

Antibiotics and Upper Respiratory Infection

Do Some Folks Think There Is a Cure for the Common Cold?

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Background. Symptomatic treatment is the only recommended therapy for the uncomplicated "common cold." The purpose of this study was to examine the use of antibiotics and other prescription medications for the common cold in a Medicaid population seen in ambulatory care settings.

Methods. A cross-sectional sample of Kentucky Medicaid claims from July 1, 1993, through June 30, 1994, was analyzed. Subjects were patients seen in an ambulatory setting for the common cold, defined as acute nasopharyngitis. A total of 1439 individuals were seen for 2171 separate outpatient and emergency department encounters for the common cold. Outpatient visits accounted for 99% (2144) of the encounters.

Results. Patients in 35% (752) of the encounters did not fill a prescription for medication, 6% (129) filled a prescription for an antihistamine or other symptomatic medication, and 60% (1290) filled a prescription for an antibiotic for the common cold. Nineteen different antibiotics, 54% of which were amoxicillin, were prescribed for the common cold. Less than 2% of the encounters

had a secondary diagnosis of either acute sinusitis or otitis media. These encounters were not more likely than the total sample to receive antibiotics. Adults were more likely than children to receive an antibiotic ($P < .001$), and urban physicians were more likely than rural physicians to prescribe antibiotics ($P = .02$). A conservative estimate of the annual cost of antibiotic prescribing for the common cold in the United States was \$37.5 million.

Conclusions. A majority of persons receiving medical care for the common cold are given prescriptions for an unnecessary antibiotic. Unchecked, this practice may lead to greater antibiotic resistance and unnecessary use of health care resources. Future research should focus on the ability to institute behavioral changes for treatment of the common cold in both closed systems (eg, managed care) and open systems (eg, general community of physicians).

Key words. Common cold; antibiotics; prescriptions; drug; health care services; drug resistance; physicians' practice patterns. (*J Fam Pract* 1996; 42:357-361)

Antibiotics are arguably the most important advance in the history of medicine. Antibiotics may be indiscriminately used, however, for a variety of infections; they are a particularly common treatment for upper respiratory tract infections.¹ Antibiotic resistance is a growing problem, with a variety of pathogens demonstrating resistance as a

result of the extensive use and abuse of antibiotics.²⁻⁶ In particular, the overuse of antibiotics in conditions for which antibiotics are neither effective nor indicated, such as viral infections, might play a significant role in the development of drug-resistant bacteria.⁷

The "common cold" is a designation used by both physicians and the general public for a constellation of acute minor upper respiratory tract symptoms. The common cold is a mild, self-limited catarrhal syndrome. It is a leading cause of acute morbidity, visits to a physician, and industrial and school absenteeism.^{8,9} The overwhelming majority of colds are caused by viruses.^{9,10} Although there has been some progress in the research on interferon as a

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treatment for rhinoviruses,^{11,12} only symptomatic treatment is available or recommended for the uncomplicated cold.¹³⁻¹⁵ More than 800 over-the-counter preparations are available in the United States to manage cold symptoms,^{13,16} but there is currently no cure for the common cold, and antibiotics are not indicated for its treatment.

Even though there is no cure for the common cold, physicians may still prescribe antimicrobial agents, believing that patients expect to receive them.¹⁶ Although evidence suggests that many patients do not enter the therapeutic encounter expecting a prescription for antibiotics,^{17,18} physicians may interpret patient behaviors as indicative of a desire for antibiotics.¹⁹ Since antibiotic use for unindicated reasons could potentiate antibiotic resistance and increase health care costs, we examined the treatment regimens for the common cold in a Medicaid population seen in ambulatory care settings to determine how frequently antibiotics were prescribed.

Methods

The data for this study are from a sample of claims extracted from the Kentucky Medicaid claims data. A random sample of 50,000 patients who had at least one claim for care by a physician, dentist, or optometrist between July 1, 1993, and June 30, 1994, was selected. All nursing home and mental health institutionalized persons were excluded.

