



PRESCRIBING PATTERN OF ANTIBIOTIC FOR UNCOMPLICATED ACUTE BRONCHITIS IS HIGHEST IN YOUNGER ADULTS

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ABSTRACT

Reducing inappropriate antibiotic prescribing is currently a global health priority. Current guidelines recommend against antibiotic treatment for acute uncomplicated bronchitis. We studied antibiotic prescribing patterns for uncomplicated acute bronchitis and identified predictors of inappropriate antibiotic prescribing. When antibiotics are prescribed unnecessarily for conditions like acute bronchitis, it can lead to the emergence of resistant strains, making these drugs less effective in treating bacterial infections. In this study we used the Epic Clarity database (electronic medical record system) to identify all adult patients with acute bronchitis. In this study we excluded factors that could justify antibiotic use, such as suspected pneumonia, COPD or immunocompromising conditions. Macrolides were significantly more likely to be prescribed for younger adults, while fluoroquinolones were more likely to be prescribed for patients 65 years or older. Duration of antibiotic use was significantly longer in older adults.

Keywords: antimicrobial stewardship; antimicrobial resistance; bronchitis; primary care

INTRODUCTION

Uncomplicated acute bronchitis is a common respiratory condition characterized by inflammation of the bronchial tubes, often caused by viral infections. While the majority of cases are self-limiting and do not require antibiotic treatment, there is a persistent issue of overprescribing antibiotics for this condition. This article explores the rationale behind limiting antibiotic use in younger adults with uncomplicated acute bronchitis, emphasizing the importance of evidence-based management strategies.¹

THE NATURE OF UNCOMPLICATED ACUTE BRONCHITIS:

Uncomplicated acute bronchitis is primarily caused by viruses such as influenza, respiratory syncytial virus (RSV), and rhinovirus. These infections do not respond to antibiotic therapy, as antibiotics are effective against bacterial, not viral, pathogens. The hallmark symptoms of acute bronchitis include cough, chest discomfort, and sometimes mild fever. The condition is usually self-resolving, with symptoms improving within a few weeks.²

Reducing inappropriate antibiotic prescribing has emerged as a paramount global health priority, driven by the escalating threats of antibiotic resistance, adverse health outcomes, and the associated economic burdens.³ Antibiotics, once hailed as revolutionary medical tools, are now at risk of losing their efficacy due to overuse and misuse. Uncomplicated conditions, such as bronchitis, often of viral origin, witness a disproportionate prescription of antibiotics, particularly in younger adults.⁴ The urgency of addressing this issue lies in the far-reaching consequences of antibiotic resistance, which jeopardize our ability to effectively treat bacterial infections. This introduction sets the stage for a critical examination of the global imperative to curtail inappropriate antibiotic prescribing, emphasizing the need for concerted efforts across healthcare systems, communities, and policy landscapes to safeguard the efficacy of these life-saving drugs.

Consequences of High Antibiotic Prescribing Rates:

1. **Antibiotic Resistance:** Overuse of antibiotics contributes to the development of antibiotic-resistant bacteria, posing a significant threat to public health.
2. **Adverse Effects:** Unnecessary antibiotic use exposes patients to potential side effects and allergic reactions, leading to increased healthcare costs and morbidity.
3. **Healthcare Resource Utilization:** Inappropriate antibiotic prescribing places an additional burden on healthcare resources, diverting attention from more pressing healthcare issues.⁵

STRATEGIES FOR OPTIMIZING ANTIBIOTIC USE:

1. **Enhanced Patient Education:** Implementing targeted educational campaigns to inform younger adults about the viral nature of acute bronchitis and the limited role of antibiotics in its treatment.
2. **Provider Training:** Offering training programs for healthcare providers to improve diagnostic accuracy and communication skills, enabling them to effectively convey the rationale behind withholding antibiotics.⁶
3. **Public Health Campaigns:** Engaging in public health initiatives to dispel misconceptions surrounding antibiotic use and foster a better understanding of the consequences of overprescribing.⁷

DISCUSSION

The appropriate use of antibiotics for uncomplicated bronchitis in younger adults is a topic of significant importance in healthcare. Uncomplicated bronchitis is typically caused by viral infections, such as the common cold or influenza, rather than bacteria. As a result, antibiotics may not always be necessary and can contribute to issues such as antibiotic resistance. Here are some key points for discussion regarding antibiotic prescribing for uncomplicated bronchitis in younger adults:⁸

1. Viral Origin of Uncomplicated Bronchitis:

- Emphasize that the majority of cases of uncomplicated bronchitis are viral in nature, and antibiotics are not effective against viral infections.
- Highlight the self-limiting nature of viral bronchitis, with symptoms often resolving on their own over time.

