confirmed viral RTI were identified through the records of the lab that performs viral diagnostics for the health system.
- Hospital medical records were reviewed to exclude patients with a documented bacterial infection within or outside the respiratory tract. Antibiotic use was ascertained from the hospitals' electronic medication ordering system.
- The study included 196 patients with viral RTI. More than 70% of them had influenza, 15% had RSV, 7% had adenovirus, and 6% had a parainfluenza virus.

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***Many patients were prescribed antibiotics on admission, and almost all stayed on antibiotics after a viral respiratory tract infection was confirmed***

The analysis revealed that antibiotic use in patients with confirmed viral RTI was common. The decision to stop antibiotic therapy was rare. Radiographic evidence that caused concern about pneumonia was the strongest predictor of continued antibiotic use.

- Of the 196 patients, 131 (67%) began antibiotic therapy, and 125 (64%) continued to receive antibiotics after the diagnosis of viral RTI. The average time from admission to viral RTI diagnosis was one day. For patients given antibiotics, the median duration of antibiotic use was 8 days.
  - The only anti-viral drug used, oseltamivir, was prescribed for a small percentage (21%) of patients with influenza; half of these patients continued to receive antibiotics in addition.
  - Forty-six (37%) of the 125 patients who continued to receive antibiotics had abnormal chest radiographs on admission. Concern about concomitant bacterial pneumonia in these patients might prompt clinicians to continue antibiotic therapy. After adjusting for other possible factors, patients with abnormal chest imaging on admission were four times as likely to use antibiotics as those with negative chest imaging.
  - However, the majority of patients who were prescribed antibiotics had normal radiographs. Possible factors that might have led clinicians to use antibiotics, such as patient age, presenting signs, symptoms, and comorbid conditions, were not associated with continuation. The reasons for continuing antibiotic treatment in these patients were not apparent.
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***Patients on antibiotics did not seem to benefit from this treatment***

The study looked at a number of patient outcomes and complications in patients given antibiotics. Although the study was not designed to detect small differences in outcomes, the results indicate that the patients who continued on antibiotics fared no better than those who did not, and some might have been harmed by the treatment.

- Median length of hospital stay was 5 days for patients on antibiotics, compared with 3 days for patient not given antibiotics after receiving a diagnosis of viral RTI. In-hospital mortality was higher in the antibiotic continuation group (10 vs. 0 deaths). These findings do not suggest that antibiotics were the cause of the increased length of hospitalization or the cause of the higher death rate. Patients who were very sick might have been more likely to receive antibiotics in an overly cautious approach to their care. And because these patients were sicker, they were also more likely to have long hospitalizations and higher mortality.
- However, eight patients (6%) who continued antibiotic therapy developed diarrhea from *C. difficile* infection, compared to 0 patients not on antibiotics. This is a well-established risk of antibiotic use. Here, the causal link between antibiotic use and complications is more plausible.
- Patients who continued on antibiotics were more likely to be rehospitalized within 30 days of discharge, although the study was too small to determine whether this result was simply due to chance.

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***POLICY IMPLICATIONS***

These data demonstrate at least one area where antibiotics are commonly used in hospitalized patients without clear reason. The study did not reveal any clinical benefit to continuing antibiotics once a viral RTI is confirmed. In some cases, it might have led to harm.

- The findings could be useful in targeting interventions to limit the use of unnecessary antibiotics among inpatients. An antibiotic stewardship program might be beneficial in targeting patients who receive a diagnosis of viral RTI. One approach might be a voluntary or mandatory antibiotic “time-out” in which the physician reassesses the need for antibiotics when the results are received.
- Although antibiotics may have been used to prevent a secondary bacterial infection, there are few data to support such practice. In contrast to antibiotic use, an effective antiviral treatment for influenza was used in a small minority of patients with confirmed influenza.
- Further research is needed to understand these clinical practice patterns. It is possible that physician anxiety over concurrent or developing bacterial infection is the reason. If so, then educational programs may help alleviate this concern and reduce overuse of antibiotics in hospitalized patients.

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## POLICY IMPLICATIONS (cont'd)

- These data should bolster ongoing efforts to limit inappropriate antibiotic use. The Centers for Disease Control and Prevention has launched *Get Smart for Healthcare*, a new campaign focused on improving antibiotic use in inpatient healthcare settings through the implementation of antibiotic stewardship programs. These programs are interventions designed to ensure that hospitalized patients receive the right antibiotic at the right time.

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*This Issue Brief is based on the following article: K.T. Shiley, E. Lautenbach, I. Lee. The use of antimicrobial agents after diagnosis of viral respiratory tract infections in hospitalized adults: antibiotics or anxiolytics? Infection Control and Hospital Epidemiology, November 2010, vol. 31, no. 11, pp. 1177-1183.*

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*This Issue Brief was supported by the Agency for Healthcare Research and Quality, Centers for Education and Research on Therapeutics, University of Pennsylvania School of Medicine (U18 HS10399). The opinions expressed are those of the authors and not the funding agency.*

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*Published by the Leonard Davis Institute of Health Economics, University of Pennsylvania, 3641 Locust Walk, Philadelphia, PA 19104.  
Janet Weiner, MPH, Associate Director for Health Policy, Editor  
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Leonard Davis Institute  
of Health Economics  
University of Pennsylvania

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3641 Locust Walk  
Philadelphia, PA 19104-6218  
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