Ruling Out the Need for Antibiotics

Are We Sending the Right Message?

Rita Mangione-Smith, MD, MPH; Marc N. Elliott, PhD; Tanya Stivers, PhD; Laurie L. McDonald, MS; John Heritage, PhD

Objectives: To examine the relationships among physician-parent communication practices, physicians’ perceptions of parental expectations for antibiotic treatment, and inappropriate antibiotic prescribing for viral upper respiratory tract infections.

Design: Cross-sectional study of pediatric encounters motivated by cold symptoms between October 1, 2000, and June 30, 2001. Each encounter was videotaped. Physicians completed a postvisit survey that measured whether they perceived the parent as expecting antibiotics. Coded communication variables were merged with survey variables. Multivariate analyses identified key predictors of parent-physician communication practices, physician perceptions of parents’ expectations for antibiotics, and inappropriate antibiotic prescribing for viral conditions.

Setting: Twenty-seven pediatric practices in Los Angeles, Calif.

Participants: Thirty-eight pediatricians and 522 consecutively approached parents of children with cold symptoms.

Main Outcome Measures: Physicians’ perceptions of parental expectations for antibiotics, inappropriate antibiotic prescribing, and parental questioning of non-antibiotic treatments.

Results: Physicians were 20.2% more likely to perceive parents as expecting antibiotics when they questioned the physician’s treatment plan (P = .004; 95% confidence interval, 6.3%-34.0%). When physicians perceived parents as expecting antibiotics, they were 31.7% more likely to inappropriately prescribe them (P<.001; 95% confidence interval, 16.0%-47.3%). Parents were 24.0% more likely to question the treatment plan when the physician ruled out the need for antibiotics (P = .004; 95% confidence interval, 7.7%-40.3%).

Conclusions: Parental questioning of the treatment plan increases physicians’ perceptions that antibiotics are expected and thus increases inappropriate antibiotic prescribing. Treatment plans that focus on what can be done to make a child feel better, rather than on what is not needed, ie, antibiotics, may decrease inappropriate antibiotic prescribing.

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prescribing, but physician perceptions of parental expectations have been demonstrated to be a stronger predictor of actual prescribing behavior. Similarly, although physicians commonly cite parent pressure as a reason for prescribing antibiotics, recordings of actual encounters between parents and physicians show that explicit demands or requests for antibiotics are relatively infrequent. Nevertheless, previous research has identified a number of indirect parental communication behaviors that are associated with physician perceptions of parental expectations, although that research was limited by a small physician sample and a homogeneous parent sample.

This study has the following 2 main objectives: (1) to test the relationships between previously identified parental communication practices and physician perceptions of parental expectations for antibiotics using a larger and more heterogeneous sample of physicians and parents and (2) to investigate the relationship between new qualitatively identified physician communication practices and parental communication practices and physician perceptions of parental expectations, although that research was limited by a small physician sample and a homogeneous parent sample.

Methods

STUDY DESIGN

We conducted a nested cross-sectional study of 522 pediatric encounters clustered among 38 pediatricians (approximately 15 encounters per physician) in 27 community pediatric practices in Los Angeles County, California. Details regarding recruitment of the physician and parent samples have been reported elsewhere. For parents to be eligible, children had to present with respiratory tract infection symptoms (cough, nasal congestion, ear pain, or throat pain). The child had to be between the ages of 6 months and 10 years and to not have taken antibiotics during the preceding 2 weeks. The parent had to be able to speak and read English, and the visit had to occur between October 1, 2000, and June 30, 2001.

As previously reported, 38 of the 59 invited eligible pediatricians agreed to participate (64.4% participation rate), 1 to 4 from each of the 27 practices. Of the 678 parents invited to participate, 570 agreed (84.1%). Twenty-seven participating parents were later determined to be ineligible because their children did not have an eligible diagnosis (eg, earwax impaction or gastroenteritis), yielding a sample of 543 participating parents. All physician and parent participants gave written informed consent. All study procedures were reviewed and approved by the general campus institutional review board of the University of California–Los Angeles.

