

# Antibiotic Prescription With Asthma Medications: Why Is It So Common?

Acute respiratory tract infections (ARTIs) are among the most common reasons for visits to primary care pediatricians and emergency departments.<sup>1</sup> Infections with respiratory syncytial virus, parainfluenza viruses, adenoviruses, rhinoviruses, human metapneumovirus, and *Mycoplasma pneumoniae* are frequently associated with wheezing, which leads to the clinical entities of bronchiolitis in infants and asthmatic bronchitis (also known as wheezy bronchitis) in older children.<sup>2</sup> In general, bacterial superinfection is uncommon after these respiratory virus infections, and antibiotics do not generally play a role in the management of wheezing associated with signs of acute infection.<sup>2-5</sup> It is important to note that bacterial infections are more common after infection with influenza A or B, but these viruses do not generally trigger wheezing in children.

Two reports in this issue of *Pediatrics* indicate that, unfortunately, simultaneous prescription of antibiotics and medications used for asthma is extremely common.<sup>6,7</sup> De Boeck et al<sup>6</sup> used a health insurance database that encompassed the records of 892 841 Belgian children seen in 1 year to examine antibiotic-prescribing practices. During this period, an antibiotic was dispensed to 44.21% of the children covered by this insurance provider, and an asthma drug ( $\beta$ -adrenergic agents, inhaled corticosteroid, ipratropium, and/or leukotriene receptor antagonist) was dispensed to 16.04%. An antibiotic was dispensed to 38.62% of children without an asthma drug versus 73.50% of children with an asthma drug dispensed ( $P < .0001$ ). Moreover, 35.64% of the children given an asthma drug had an antibiotic prescribed on the same day, which suggests concerns for the coexistence of asthma and a bacterial infection.

Similarly, Paul et al<sup>7</sup> used data from the National Ambulatory Medical Care Survey and the National Hospital Ambulatory Medical Care Survey to determine the frequency of antibiotic-prescribing during office and emergency department visits by children for asthma. They used *International Classification of Diseases, Ninth Revision, Clinical Modification* (ICD-9-CM) codes to assess the presence of coexisting bacterial indications for antibiotic therapy at these visits. These data indicate that between 1998 and 2007, ~60.4 million visits occurred for asthma without a concomitant ICD-9 code that would support prescription of an antibiotic. Antibiotics were prescribed during 16% of these visits; macrolides were the most commonly prescribed antibiotic (48.8%). After controlling for numerous covariates, systemic corticosteroid prescription and treatment during the winter were associated with increased odds of antibiotic prescription, whereas treatment in an emergency department was associated with decreased odds.

A major strength of these studies is the sheer power of the data provided by their large data sets. De Boeck et al<sup>6</sup> had access to data from

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## ABBREVIATION

ARTI—acute respiratory tract infection

Opinions expressed in these commentaries are those of the author and not necessarily those of the American Academy of Pediatrics or its Committees.

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a health care insurer that covers 44% of the population of Belgium, where medical insurance coverage is mandatory. Although neither study directly assessed the complaints and findings that led to prescription of either antibiotic or bronchodilator therapy, the results suggest that Belgian and American physicians prescribe antibiotics for patients perceived to have a diagnosis of asthma or bronchospasm at a previously unsuspected level: as often as 1 in 6 visits for American children, which accounts for 1 million or more dubious prescriptions per year. By contrast, domestic and international guidelines specify that antibiotics should not be used as part of chronic asthma therapy or for acute exacerbations apart from their use to treat comorbid bacterial infections such as pneumonia or sinusitis.<sup>3,5</sup>

What drives this pattern of prescribing? Diagnostic uncertainty and medical-legal concerns are likely to drive some degree of unjustified antibiotic-prescribing. Paul et al<sup>7</sup> noted that children who were prescribed systemic corticosteroids were significantly more likely to also receive an antibiotic; prescription of corticosteroids presumably represents a proxy for more severe illness and increased concern related to the potential for a coexisting bacterial infection. Prescribing for bacterial illness when none is present is not a new phenomenon and, in fact, represents the bulk of antibiotic-overprescribing that we see today.<sup>1,8</sup> During the 12-year period from 1998 to 2006, visit rates and antibiotic-prescribing for diagnoses for which antibiotics are considered appropriate (acute otitis media, sinusitis, pharyngitis, tonsillitis, and nonviral pneumonia) did not change.<sup>1</sup> If we take into account the prevalence of true bacterial pathogens in children with presumed “bacterial” ARTIs (sinusitis, pharyngitis, and acute otitis

media), there remains a substantial degree of antibiotic-overprescribing for such conditions.<sup>9</sup>

