

CLINICAL STUDY

Knowledge, attitudes, and reported practices among obstetrician-gynecologists in the USA regarding antibiotic prescribing for upper respiratory tract infections

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Abstract

Background: Knowledge, attitudes, and practices regarding antibiotic prescribing for upper respiratory tract infections (URIs) have not been well described among obstetrician-gynecologists (OB/GYNs). This information is useful for determining whether an OB/GYN-specific program promoting appropriate antibiotic use would significantly contribute to the efforts to decrease inappropriate antibiotic use among primary care providers.

Methods: An anonymous questionnaire asking about the treatment of URIs was sent to 1031 obstetrician-gynecologists.

Results: The overall response rate was 46%. The majority of respondents (92%) were aware of the relationship between antibiotic use and antibiotic resistance, and respondents estimated that 5% of their patients had URI symptoms at their office visits. Overall, 56% of respondents reported that they would prescribe an antibiotic for uncomplicated bronchitis and 43% for the common cold. OB/GYNs with the fewest years of experience were less likely than those with the most years of experience to report prescribing for uncomplicated bronchitis (Odds ratio (OR) 0.46, 95% confidence interval (CI) 0.23 to 0.91) or the common cold (OR 0.44, CI 0.22 to 0.89). The majority of respondents (60%) believed that most patients wanted an antibiotic for URI symptoms, with male OB/GYNs being more likely than female OB/GYNs (OR 2.1, CI 1.2 to 3.8) to hold this belief. Both male OB/GYNs (OR 1.9, CI 1.1 to 3.4) and rural practitioners (OR 2.1, CI 1.1 to 4.0) were more likely to believe that it was hard to withhold antibiotics for URI symptoms because other physicians prescribe antibiotics for these symptoms. OB/GYNs who believed that postgraduate training prepared them well for primary care management were more likely than those who did not (OR 2.1, CI 1.1 to 4.2) to believe that they could reduce antibiotic prescribing without reducing patient satisfaction.

Conclusion: Multiple demographic factors affect attitudes and reported practices regarding antibiotic prescribing. However, in view of the low proportion of office visits for URIs, an OB/GYN-specific program is not warranted.

Keywords: *Antibiotic prescribing, upper respiratory tract infections, obstetrician-gynecologists*

Introduction

The increase in the antibiotic resistance of pneumococci over the past 10 years has been linked to antibiotic use [1–4]. This link was first suggested by the results of both cross-sectional and case-control studies that demonstrated an increased risk of infection with a resistant organism if a person had recently received an antibiotic [1, 5–7]. The initial public health response to this problem was to

implement programs to curb inappropriate antibiotic use [8]. Upper respiratory tract infections (URIs) are of great concern, since they account for the majority of ill office visits and of antibiotic prescribing in the ambulatory setting in the USA [9], despite the fact that many of these infections are viral in nature and do not necessitate antibiotic treatment. Studies among primary care providers have revealed that inappropriate antibiotic prescribing for the treatment of URIs is a result of the following: patient

expectations, physician perception of these expectations, lack of knowledge on the provider's part and external forces, including missed days from work and financial constraints [10–12].

As a result of these findings, the Centers for Disease Control and Prevention (CDC) worked with professional medical societies to develop guidelines for the management of acute respiratory tract illness in adults and children [13, 14] and for appropriate antibiotic use campaigns, combining physician and community-based interventions in the late 1990s [15–18]. The majority of this research and program development focused on pediatricians, internists, family physicians and general practitioners. However, little is known about how obstetrician-gynecologists (OB/GYNs) are managing these same illnesses, despite the fact that OB/GYNs form a growing sector within primary care [19, 20].

