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Antibiotic Prescribing for Adults with Acute Bronchitis in the United States, 1996–2010

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Introduction

Acute bronchitis is a cough-predominant acute respiratory illness of less than 3 weeks' duration. For over 40 years, trials have shown that antibiotics are not effective for acute bronchitis.¹ Despite this, between 1980 and 1999, the acute bronchitis antibiotic prescribing rate in the United States was between 60% and 80%.² Over the past 15 years, the Centers for Disease Control and Prevention (CDC) has spearheaded efforts to decrease antibiotic prescribing for acute bronchitis.^{3,4} Since 2005, a Healthcare Effectiveness Data and Information Set (HEDIS) measure has stated that the antibiotic prescribing rate for acute bronchitis should be zero.⁵

To assess the effectiveness of ongoing CDC efforts and the implementation of the HEDIS measure, we estimated the antibiotic prescribing rate for acute bronchitis in the United States between 1996 and 2010.

Methods

The National Ambulatory Medical Care Survey and National Hospital Ambulatory Medical Care Survey (NAMCS/NHAMCS) are annual, nationally representative, multi-stage probability surveys of ambulatory care in the United States.⁶ The NAMCS/NHAMCS collect information on physicians, outpatient practices, and emergency departments (EDs), as well as visit-level data including patient demographics, reasons for visits, diagnoses, and medications. Physicians, office staff, or Census Bureau representatives collect information – including information about patient race/ethnicity to enable assessment of healthcare disparities – on visit record forms. Each visit in the NAMCS/NHAMCS is weighted to allow extrapolation to national estimates. The NCHS institutional review board approved the

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Data Access and Responsibility: Dr. Barnett had full access to all the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.

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protocols for the NAMCS/NHAMCS, including a waiver of the requirement for patient informed consent.

We strove to include visits that would be eligible for the HEDIS measure.⁵ We included NAMCS/NHAMCS “new problem visits” to primary care physicians, general medicine clinics, or EDs from 1996 to 2010 by adults 18 to 64 years old with any diagnosis of “acute bronchitis” (ICD-9 code: 466.0). We excluded patients who were admitted to the hospital or visits associated with chronic pulmonary disease, immunodeficiency, cancer, or concomitant infectious diagnoses. We classified antibiotics, the main outcome, as either extended macrolides or other.

We calculated standard errors for all results using the *survey* package in R, version 3.0.1, using logistic regression. We considered two-sided p values < .05 as significant. To increase reliability, we combined data into 3-year periods.

Results

There were 3153 sampled acute bronchitis visits meeting our inclusion and exclusion criteria between 1996 and 2010. The overall antibiotic prescription rate was 71% (95% CI, 66 to 76) and increased between 1996 and 2010 (adjusted odds ratio, 1.75 per 10-year period; p=.03; Table). There was a statistically significant increase in antibiotic prescribing in EDs (Figure). Physicians prescribed extended macrolides at 36% (95% CI, 32% to 41%) of acute bronchitis visits and extended macrolide prescribing increased from 25% of visits in 1996–1998 to 41% in 2008–2010 (p=.01). Other antibiotics were prescribed at 35% of visits (95% CI, 30% to 39%), most commonly fluoroquinolones, aminopenicillins, and cephalosporins. The antibiotic prescribing rate for other antibiotics did not change significantly over time (48% of visits in 1996–1998 to 35% of visits in 2008–2010; p=.55).

Discussion

Despite clear evidence, guidelines, quality measures, and over 15 years of educational efforts stating that the antibiotic prescribing rate should be zero, the antibiotic prescribing rate for acute bronchitis was 71% and increased over the study period. Physicians continue to prescribe expensive, broad-spectrum antibiotics.

Our analysis has limitations. First, the sample size for some estimates was small. Second, the surveys do not capture care provided outside of clinic visits. Third, the surveys capture limited clinical information, restricting our ability to identify exclusionary factors. Fourth, as an analysis of visits, an individual patient could theoretically be included more than once, although this is unlikely given the sampling design.

Avoidance of antibiotic overuse for acute bronchitis should be a cornerstone of quality health care. Antibiotic overuse for acute bronchitis is straightforward to measure. Physicians, health systems, payers, and patients should collaborate to create more accountability and decrease antibiotic overuse.