DATA COLLECTION PROCEDURES

Before the visit, parents completed a self-administered questionnaire. Each pediatric visit was then videotaped. After the visit, physicians completed a self-administered questionnaire. A detailed list of survey variables collected can be found in our previous report. For the purposes of the present study, the following diagnoses were coded as viral: bronchitis, bronchiolitis, croup, viral pharyngitis, viral pneumonia, viral stomatitis, and viral URI. Oral and injectable antibacterial drugs were considered antibiotics for analysis purposes. Inappropriate antibiotic prescribing was defined as the prescription of antibiotics for a viral respiratory diagnosis.

Parental expectations for antibiotic treatment were assessed by responses to the following question, “How necessary do you think it is for the physician to prescribe an antibiotic for your child?” This item was scored on a 5-point scale (response options: definitely necessary, probably necessary, uncertain, probably unnecessary, and definitely unnecessary). Responses were dichotomized such that the first 2 ratings were labeled “antibiotics expected,” whereas the other ratings were labeled “antibiotics not expected.”

Physician perceptions of parental expectations for antibiotics were measured by physicians’ responses to the statement, “At the beginning of this visit, this parent expected me to prescribe an antibiotic.” This item was scored on a 5-point Likert scale (response options: strongly agree, somewhat agree, uncertain, somewhat disagree, and strongly disagree). Responses were dichotomized such that the first 2 ratings were labeled “physician perceives a parental expectation for antibiotics,” whereas the other ratings were labeled “physician perceives no parental expectation for antibiotics.”

COMMUNICATION CONDUCT

The qualitative method of conversation analysis was used to analyze the videotaped data. Both of the conversation analysts (T.S. and J.H.) were initially blinded to whether antibiotics were prescribed for a given encounter. Through conversation analysis, we identified 3 relevant communication practices that constituted our interaction analysis coding scheme. Two trained research assistants each coded approximately half of the 522 videotaped encounters, and one of us (R.M.-S.) coded a 15% random sample of the encounters to test interrater reliability of the coding scheme, as measured by the $\kappa$ statistic. The communication behaviors we focused on emerge in the problem presentation and counseling phases of the visit. We examined whether (1) the parent offered a candidate bacterial diagnosis during the presentation of the child’s illness to the physician, (2) the physician’s treatment recommendation explicitly ruled out the need for antibiotics, and (3) the parent questioned the physician’s treatment recommendation. These communication behaviors are summarized and exemplified in Table 1 and the eFigure (available at: http://www.archpediatrics.com). Weighted $\kappa$ statistics calculated to examine interrater reliability for coding the 3 communication behaviors revealed moderate to near-perfect agreement beyond that of chance: 0.84, 0.77, and 0.55 respectively.

ANALYTIC METHODS

For all analyses, the physician-parent encounter, clustered within physicians in practices, was the unit of analysis. All multivariate analyses corrected for this hierarchical structure. We tested the bivariate relationships between our hypothesized categorical predictor and outcome variables using the $\chi^2$ test of independence. Bivariate relationships were examined between each of a common set of candidate predictor variables and (1) parental expectations for antibiotics and (2) physician perceptions of parental expectations. The predictor variables included parental communication practices as summarized in Table 1, symptoms, whether antibiotics had previously been prescribed for a cold or sore throat, and child, parent, and physician demographics. Predictor variables having significant bivariate relationships ($P<.05$) with these outcome variables were retained for multivariate models. The final models included (1) parents who were not initially offered antibiotics for their child and who did not question the treatment plan and (2) parents who did not question the treatment plan and (2) parents who did not question the treatment plan and (2) parents who did not question the treatment plan and (2) parents who did not question the treatment plan and (2) parents who did not question the treatment plan and (2) parents who did not question the treatment plan and (2) parents who did not question the treatment plan and (2) parents who did not question the treatment plan and (2) parents who did not question the treatment plan and (2) parents who did not question the treatment plan and (2) parents who did not question the treatment plan and (2) parents...
who were not initially offered antibiotics for their child but did question the treatment plan. This latter group of parents was included regardless of whether they successfully negotiated with the physician to ultimately obtain antibiotics for their children. We excluded from these analyses 204 cases (39.1%) in which both of the following exclusion criteria were met: (1) physicians recommended antibiotics as part of their initial treatment plan and (2) parents did not question the treatment plan. In other words, we excluded cases in which parents did not need to negotiate with the physician to obtain a prescription for antibiotics because the physician’s initial treatment recommendation already included antibiotics. This yielded a subsample of 318 encounters for analysis in which physician-parent communication had reasonable potential to influence physician perceptions and ultimately to lead to inappropriate antibiotic prescribing.