For the present study, the common cold was defined as a diagnosis of acute nasopharyngitis, classified by the ICD-9-CM code of 460.0.²⁰ This diagnosis was used to represent the common cold because some ICD-9-CM code books indicate that this diagnosis *should* be used for the common cold.²⁰ Further, we hoped to decrease the likelihood of misclassification bias that could be present if a more general diagnosis, such as acute upper respiratory infections (465.0-465.9), was used to represent the common cold. All encounters for acute nasopharyngitis seen in either an outpatient setting or an emergency department were available for analysis.

Because antibiotic prescribing could have been related to a comorbid condition, we also examined secondary diagnoses to estimate whether antibiotic use was directed toward a diagnosis other than acute nasopharyngitis. Noting an association of colds with sinusitis and otitis media, we examined the encounters in which either ICD-9-CM codes 461-461.9 (acute sinusitis) or 381-382.9 (otitis media) were included as secondary diagnoses.

Ambulatory care was defined in this study as encompassing encounters in both outpatient and emergency department settings. Visits to the latter setting were in-

cluded in this analysis of ambulatory care practice because a substantial portion of persons of lower socioeconomic status use emergency departments for ambulatory care.²¹ Patient residence was classified as urban if the patient lived in a county within a metropolitan statistical area (MSA), and rural if the county of residence was outside an MSA.

Kentucky Medicaid drug claims do not have a corresponding diagnosis code. Consequently, the diagnosis and drugs were linked according to the date of service to provide an assessment of prescribing behavior. The pharmaceutical treatment was assumed to have been prescribed for treating the common cold if the date of the drug claim was on the day of the physician visit, or up to and including 4 days after the physician visit. This time frame surrounding the physician visit should account for the possible time lag between when the patient saw the physician and when the prescription was filled. Encounters were excluded if any additional inpatient or outpatient visit for another condition occurred within the 4 days following the visit for acute nasopharyngitis. This was done to provide a window of drug acquisition uncontaminated by other conditions. Furthermore, if another visit for acute nasopharyngitis was reported within the time frame, the second visit was eliminated from the data set and the first visit was considered to be the primary diagnostic encounter. Finally, in an effort to link the prescribed drug and the acute encounter, all drugs filled with more than a 29-day supply were excluded, since a 30-day supply would be indicative of medication for a chronic condition.

Data were analyzed using chi-square statistics for bivariate relations.

Results

The common cold was diagnosed in 2171 separate outpatient and emergency department visits accounted for by 1439 patients. Because of the cross-sectional nature of the year's worth of claims, individuals could have had more than one encounter for a common cold. Outpatient visits accounted for 99% (2144) of the encounters.

The demographic characteristics of the patients filing claims were as follows: 45% male, 85% white, and 57% residing in rural areas. Fifty-four percent of the prescriptions filled by these patients were from physicians located in rural areas. The mean age of the patients was 10 years (standard deviation [SD], 14.1), with 80% of the sample being younger than age 18.

The treatment regimens for the common cold indicated that patients in 35% (752) of the encounters did not fill a prescription for medication, 32% (689) filled an antibiotic prescription only, 6% (129) filled a prescription

Table 1. Treatment Regimens for the Common Cold, by Rural and Urban Practice Sites

Practice Site	Type of Medication			
	None, %	Antibiotic, %	Symptomatic, %	Combination, %
Rural (n=1179)	37	25	6	32
Urban (n=992)	32	40	6	22

NOTE: There was a significant difference ($P<.001$) in treatment regimens for the common cold between rural and urban practice sites.

for an antihistamine or other symptomatic medication, and 28% (601) filled prescriptions for both antibiotics and symptomatic relief medication. Although 19 different antibiotics were prescribed for the diagnosis, 10 days of amoxicillin was the most frequently used regimen (54%). Among antibiotic classes accounting for at least 10% of the prescribed antibiotics, second- and third-generation cephalosporins accounted for 14% (185), and erythromycin accounted for 11% (144).

Diphenhydramine hydrochloride was the medicine used most often for symptomatic relief (424 cases, or 58% of encounters receiving symptomatic relief medication). Other prescribed symptomatic relief medications included bronchodilators (albuterol, theophylline, metaproterenol sulfate, terbutaline sulfate), analgesics (ibuprofen, acetaminophen with codeine), and promethazine hydrochloride, which may have been used for its antihistamine or antiemetic qualities.