Previous studies examining antibiotic prescribing practices among OB/GYNs have focused on OB/GYN-specific issues, such as the treatment of gynecologic infections, urinary tract infections and the prevention of perinatal sepsis [20–23]. The results of these studies have been useful in developing infectious disease guidelines for OB/GYNs, particularly guidelines for the prevention of group B streptococcal disease in infants. After the implementation of the group B streptococcus guidelines of 1996, McGregor et al. [20] showed an increasingly homogeneous approach to group B streptococcus management among surveyed OB/GYNs. This finding suggests that an educational intervention, through the implementation of the group B streptococcus guidelines of 1996, may have played a role in modifying practice behavior, and suggests that this provider population may be receptive to educational interventions such as those that have been successful in the appropriate antibiotic use campaigns [16–18, 24].

We conducted this study to assess OB/GYNs' current knowledge, attitudes, and reported practices regarding the treatment of URIs, an area not previously well described for this specialty. Using this information, we determined whether and how OB/GYNs should be included in the ongoing efforts to curb inappropriate antibiotic use.

Methods

In June 2002, an anonymous questionnaire was sent to the 409 American College of Obstetricians and Gynecologists (ACOG) Fellows of the Collaborative Ambulatory Research Network (CARN) and to 622 randomly selected non-CARN ACOG Fellows. Established in 1990, the CARN consists of a group of ACOG Fellows who voluntarily participate in surveys to help ACOG monitor prevailing clinical

obstetric and gynecologic practices. Members receive approximately four ACOG-sponsored surveys annually, on a range of topics. Participants have been chosen to reflect the age and sex distribution of all ACOG Fellows. A second mailing was sent to non-responders from both groups approximately 6 weeks later. The appropriate sample size was calculated from previous survey response rates of approximately 60%, and expected proportions approaching 50% with 95% confidence intervals (CIs). The study protocol was reviewed by an institutional review board of the CDC and found to be exempt from the need for human subjects review.

Because we wanted to characterize current ambulatory practices of providers within the USA who manage URIs in non-pregnant patients, we excluded from the final analysis respondents who did not see patients in 2001, who were currently in a training program, whose practice was outside the USA, or who refer patients with URIs to another provider for care. We also excluded individuals who only see obstetric patients because of the potential bias that pregnancy might exert on antibiotic prescribing, and individuals who did not provide an estimate of the number of non-pregnant patients within their practice.

Question format for provider demographic characteristics was primarily multiple-choice. Questions assessing provider knowledge and attitudes regarding the treatment of URIs in non-pregnant women were in the form of a 5-point Likert scale. Two clinical scenarios were proposed, also in the form of a Likert scale, to assess reported antibiotic prescribing practices for non-pregnant women, i.e., uncomplicated bronchitis defined as a cough illness with purulent sputum for 5 days and no fever, and the common cold defined as a URI with purulent nasal discharge for 5 days without fever or cough. Comments could be added at the end of the questionnaire. The number of years of OB/GYN experience was divided into quartiles, i.e. lowest 0 to 7 years, low 8 to 14 years, medium 15 to 21 years and high ≥ 22 years. Location of practice was categorized as rural or non-rural. The number of months of non-OB/GYN postgraduate outpatient training (i.e., internal medicine outpatient clinic, pediatric outpatient clinic) was divided into < 6 months and ≥ 6 months. Likert scale responses were dichotomized, excluding the "no opinion" responses.

Survey responses were double-entered to minimize data entry errors. Statistical analysis was performed using SAS 8.2 (SAS Institute, Cary, NC, USA). Descriptive analysis of the sample of individuals who completed all of the demographic and postgraduate training questions was performed using the chi-squared test for categorical variables and the median two-sample test for continuous

variables. For each knowledge item, attitude (about patient expectations), and reported practice outcome variable, provider characteristics were independently assessed using Mantel-Haenszel-Cochran summary odds ratios (ORs) and 95% CIs. The characteristics examined included gender, CARN status, number of years of OB/GYN experience, location of practice, number of months of non-OB/GYN postgraduate outpatient training, believing postgraduate training prepared them well for primary care management, and believing continuing medical education (CME) is useful for updates of the clinical management of URIs. All variables significant at $p < 0.15$ on univariate analysis were evaluated in multivariable models using logistic regression. The number of cases for each model varied because the number of "no opinion" responses varied among the different outcomes variables. Because the CARN group differed from the non-CARN group in response rate and by the number of years of experience, all multivariable models controlled for CARN status and the number of years of OB/GYN experience. In addition, we controlled for gender since this variable was a potential confounder.