Bivariate relationships were also examined between a set of candidate predictor variables and prescribing antibiotics for a viral condition. This set of predictor variables included parental expectations for antibiotic treatment, physician perceptions of parental expectations, symptoms, duration of illness, parent anxiety level (extremely or very worried vs somewhat or not very worried about the child’s illness), history of chronic illness, past experience with the physician regarding antibiotic treatment for colds and sore throat, physical examination findings, the physician’s level of diagnostic uncertainty, presence of a local influenza epidemic, patient load for the day (slow, average, very busy, or extremely busy), day of the week, whether the child could attend day care when sick, length of the relationship with the child’s physician, and child, parent, and physician demographics. Predictor variables having significant bivariate relationships (P < .05) with prescribing antibiotics for a viral condition were retained for the multivariate model.

Parental questioning of nonantibiotic treatment recommendations was modeled using a subset of variables, including physician and parent demographics and 2 physician communication variables that were significant in bivariate analyses (P < .05).

Because of the strong confounding of the parent’s race/ethnicity and socioeconomic status (SES) in the sample, independent estimates of race/ethnicity and SES in multivariate models were not well identified, and large standard errors resulted when both were included simultaneously. Thus, we constructed a combined variable with 8 mutually exclusive categories having sufficient sample size for precise estimates. These categories included very low SES with any race/ethnicity, low SES with Hispanic ethnicity, low SES with other race/ethnicity, medium SES with white race (reference group), medium SES with Hispanic ethnicity, medium SES with African American race, medium SES with Asian race, and high SES with any race/ethnicity (60 of 105 parents in this category were non-Hispanic white).

Parents in the sample were on average 34 years of age, with a median annual income of approximately $40,000. Of the 522 parents, 86.0% were female, 52.9% were Hispanic, and 68.4% had attended at least some college (Table 2). As previously reported,2 27 (71.1%) of the participating physicians were male, 27 (71.1%) were non-Hispanic white or Asian (Table 2), and 16 (42.1%) were aged 40 to 65 years.

**PARENTAL EXPECTATIONS FOR ANTIBIOTICS**

Of the 318 parents involved in encounters in which the physicians did not recommend antibiotics as part of their initial treatment plan and who either did or did not question the treatment plan, 203 (63.8%) reported an expectation for antibiotic treatment, whereas physicians perceived such an expectation in 70 (22.0%) of the 318 encounters. Parents who expected antibiotics were more likely to use a candidate diagnosis during the initial presentation of their child’s problem (Table 1), with the rate of parental expectations for antibiotics 27.0% higher (93.1% vs 66.1%) in those who used candidate diagnoses than those who did not. (Table 3; P = .02, 95% CI,
viral diagnoses. Multivariate models showed that when phy-

Antibiotics were prescribed in 41 (15.8%) of 260 cases with

multicollinearity between other predictors, including these 2 parental

Table 3; $P=.02$; 95% CI, −26.6% to −2.0%). Parents of chroni-

Parents with very low SES§ 10.8 (−7.0 to 28.6) 0.4 (−0.3 to 1.1)

Parents with low SES§

Hispanic 20.7 (3.0 to 38.5) 1.9 (−4.7 to 8.4)