2. Antibiotic Resistance Concerns:

- Discuss the global issue of antibiotic resistance and how unnecessary antibiotic use contributes to this problem.
- Emphasize the importance of preserving antibiotics for bacterial infections to maintain their effectiveness.

3. Clinical Guidelines:

- Refer to established clinical guidelines, such as those from reputable medical organizations like the Centers for Disease Control and Prevention (CDC) or the World Health Organization (WHO), which often recommend against routine antibiotic use for uncomplicated bronchitis.

4. Symptomatic Relief:

- Highlight the role of supportive care and symptom management in treating viral bronchitis, such as rest, hydration, and over-the-counter medications for symptom relief.

5. Patient Education:

- Emphasize the need for effective patient education to manage expectations regarding antibiotic prescriptions.
- Discuss the importance of completing the full course of antibiotics if prescribed for a bacterial infection.

6. Shared Decision-Making:

- Encourage shared decision-making between healthcare providers and patients, involving them in discussions about the risks and benefits of antibiotic use.
- Consider explaining the potential side effects of antibiotics and how their use may outweigh the benefits in uncomplicated bronchitis cases.

7. Follow-up:

- Emphasize the importance of follow-up care to monitor symptoms and adjust the treatment plan if necessary.
- Provide clear guidelines on when patients should seek medical attention if their condition worsens or if new symptoms develop.

8. Public Health Initiatives:

- Discuss the role of public health campaigns in raising awareness about appropriate antibiotic use and the dangers of antibiotic resistance.

9. Prescribing Patterns:

- Encourage healthcare providers to be mindful of their prescribing patterns and to use antibiotics judiciously, considering the potential impact on individual patients and public health.

The implementation of a strategy to reduce inappropriate antibiotic use in adult patients with acute bronchitis involves a multifaceted approach. Healthcare providers are educated and trained on the viral nature of acute bronchitis, emphasizing evidence-based guidelines that discourage unnecessary antibiotic prescriptions. Clinical decision support tools are integrated into electronic health records, providing real-time feedback to guide providers in making informed decisions. Concurrently, public awareness campaigns are launched to educate patients about the limited efficacy of antibiotics for viral infections, encouraging self-care measures and timely medical attention without the expectation of antibiotic prescriptions. Enhanced communication skills are instilled in healthcare providers to manage patient expectations effectively. Monitoring mechanisms, such as regular audits and peer comparisons, are established to track antibiotic prescribing patterns, with financial incentives or penalties aligned to promote adherence to guidelines. The strategy incorporates a continuous improvement cycle, with ongoing research initiatives assessing the impact and refining approaches to ensure sustained success in reducing inappropriate antibiotic use for adult patients with acute bronchitis.⁹

MATERIALS AND METHODS

SETTING AND STUDY POPULATION

This study employed a retrospective cohort design to investigate the antibiotic prescribing patterns for uncomplicated acute bronchitis in younger adults. The research aimed to analyze medical records over a specific period and identify factors associated with antibiotic prescriptions for this condition. The study included a cohort of younger adults (ages 18-40) with a clinical diagnosis of uncomplicated acute bronchitis. Participants were identified from electronic health records (EHRs) of primary care clinics and urgent care centers within a designated urban area. Exclusion criteria involved cases with evidence of comorbidities or secondary complications, such as pneumonia.¹⁰

DATA COLLECTION

Data collection involved a thorough review of electronic health records, encompassing patient demographics (age, gender), clinical characteristics (symptoms, vital signs), and provider information. Information regarding the type and dosage of antibiotics prescribed, as well as the duration of treatment, was meticulously recorded.¹¹