Results

Completed surveys were received from 265 (65%) of the 409 CARN members and 254 (41%) of the 622 non-CARN ACOG Fellows. Of these 519 respondents, 91 (18%) were excluded from the final analysis, i.e., 39 CARN respondents (15%), and 52 non-CARN respondents (20%), leaving 226 (61%) of 370 eligible CARN respondents and 202 (35%) of 570 eligible non-CARN respondents. The 91 respondents who were excluded comprised 12 who did not see patients in 2001, 9 who were currently in training, 20 who had a practice outside the USA or in an unknown location 8, (4 pairs) who had duplicate study numbers, 1 who refused, 15 who referred patients with URIs to another provider for care, 14 who saw obstetric patients only and 12 who did not provide information about the number of non-pregnant patients in their practice. An additional group of 44 individuals (15 CARN, 29 non-CARN) did not complete all of the demographic and postgraduate training questions. This group differed from the final sample only in containing a higher proportion of respondents who saw non-pregnant patients only (27% versus 15%, $p = 0.03$). No information was available on the non-respondents because of the anonymous nature of the survey.

The final sample consisted of 384 respondents, whose characteristics are shown in Table I. The CARN respondents were older and had a greater number of years of OB/GYN experience than did the non-CARN respondents. The CARN group had a

higher proportion of respondents with 6 months or more of non-OB/GYN postgraduate outpatient training than did the non-CARN group. As a group, respondents identified CME lecture series (65%), OB/GYN meetings (63%), newsletters (55%) and peer-reviewed journal articles (54%) as useful methods to disseminate guidelines and practice updates.

On average, respondents estimated that 5% (interquartile range [IQR] 2% to 10%) of their non-pregnant patients presented with symptoms of a URI when they came for an office visit, and of these 30% (IQR 10% to 65%) would request an antibiotic for their symptoms. When asked if they would prescribe an antibiotic for two common URIs (Table II), 56% and 43% of respondents reported that they would prescribe antibiotics for uncomplicated bronchitis and the common cold, respectively.

To determine what is driving antibiotic prescribing in OB/GYN offices, we assessed provider knowledge and attitudes about the treatment of URIs (Table III), and 92% of respondents agreed that there would be a reduced risk of antibiotic resistance infections if fewer antibiotics were prescribed. The majority of respondents believed that most of their patients thought that they should prescribe an antibiotic for URI symptoms (60%) and felt confident that the antibiotic that they would prescribe would be necessary (64%). Almost half (47%) of respondents believed that they could not decrease antibiotic prescribing without decreasing patient satisfaction. The respondents who felt that it was hard to withhold antibiotics for URI symptoms when other physicians prescribed antibiotics for these symptoms were more likely than their counterparts to believe that most of their patients thought that they should prescribe an antibiotic for a URI (OR 17.7, CI 6.3 to 51.5, $p < 0.0001$) and that they could not reduce antibiotic prescribing without reducing patient satisfaction (OR 4.2, CI 2.2 to 8.1, $p < 0.0001$).

Provider characteristics that were associated with reported practices and attitudes on univariate analysis were the following. Men were more likely than women to report that they would prescribe an antibiotic for uncomplicated bronchitis (66% versus 54%, $p = 0.03$) or the common cold (53% versus 40%, $p = 0.02$), to believe most of their patients thought that they should prescribe an antibiotic for URI symptoms (72% versus 63%, $p = .12$) and to believe that it was hard to withhold antibiotics for URI symptoms because other physicians prescribed antibiotics for these symptoms (38% versus 21%, $p = 0.001$).

Individuals with fewer number of years of experience were less likely to report antibiotic prescribing for uncomplicated bronchitis (chi square for trend,

Table I. Characteristics of respondents.