Non-Hispanic 14.2 (−12.5 to 40.8) NA

Parents with very low SES§

10.8 (−7.0 to 28.6) 0.4 (−0.3 to 1.1)

Parents has known physician for ≥1 y

10.5 (−58.0 to 78.9) 4.1 (−11.5 to 19.7)

Parents is anxious about the child’s current illness

29.3 (12.3 to 46.3) 3.9 (−8.7 to 16.7)

Physician age <45 y‡

−1.0 (−11.5 to 9.6) −6.3 (−39.7 to 27.1)

Physician age ≥65 y‡

−23.1 (−73.1 to 26.9) −2.1 (−13.4 to 8.1)

Physician is male

−14.9 (−28.8 to −1.1) 6.3 (−6.3 to 18.0)

Abbreviations: CI, confidence interval; NA, not applicable;

+Analysis excludes cases in which antibiotics were recommended as part of the initial treatment plan

1)Base rate is 64%.

§Analysis is relative to non-Hispanic white parents with medium SES. The SES group definitions are as follows: high, education greater than a bachelor’s degree and annual income of $40 000 to $80 000 or more than $80 000; low, high school education and annual income less than $40 000; very low, less than a high school education and annual income less than $40 000, and medium, all others.

None of the 16 parents in this group were perceived as expecting antibiotics, so the perfect prediction precluded their inclusion in this multivariate model.

Analyses were performed with Stata, release 8.0 (College Station, Tex: Stata Corp, 2003). Two-tailed tests of significance were used, and 95% confidence intervals were calculated. The statistical significance of differences in rates were assessed with Pearson’s $\chi^2$ test. All reported $P$ values are two-sided. Multivariate analysis was conducted with the use of linear probability models and was adjusted for both clinical encounters and physician characteristics. Each model was also adjusted for the presence of parental expectations for antibiotics, which suggests a potential for bias. The models were then adjusted for physician characteristics to account for potential confounding.
Inappropriate antibiotic prescribing is primarily driven by physicians’ perceptions that parents expect an antibiotic for their child. In the present study, we hypothesized that these perceptions would be positively associated with a variety of parental communication practices, including the use of candidate diagnoses and parental questioning of physicians’ diagnoses and treatment recommendations. Our results indicate that physician perceptions of parental expectations for antibiotic treatment are strongly related to both candidate diagnoses being offered and parental questioning of non–antibiotic treatment recommendations. Although the offering of candidate diagnoses was also associated with a preexisting parental expectation for antibiotic treatment, questioning the physician’s treatment plan was not. Instead, parental questioning of the treatment plan was strongly associated with the physician communication practice of ruling out the need for antibiotics. Qualitative analyses of these exchanges suggested that these rule-out statements may motivate such questioning because
they seem to delegitimize the parent’s decision to seek medical help for the child’s condition. These effects may be aggravated when attempts are made to reassure a parent by minimizing the significance of symptoms, or when recommendations for nonprescription medicines are vaguely described.

Positively framed treatment recommendations for symptomatic treatments or home remedies were met with significantly more parent alignment with the proposed treatment plan. Parents who did not question the treatment plan were significantly less likely to be perceived by the physician as expecting antibiotics. Thus, our study suggests that the use of positively framed treatment recommendations may indirectly reduce inappropriate antibiotic prescribing by ultimately decreasing the frequency with which physicians perceive parents as expecting antibiotics.

Parents who used candidate diagnoses when presenting their child’s problem were more likely to expect and be perceived as expecting antibiotics. Because these presentations are the first event to occur in the visit, education about what would support the diagnosis proposed by the parent might best be addressed during this first phase of the visit, shortly after the parent has raised the issue. The physician might tell the parent what findings from the physical examination he or she will be focusing on to evaluate the suggested diagnosis, as well as address which of these findings would require antibiotic treatment. For example, if the parent offers “strep throat” as a candidate diagnosis, the physician could briefly explain that if the child has white spots on the tonsils this would raise his suspicion of streptococcus infection, and a throat culture or rapid test would be used to confirm the diagnosis. If the actual examination reveals only a red throat and the physician states that the tonsils do not have white spots on them, the parent has already been prepared for the possibility of a different diagnosis that may not require a test or antibiotics.