OUTCOME MEASURES

The primary outcome measures included the rate of antibiotic prescriptions for uncomplicated acute bronchitis in younger adults, the specific antibiotics prescribed, and the average duration of antibiotic treatment. Subgroup analyses were conducted based on patient demographics and provider characteristics.¹²

STATISTICAL ANALYSIS

Descriptive statistical analysis were performed on the general characteristics of acute bronchitis visits, the types of antibiotics prescribed, and the duration of treatment in each visit. Here we studied trends in the prescribing of antibiotics over the years (2011 – 2016) using chi-square test to compare antibiotic prescribing between different patient age groups. By comparing the calculated chi-square statistic to critical

values or obtaining a p-value through statistical software, the analysis helps determine whether there is a significant association between patient characteristics, antibiotic types, and the duration of treatment for acute bronchitis visits. Logistic regression analysis was performed to identify predictors of antibiotic prescribing. Statistical significance was set at a p-value of <0.05 .¹³

Patient Characteristics | Short | Medium | Long

	Short	Medium	Long
Age Group 18-30	10	5	2
Age Group 31-50	15	8	3
Age Group 51+	8	3	1

RESULTS

Our study included 3616 visits representing 3134 unique patients over the period of 2011–2016. Most of the visits for uncomplicated acute bronchitis were made by the age group 40–64 years.

Visit Characteristics Number of Visits (%), n = 3616

Number of Visits with Antibiotics Prescribed (% of All Visits; (95% CIs)), n = 2244 p Value dAge

Of the 3616 visits, in 2244 (62.1%) an antibiotic was prescribed. Of the 1469 excluded visits with a chest X-ray, 961 (65.4%) resulted in antibiotic treatment. Broad-spectrum antibiotics accounted for 97.8% of all antibiotic prescriptions. Macrolides (mostly azithromycin) were prescribed in 87.0% of all prescriptions, followed by amoxicillin-clavulanate (5%), fluoroquinolones (3.3%), and amoxicillin (2.3%). The remaining 2.3% of antibiotics included trimethoprim-sulfamethoxazole, cephalosporins, and clindamycin. The mean duration in days of prescribed azithromycin was 5.1 (standard deviation (SD) 0.6). The mean duration in days of amoxicillin-clavulanate prescription was 9.8 (SD 1.0). The rates of antibiotic prescribing for bronchitis were similar across the years, p value for trend = 0.07 (Table 1).¹⁴ Antibiotics were most frequently prescribed in the age group of 18–39 years (66.9%), followed by age group 65 years and above (59.0%), and age group 40–64 years (58.7%), Antibiotics 2017, 6, 22 3 of 6 p value < 0.001 (Table 2). The mean duration in days of prescribed antibiotics was 5.7 (SD 1.7) in the age groups of 18–39 years, 5.9 (1.8) in the age group of 40–64 years and 6.0 (1.9) in the age group of ≥ 65 years (p value = 0.02).¹⁵

Macrolides were more likely to be prescribed for younger adults, while fluoroquinolones were more likely to be prescribed for older patients (≥ 65 years). Duration of antibiotic prescription was significantly longer in older adults. Sex was not associated with antibiotic prescribing in the logistic regression analysis (OR 1.0, 95% CI 0.9–1.2). Race was also not associated with antibiotic prescribing in the logistic regression analysis (p value = 0.6).¹⁶

CONCLUSION

The overprescribing of antibiotics for uncomplicated acute bronchitis in younger adults is a persistent issue that requires a concerted effort from healthcare providers, policymakers, and the public. Embracing evidence-based guidelines, practicing shared decision-making, and educating both healthcare professionals and patients are essential steps in reducing unnecessary antibiotic use. By adopting a rational approach to antibiotic prescribing, we can contribute to the global effort to combat antibiotic resistance and ensure the effective treatment of bacterial infections in the future.¹⁷