For cases in which a child presents with an acute exacerbation of asthma and there is low suspicion for bacterial illness, a watchful-waiting approach could be used, similar to that used for some cases of acute otitis media.<sup>10</sup> In such cases, a child would be treated with appropriate asthma medications and, if the child is not improving in 1 to 2 days or getting worse, be reevaluated. For acute otitis media this approach has been shown to reduce the percentage of children treated with antibiotics by 66%.<sup>10</sup> Providing specific follow-up plans for parents that “leave the door open” also results in higher satisfaction.<sup>11</sup>

Another potential driver of the unjustified antibiotic use described in these articles is doctor-parent communication during visits for asthma exacerbation triggered by ARTIs. During these visits, although parents rarely directly request antibiotics for their child, they sometimes suggest that their child has an illness, such as bronchitis, that they believe to be effectively treated with antibiotics.<sup>12</sup> When parents suggest such diagnoses, their child’s doctor is significantly more likely to perceive them as wanting antibiotics.<sup>12</sup> When providers perceive parents as wanting antibiotics for their child, they are more likely to inappropriately prescribe them.<sup>13,14</sup> These are the cases in which parent education can and should come into play.

National Asthma Education and Prevention Program guidelines recommend patient asthma education as a routine part of clinical care.<sup>3</sup> Paul et al<sup>7</sup> performed a multivariate analysis restricted to office-based visits and found that asthma education at visits was associated with a >50% reduction in antibiotic prescriptions (odds ratio: 0.46). This finding is consistent

with others that have demonstrated a relationship between education and more judicious use of antibiotics for pediatric ARTIs.<sup>15,16</sup> Providing asthma education is likely a proxy for higher-quality doctor-parent communication during such visits. In addition to decreasing rates of unjustified antibiotic-prescribing, better communication has the added benefit of increasing satisfaction with visits for ARTIs.<sup>11,14</sup>

What are the consequences of overuse? It is common knowledge that antibiotic overuse leads to increased bacterial resistance in the community. As we continue to overuse antibiotics, our armamentarium to fight resistant infections continues to shrink. Unjustified antibiotic use also introduces the risk of allergic or other adverse drug reactions and may mislead some parents into believing that such treatment is appropriate or important for children who have clinical evidence of asthma.

What research is needed? Quality-improvement (QI) programs with a high potential for dissemination (eg, Web-based distance-learning QI programs) should be developed to address inappropriate antibiotic-prescribing in the pediatric outpatient setting. Such QI programs should be multifaceted and include decision support (eg, automated prompts in electronic medical record systems) on appropriate use of broad-spectrum agents and education related to the consequences of overuse in cases of asthma and other respiratory illnesses. A component of feedback on provider performance should be included, as well as skills training in good communication practices, especially provision of specific follow-up plans and parent education about effective management of asthma and ARTI. Once developed, such programs should undergo rig-

orous evaluation and, if effective, be broadly disseminated.

The battle to reduce inappropriate antibiotic-prescribing for children di-

agnosed with viral upper respiratory infections has largely been won.<sup>1,15,16</sup>

The new battle for curbing unjustified antibiotic use in the pediatric outpa-

tient setting requires that we focus on reducing inappropriate bacterial diagnoses and decreasing the use of broad-spectrum agents.

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**ASTHMA CARE:** Children with asthma in several US states are getting help from a unique form of community health outreach: “Breathmobiles” (Ogburn S. High Country News. October 11, 2010). Staffed by physicians, nurses, and respiratory therapists, Breathmobiles are specially-outfitted recreational vehicles that bring asthma care to inner-city schools and neighborhoods—areas with high asthma rates due to poverty, industrial pollution, and poor access to preventative medicine. Piloted in 1995 at the LA County/USC Medical Center, the model has since expanded to include 11 Breathmobiles throughout California as well as replica programs in Phoenix, Baltimore, and Mobile, Alabama. In 2002, the program was credentialed by the Joint Commission on Accreditation of Health Care Organizations. Breathmobiles have proven successful at reducing the number of inpatient hospitalizations, ER visits, and missed school days among children with asthma. That means not only improved health for inner-city children, but also significant reductions in healthcare expenses. More information about this creative preventative healthcare model can be found at The Asthma and Allergy Foundation of America’s website, [www.aafa-ca.com](http://www.aafa-ca.com).

Noted by Patrick Huffer, MS-IV

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