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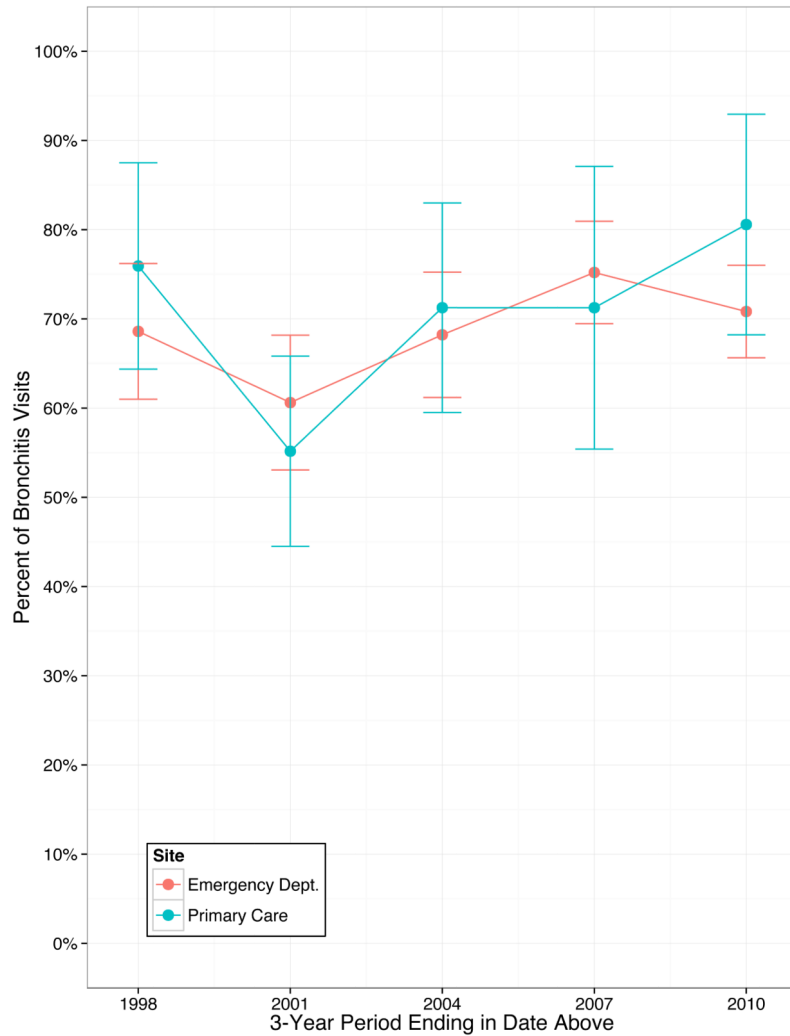


Figure. Antibiotic Prescribing for Acute Bronchitis in the United States by Site of Care, 1996–2010

For trends over time period, $P = .06$ for primary care and $P = .03$ for emergency departments. Linear trends across time were assessed using survey-weighted logistic regression by estimating the p-value of the coefficient for year as an explanatory variable for the outcome of antibiotic prescription.

Table

Visits and Antibiotic Prescribing for Adults with Acute Bronchitis in the United States, 1996–2010

| | Unweighted Visits (n = 3153)* | Weighted Proportion of Visits (95% CI [†]), % | Any Antibiotic | |
|----------------------------|-------------------------------|---|--------------------------------------|-----------------------------------|
| | | | Prescribed (95% CI) [‡] , % | Adjusted OR [§] (95% CI) |
| Year, per decade | - | - | - | 1.75 (1.06–2.90) |
| Age, y | | | | |
| 18–44 | 2037 | 58 (54–63) | 71 (65–76) | - |
| 45–64 | 1116 | 42 (37–46) | 71 (65–78) | 0.99 (0.64–1.53) |
| Gender | | | | |
| Female | 1918 | 60 (55–64) | 70 (65–76) | - |
| Male | 1235 | 40 (36–45) | 72 (65–78) | 0.95 (0.64–1.40) |
| Race | | | | |
| White | 2379 | 82 (78–86) | 72 (67–77) | - |
| Black | 672 | 12 (9–15) | 71 (64–79) | 0.96 (0.56–1.63) |
| Other | 102 | 6 (3–9) | 51 (35–66) | 0.39 (0.16–0.95) |
| Insurance | | | | |
| Private | 1480 | 62 (57–67) | 71 (66–77) | - |
| Medicare | 190 | 5 (3–7) | 74 (66–82) | 1.16 (0.57–2.34) |
| Medicaid | 595 | 11 (9–14) | 63 (55–71) | 0.73 (0.39–1.37) |
| Uninsured/Other | 888 | 22 (18–26) | 73 (67–79) | 1.25 (0.83–1.89) |
| Specialty/Setting | | | | |
| Primary Care ^{**} | 971 | 74 (71–77) | 72 (65–78) | - |
| Emergency Department | 2182 | 26 (23–29) | 69 (65–72) | 0.86 (0.57–1.29) |
| Region | | | | |
| Northeast | 525 | 15 (11–19) | 70 (61–79) | - |
| Midwest | 877 | 27 (22–34) | 72 (61–83) | 1.16 (0.60–2.21) |
| South | 1240 | 41 (33–48) | 73 (66–80) | 1.14 (0.64–2.04) |
| West | 511 | 17 (12–21) | 65 (54–75) | 0.87 (0.46–1.63) |
| Rural/Urban | | | | |
| Rural | 463 | 15 (8–23) | 68 (58–79) | - |
| Urban | 2690 | 85 (77–92) | 71 (66–77) | 1.23 (0.61–2.49) |

* N = 3153 sampled acute bronchitis visits.

[†] CI is confidence interval.[‡] % prescribed is the proportion of patients with acute bronchitis in each category (row percent) who received any antibiotic.[§] Adjusted odds ratio is based on a logistic regression model that includes all variables shown in the table. Calendar year was modeled using each year during the study period. To facilitate interpretation the result is the adjusted odds of antibiotic prescribing per 10-year interval.^{**} Primary Care included primary care physicians (family practice, general practice, internal medicine, and medicine-pediatrics) from the NAMCS and general medical practices from the NHAMCS.