In terms of secondary comorbid conditions that could account for the prescribing of antibiotics, we observed that 1.4% (31/2171) of the encounters for the common cold had a secondary diagnosis of otitis media, and 0.4% (8/2171) had a secondary diagnosis of acute sinusitis. Among encounters involving a secondary diagnosis of otitis media, 68% resulted in antibiotic prescriptions; antibiotics were prescribed in 62% of encounters in which acute sinusitis was diagnosed. The rate of antibiotic prescribing when otitis media or sinusitis was also diagnosed was not significantly different from that of the total sample ($P=.25$ and $.88$, respectively).

The relation of treatment regimens for the common cold to point-of-service characteristics indicated significant differences between rural and urban practice sites (Table 1). Physicians in urban practices were significantly more likely to prescribe antibiotics alone, while those in rural practices were more likely to prescribe antibiotics in combination with a symptomatic relief medication. When the two points of service were compared in terms of the likelihood of prescribing an antibiotic vs no antibiotic, physicians in urban practices were more likely than those in rural practices to prescribe antibiotics in visits of patients with colds (62% vs 57%, respectively, $P=.02$). Because of the few times ($n=27$) that acute nasopharyngitis

Table 2. Treatment Regimens for the Common Cold, by Age of Patient

Patient Age	Type of Medication			
	None, %	Antibiotic, %	Symptomatic, %	Combination, %
<18 years (n=1731)	38	34	5	23
≥18 years (n=440)	21	24	10	45

NOTE: There was a significant difference ($P<.001$) in treatment regimens for the common cold for children and adolescents compared with that for adults.

was diagnosed in emergency departments, the analysis was collapsed to examine the difference between the two groups with respect to likelihood of receiving a prescription for an antibiotic. No significant difference in antibiotic prescribing was seen between emergency departments (66%) and other outpatient settings (60%) ($P=NS$).

Significant differences were observed when children and adolescents were compared with adults with respect to treatments for the common cold (Table 2). Children and adolescents were more likely to receive no medication, whereas adults were more likely to receive a combination of antibiotics and symptomatic relief medication. With respect to the likelihood of receiving an antibiotic relative to the age of the patient, children and adolescents (57%) were significantly less likely to receive an antibiotic than were adults (69%, $P<.001$).

Discussion

Patients in the majority (60%) of ambulatory care encounters for the common cold were treated with antibiotics. Prescriptions for symptomatic relief medications with or without an antibiotic were filled only slightly more often than were prescriptions for antibiotics alone. This suggests that the treatment goal for encounters for the common cold are for a curative regimen (ie, antibiotics) rather than symptomatic relief.

The treatment of respiratory infections with antibiotics may be so ingrained in the belief systems of both American physicians and patients that both expect it. Evidence exists to indicate that physicians may code a condition that is likely to be of viral origin with an alternative diagnosis that would suggest a bacterial origin to satisfy patient expectations for antibiotics.¹⁹ For instance, the physician could have coded the individual with a cold as having acute sinusitis, a condition that warrants antibiotic treatment.²² Consequently, the present results could be and probably are an underestimation of the number of common colds treated with antibiotics.

The rationale for prescribing antibiotics for the common cold are complex. Reasons may include the physi-

cian's belief that antibiotics are actually effective or the impression that prescribing antibiotics will satisfy patient expectations. Physicians may feel that the failure to prescribe an antibiotic will result in a dissatisfied patient who will seek care elsewhere. Thus, the seemingly benign act of prescribing an antibiotic such as amoxicillin for a cold does little or no physical harm to the patient and keeps the practice economically viable. This particular perspective may be based on practice management behaviors deemed effective in a fee-for-service model of health care delivery. In closed-panel managed care organizations, the ability of the patient to change physicians may be greatly impeded, thereby decreasing the perceived economic threat of patients leaving the practice if they do not receive antibiotics for colds. We could not examine the effects of the organization of physicians on prescribing behaviors, however, since at the time of the study the Kentucky Medicaid program did not enroll any patients in managed care programs.