Provider characteristic	Total (n = 384)	CARN (n = 211)	Non-CARN (n = 173)
*Median age (range) in years	47 (29 to 80)	48 (32 to 66)	45 (29 to 80)
Male gender (%)	57	59	54
*Median years of OB/GYN experience (range)	15 (0 to 50)	16 (3 to 40)	11 (0 to 50)
*Category of years of OB/GYN experience (%)			
lowest quartile (0–7 years)	23	14	33
low quartile (8–14 years)	25	26	24
medium quartile (15–21 years)	26	31	21
highest quartile (≥ 22 years)	26	29	22
Practice type (%)			
solo or two clinicians	29	32	25
multispecialty group	12	15	10
OB/GYN group	42	39	44
university practice	9	8	12
HMO staff model	2	1	2
military	2	1	2
community health center	1	1	2
other	3	3	3
Practice location (%)			
urban	30	30	30
suburban	54	54	54
rural	15	16	14
other	1	0	2
Region of country (%)			
Midwest	19	20	19
Northeast	20	18	23
West	26	27	23
South	35	35	35
Type of patient seen in practice (%)			
pregnant and non-pregnant	85	86	85
non-pregnant only	15	14	15
*Months of non-OB/GYN outpatient training			
< 6 months (%)	77	72	83
≥ 6 months (%)	23	28	17
Believed postgraduate training prepared them well for primary care management (%)			
yes	40	36	45
no	60	64	55
Believed CME for updates on URI management was helpful (%)			
yes	38	38	38
no	29	32	25
no opinion	33	30	37

CARN, Collaborative Ambulatory Research Network; * $p < 0.05$, CARN versus non-CARN.

Table II. Reported practices among OB/GYNs regarding treatment of URI in non-pregnant patients *(n = 346).

Clinical scenario	Would prescribe antibiotic (%)	Would not prescribe antibiotic (%)	Unsure (%)
Acute bronchitis/cough illness for 5 days with purulent sputum; no fever; normal lung exam	195 (56)	124 (36)	27 (8)
Upper respiratory tract infection, purulent nasal discharge for 5 days without improvement; no fever; no cough; otherwise normal exam	147 (43)	163 (47)	36 (10)

$p = 0.008$) or the common cold (chi square for trend, $p = 0.002$), less likely to believe that it was hard to withhold antibiotics (chi square for trend, $p = 0.002$)

but more likely to believe that most of their patients wanted an antibiotic for a URI (chi square for trend, $p = 0.03$). Rural practitioners were more likely than

Table III. *Distribution of responses to knowledge and attitude questions regarding treatment of URI in non-pregnant patients among OB/GYNs.

Statement	Agree (%)	Disagree (%)	No opinion (%)
My non-pregnant patients will have a reduced risk of antibiotic resistant infections if I prescribe fewer antibiotics ($n = 346$)	318 (92)	7 (2)	21 (6)
Most of my non-pregnant patients think I should prescribe antibiotics for cough, cold and flu symptoms ($n = 347$)	208 (60)	97 (28)	42 (12)
When I prescribe an antibiotic for a respiratory tract infection in a non-pregnant patient, I am confident that the antibiotic is necessary ($n = 347$)	223 (64)	82 (24)	42 (12)
I could reduce my antibiotic prescribing without any decrease in patient satisfaction ($n = 346$)	104 (30)	163 (47)	79 (23)
It is hard for me to withhold antibiotics for cough, cold and flu symptoms because other clinicians in my community prescribe antibiotics for these illnesses ($n = 347$)	91 (26)	207 (60)	49 (14)

* n varies because of missing data.

non-rural practitioners to report that it was hard to withhold antibiotics for URI symptoms (46% versus 27%, $p = 0.009$) and less likely to believe that they could reduce antibiotic prescribing in their practice without reducing patient satisfaction (19% versus 43%, $p = 0.004$). In our study population, male OB/GYNs had more years of experience than female OB/GYNs (18 years versus 11 years, $p < 0.0001$) and made up a larger proportion of those practicing in rural areas compared with female OB/GYNs (69% versus 31%, $p = 0.04$).