Low-SES Hispanic parents were significantly more likely to expect antibiotics than were medium-SES white parents who were otherwise similar (20.7% more likely; P = .02), but physicians did not perceive these higher expectations (1.9% more likely; P = .58) (Table 3). The higher expectations of low-SES Hispanic parents did not translate into higher-level use of the 2 key parental communication practices we identified in this study as having the potential to influence physician perceptions and behavior; their use of these behaviors was similar to their use by parents in other SES and racial/ethnic groups (data not shown). This finding suggests that any additional unmeasured communication practices used by this group of parents to convey expectations for antibiotics are unlikely to have substantial effects on physician perceptions and behavior.

Physicians were significantly more likely to inappropriately prescribe antibiotics to children of all parents in the very-low-SES group (n=74; 87.8% Hispanic and 12.2% African American parents) and to children of parents in the low-SES group who were African American (n=7) or white (n=6). However, physicians did not perceive these parents as being more likely to expect antibiotics and, in fact, they were no more likely to expect antibiotics than were medium-SES white parents. The families in the very-low- and low-SES groups were primarily seen in high-volume safety-net clinics in East or South Central Los Angeles. Physicians providing care in these clinics may view the practice of prescribing inappropriate antibiotics as more efficient than explaining how to provide symptomatic over-the-counter treatments or home remedies to these families. However, a recent study does not support the presumed efficiency of such prescribing practices. Using data from the National Ambulatory Medical Care Survey, Coco and Mainous found that pediatric visits in which antibiotics were prescribed for colds and bronchitis were 3.6 seconds longer on average (14.24 vs 14.18 minutes; P > .05) than were visits in which no antibiotics were provided.

This study has several limitations. First, it was conducted in Los Angeles, so the results may not be generalizable to different populations of parents and physicians in different geographic locations. We had a small physician sample (n=38), which underrepresented non-Hispanic white physicians (42.1%) and female physicians (28.9%). Second, it is possible that under normal circumstances, when these particular physicians are not being observed, pressure to prescribe antibiotics may be acted on more frequently. In a previous study with a similar study design, a significant Hawthorne effect was observed on antibiotic prescribing patterns. It is our expectation that Hawthorne effects are more likely to cause us to underestimate the strength of associations between parental communication practices and physician perceptions and behavior than they are to cause the reverse. Finally, our results indicate that other unmeasured factors contribute to physician-perceived expectations for antibiotics and inappropriate antibiotic prescribing.

CONCLUSIONS

Although many physicians may understandably wish to educate parents about the circumstances in which antibiotics are an appropriate treatment option, our results suggest that the final phase of the visit, when treatment recommendations are being made, may be an ineffective context in which to begin physician-initiated education for which the parent is unprepared. Although changing the way treatment recommendations are made (ie, avoiding statements that rule out the need for antibiotics) will not eliminate inappropriate prescribing in response to perceived parental expectations, changing physician communication in this regard will likely help to diminish the problem. Future interventions should consider alternative communication practices by which physicians can educate parents about the appropriateness of antibiotic medications early in the visit and prepare parents for the subsequent diagnosis and treatment recommendation. Because inappropriate antibiotic prescribing to children from families with low and very low SES does not appear to be primarily driven by physician-perceived pressure to prescribe, future work should examine the determinants of prescribing antibiotics to these children to better inform the development of interventions aimed at physicians caring for them.
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Correspondence: Rita Mangione-Smith, MD, MPH, Department of Pediatrics, University of Washington, Child Health Institute, 6200 NE 74th St, Suite 210, Seattle, WA 98115-8160 (ritams@u.washington.edu).