The results indicate that American physicians are prescribing antibiotics at a rate far greater than that of some of their European colleagues. In a study of the management of respiratory infections, it was discovered that Dutch family physicians prescribe antibiotics for 17% of encounters for acute upper respiratory tract infections.²³ Although the diagnosis of acute nasopharyngitis is not synonymous with the diagnosis of acute upper respiratory tract infections, patients with acute nasopharyngitis should be no more likely to receive antibiotics for treatment.

The results of this study have important implications for the cost of health care. Based on results from the 1992 National Health Interview Survey indicating that 26 colds occur per 100 persons per year and that 37% of those result in medical attention,⁸ it can be estimated that medical attention is sought for 25.9 million colds per year among the 270 million people living in the United States. Our data suggest that antibiotics are prescribed for 60% of diagnosed colds. Even using the most conservative estimates of medication costs for a course of therapy (\$2.41, the Health Care Financing Administration figure for the wholesale cost of 250 mg of amoxicillin for 10 days),²⁴ our findings suggest that antibiotic use for the common cold adds \$37.5 million to the annual cost of care in the United States. This cost estimate is conservative, considering that our data show that for a substantial proportion of visits, more expensive antibiotics were prescribed. In many cases, a course of antibiotics prescribed for the common cold was more expensive than a typical physician's office visit.

Recommendations to prevent the spread of drug-resistant bacteria have included educational interventions for medical staff and guidelines regarding the proper use

of antibiotics.²⁵ These guidelines and educational interventions indicate situations in which the use of the drug is appropriate or acceptable and those in which the use of the drug should be discouraged.

Even guidelines to be voluntarily followed have shown positive effects in increasing the appropriate use of antibiotics.²⁶ Although most of the guidelines have been proposed for small closed systems such as hospitals, they may be useful to managed care organizations. However, open systems, such as the general community of physicians, could also be influenced by a clinical guideline for treating the common cold. Evidence suggests that clinical guidelines for medical practice can be particularly effective when presented in the context of a specific educational intervention but seldom change practice when disseminated through publication in journals or unsolicited mailed material.²⁷

Several limitations to this study should be noted. First, the data are based on claims filed with Medicaid. Because the drug claims contained no diagnosis code, we had to make assumptions about the drug behavior by examining medications filled within a specified time frame. Other medications may have been prescribed and not filled, or provided as a sample from the physician's office. We also assumed that medications filled within 4 days of the office visit were related to the condition for which the physician billed and were not prescribed at an earlier date or for an unrelated condition that was diagnosed but not submitted as a diagnosis to Medicaid as the reason for the visit. Additionally, many individuals may have acquired or been recommended to acquire some of the same symptomatic relief medication (diphenhydramine, ibuprofen) in over-the-counter forms.

Second, no objective validation of the diagnoses could be made from the available data. Patients who were inappropriately given prescriptions for antibiotics for the common cold may have actually benefited from antibiotic therapy if their true illness was pneumonia or sinusitis but was misdiagnosed by the physician. A possible misclassification bias may have occurred in that the presenting symptoms of a diagnosis of acute nasopharyngitis may have overlapped other upper respiratory tract infections. Nevertheless, the present study used the most restrictive diagnosis available for the common cold, thereby limiting possible misclassification bias. Moreover, although the diagnosis could not be objectively evaluated, treatment decisions were based on the physician's diagnosis. The most accurate indicator available about the physician's impression is the diagnosis code submitted to Medicaid.

Finally, this study used data from a sample of Kentucky Medicaid recipients; thus, the generalizability of these results to other ambulatory care populations may be limited. The Medicaid program has a restrictive formu-

lary, particularly for antihistamines and decongestants, thereby limiting the types of prescriptive symptomatic care available to the patient. Further, because the antibiotics were provided by Medicaid, there was no cost to the patient for filling antibiotic prescriptions to treat a common cold.

A direction for future research is to investigate attitudinal differences between physicians in managed care and those in fee-for-service environments with respect to the need to provide antibiotics for the common cold. The dissemination of guidelines for treatment of the common cold may be particularly useful in terms of promoting appropriate use of antibiotics and decreasing the cost of health care.

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