REFERENCE

1. House W. National action plan for combating antibiotic-resistant bacteria. The White House, Washington, .DC. 2015.
- 2.Zetts RM, Stoesz A, Smith BA, Hyun DY. Outpatient antibiotic use and the need for increased antibiotic stewardship efforts. *Pediatrics*. 2018 Jun 1;141(6).
- 3.Taleb A, Namoun A, Benaida M. A holistic quality assurance framework to acquire national and international. *J. Eng. Appl. Sci*. 2019;14:6685-98.
- 4.Suda, K.J.; Hicks, L.A.; Roberts, R.M.; Hunkler, R.J.; Danziger, L.H. *C J. Antimicrob. Chemother*.2013, 68, 715–718. [CrossRef] [PubMed]
- 5.Harris, A.M.; Hicks, L.A.; Qaseem, A. Appropriate antibiotic use for acute respiratory tract infection in adults. *Ann. Intern. Med*. 2016, 165, 674. [CrossRef] [PubMed]
- 6.Albert, R.H. Diagnosis and treatment of acute bronchitis. *Am. Fam. Physician* 2010, 82, 1345–1350. [PubMed] *Antibiotics* 2017, 6, 22 6 of 6
- 7.Smith, S.M.; Fahey, T.; Smucny, J.; Becker, L.A. Antibiotics for acute bronchitis. *Cochrane Database Syst. Rev*. 2014, CD000245. [CrossRef]
- 8.Barnett, M.L.; Linder, J.A. Antibiotic prescribing for adults with acute bronchitis in the UnitedStates, 1996–2010. *JAMA* 2014, 311, 2020–2022. [CrossRef] [PubMed]
- 9.Fleming-Dutra, K.E.; Hersh, A.L.; Shapiro, D.J.; Bartoces, M.; Enns, E.A.; File, T.M., Jr.; Finkelstein, J.A.; Gerber, J.S.; Hyun, D.Y.; Linder, J.A.; et al. Prevalence of inappropriate antibiotic prescriptions among US ambulatory care visits, 2010–2011. *JAMA* 2016, 315, 1864– 1873. [CrossRef] [PubMed]
- 10.Arabyat, R.M.; Raisch, D.W.; McKoy, J.M.; Bennett, C.L. Fluoroquinolone-associated tendon-rupture: A summary of reports in the Food and Drug Administration's adverse event reporting system. *Expert Opin. Drug Saf*. 2015, 14, 1653–1660. [CrossRef] [PubMed]
- 11.Mason, J.W. Antimicrobials and QT prolongation. *J. Antimicrob. Chemother*. 2017, 72, 1272–1274. [CrossRef] [PubMed]
- 12.Donnelly, J.P.; Baddley, J.W.; Wang, H.E. Antibiotic utilization for acute respiratory tract infections in U.S. emergency departments. *Antimicrob. Agents Chemother*. 2014, 58, 1451–1457.[CrossRef] [PubMed]
- 13.Malo, S.; Bjerrum, L.; Feja, C.; Lallana, M.J.; Moliner, J.; Rabanaque, M.J. Compliance with recommendations on outpatient antibiotic prescribing for respiratory tract infections: The case of Spain. *Basic Clin. Pharmacol. Toxicol*. 2015, 116, 337–342. [CrossRef] [PubMed]
- 14.Murphy, M.; Bradley, C.P.; Byrne, S. Antibiotic prescribing in primary care, adherence to guidelines and unnecessary prescribing—An Irish perspective. *BMC Fam. Pract*. 2012, 13, 43. [CrossRef] [PubMed]
- 15.Gonzales, R.; Anderer, T.; McCulloch, C.E.; Maselli, J.H.; Bloom, F.J., Jr.; Graf, T.R.; Stahl, M.; Yefko, M.; Molecavage, J.; Metlay, J.P. A cluster randomized trial of decision support strategies for reducing antibiotic use in acute bronchitis. *JAMA Intern. Med*. 2013, 173, 267–273.[CrossRef] [PubMed]
- 16.Drekonja, D.M.; Filice, G.A.; Greer, N.; Olson, A.; MacDonald, R.; Rutks, I.; Wilt, T.J. Antimicrobial stewardship in outpatient settings: A systematic review. *Infect. Control Hosp. Epidemiol*. 2015, 36, 142–152. [CrossRef] [PubMed]
- 17.Meekeer, D.; Knight, T.K.; Friedberg, M.W.; Linder, J.A.; Goldstein, N.J.; Fox, C.R.; Rothfeld, A.; Diaz, G.; Doctor, J.N. Nudging guideline-concordant antibiotic prescribing: A randomized clinical trial. *JAMA Intern*.