Author Contributions: Dr Mangione-Smith had full access to all of the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis. Study concept and design: Mangione-Smith, Elliott, Stivers, and Heritage. Acquisition of data: Mangione-Smith and Stivers. Analysis and interpretation of data: Mangione-Smith, Elliott, Stivers, McDonald, and Heritage. Drafting of the manuscript: Mangione-Smith, Elliott, Stivers, and Heritage. Critical revision of the manuscript for important intellectual content: Mangione-Smith, Elliott, Stivers, and Heritage. Obtained funding: Mangione-Smith. Administrative, technical, and material support: Mangione-Smith, Elliott, Stivers, McDonald, and Heritage. Study supervision: Mangione-Smith and Heritage.

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Additional Information: The eFigure is available at: http://www.archpediatrics.com.

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**Correction**

Incorrect Terminology. In the article titled “Effectiveness of Child Safety Seats vs Seat Belts in Reducing Risk for Death in Children in Passenger Vehicle Crashes,” by Elliott et al published in the June issue of the ARCHIVES (2006;160:617-621) the term tow-away was incorrectly changed to the term two-way. Thus, on page 617, in the “Participants” subsection of the “Abstract,” the sentence should have read as follows: “Children in tow-away crashes occurring between 1998 and 2003.” The same error occurred on page 621, left-hand column, lines 1 and 2. These should have read “... of the NASS CDS to obtain a representative sample of the full tow-away crash population may suffer from confounding. ...” Further down on the same page and in the same column, the last sentence of that paragraph should have read as follows: “The restriction of NASS CDS to tow-away crashes and use of adjustment factors such as vehicle type, model year, age of driver, and, especially, survival status of the driver should reduce this confounding.”
Citing the eFigure for POA60037.

1. Candidate Diagnosis
Case 36-32-08
Mother: I kinda think he’s got a sinus infection because he’s had like a lot of green. You know, it’s like nonstop when he blows his nose. It feels like there’s no end to his blowing, you know, and it’s been a month that he’s had this going on where he just sneezes up a big green.
Physician: Okay. Any fever?

2. Positive Treatment Recommendations
Case 32-29-11
Physician: The fact that she’s really rubbing her nose a lot and has itchy eyes, those are all classic allergy symptoms. Over-the-counter medicines like Benadryl are very helpful. They block histamines, which cause a lot of the symptoms, a lot of the itchiness and the redness. So that’s usually what we recommend starting with, unless it becomes a progressive problem with a lot of congestion and a lot of sneezing and itchy eyes. Then we can give her a preventative medicine, something like Flonase nasal spray.
Mother: Okay.

3. Negative (Rule-Out) Treatment Recommendation
Case 17-08-10
Physician: Um, what we’re dealing with is a flu.
Mother: Mm hmm.
Physician: Um, a viral infection if you will. They’re self-limited. There isn’t a lot we can do. We can make him more comfortable.
Mother: Mm hmm.
Physician: But there’s no antibiotic that’s gonna touch it.
Mother: So, his throat looks OK?

Case 32-27-08
Physician: So, I think it’s just one of the things that kids get; one thing after another sometimes.
Mother: Mm-kay.
Physician: Nothing serious here. Nothing that I can see. Nothing that an antibiotic would help.
Mother: Okay.

4. Parent Questions the Treatment Plan
Case 16-13-03
Physician: Uh yeah, it’s a viral infection.
Mother: Mm-hmm.
Physician: A viral infection.
Mother: Well I’ve been giving him a decongestant cough medicine and I really don’t. I don’t like antibiotics on him, but....

Case 32-28-03
Physician: I think from what you’ve told me, that this is probably a kind of virus infection that I don’t think antibiotics will kill.
Father: Yeah, yeah. I had it. I had the symptoms 3 weeks ago;
Physician: I understand.
Father: And I was taking the over-the-counter stuff.
Physician: Good.
Father: Uh, cough syrup. It did nothing to take away my sore throat. My throat was really bad for awhile.
Physician: Mm hm.
Father: A whole week and I started antibiotics yesterday;
Physician: Right.
Father: And it seemed to take care of the problem.