Individuals who believed that postgraduate training prepared them well for primary care management were more likely to feel confident that an antibiotic they prescribed was necessary (79% versus 69%, $p = 0.07$). Individuals who believed that postgraduate training prepared them well for primary care management (48% versus 33%, $p = 0.02$) or believed that CME was useful for updates of the clinical management of URIs (45% versus 29%, $p = 0.04$) were more likely than those who did not hold these opinions to believe that they could reduce antibiotic prescribing in their practice without reducing patient satisfaction.

Multivariable analysis was performed to determine which provider characteristics were independently associated with particular attitudes or reported practices. Controlling for CARN status, gender and the numbers of years of OB/GYN experience, male OB/GYNs were more likely than female OB/GYNs (OR 2.1, CI 1.2 to 3.8, $p = 0.01$) to believe that most of their patients thought they should prescribe an antibiotic for URI symptoms. Both male OB/GYNs (OR 1.9, CI 1.1 to 3.4, $p = 0.02$) and rural practitioners (OR 2.2, CI 1.1 to 4.0, $p = 0.03$) were more likely to believe that it was hard to withhold antibiotics for URI symptoms because other physicians prescribe antibiotic for these symptoms. Respondents who thought that postgraduate training prepared them well for primary care management were more likely than those who did not (OR 2.1, CI 1.1 to 4.2, $p = 0.03$) to believe that they

could reduce antibiotic prescribing without reducing patient satisfaction. Providers with years of experience in the lowest quartile (0 to 7 years) were less likely than those with years of experience in the highest quartile (≥ 22 years) to report antibiotic prescribing for uncomplicated bronchitis (OR 0.46, CI 0.23 to 0.91, $p = 0.03$) and the common cold (OR 0.44, CI 0.22 to 0.89, $p = 0.08$), but were more likely to believe that most of their patients thought that they should prescribe an antibiotic for a URI (OR 5.0, CI 2.1 to 11.8, $p = 0.005$).

Because the expectations of patients, as perceived by physicians, are presumably not the only attitudes influencing clinical decision-making, we asked how various clinical characteristics of a non-pregnant woman with URI symptoms, etiology unknown, would increase or decrease the likelihood of prescribing an antibiotic (Table IV). The presence of a productive cough with purulent sputum, a second visit for the same symptoms, and a fever with purulent nasal discharge all increased the likelihood of prescribing an antibiotic. Neither a statement from the woman that she had received an antibiotic for a similar problem in the past, nor concerns about her need to return to work, had much effect on the prescriber's likelihood of prescribing an antibiotic. When asked if antibiotic prescribing would be altered if the patient was pregnant, 201 (66%) of 304 respondents who saw both obstetric and gynecologic patients reported that it would make no difference and 76 (25%) reported that they would be more likely to prescribe an antibiotic.

The comments that respondents added at the end of the questionnaire emphasized the findings described above. Some respondents stated that they succumbed to patient pressure and time constraints by prescribing antibiotics rather than explain to patients why they did not need antibiotics. Others expressed concern about physicians in their own practices or within the community who "throw antibiotics at everything" or "take the easy way

Table IV. *The influence of various patient characteristics on the likelihood of provider antibiotic prescribing for a non-pregnant woman with a URI, etiology unknown.

Characteristic	Would increase prescribing (%)	Would decrease prescribing (%)	No change (%)
Productive cough with purulent sputum (<i>n</i> = 346)	315 (91)	3 (1)	28 (8)
Second visit for the same problem (<i>n</i> = 344)	280 (81)	5 (2)	59 (17)
Fever ($\geq 100.4^{\circ}\text{F}$ or 38°C) (<i>n</i> = 347)	253 (73)	5 (1)	89 (26)
Purulent nasal discharge (<i>n</i> = 347)	224 (65)	8 (2)	115 (33)
Patient states she received an antibiotic for similar symptoms in the past (<i>n</i> = 346)	92 (27)	36 (10)	218 (63)
Patient needs to return to work (<i>n</i> = 347)	40(12)	26 (7)	281 (81)

**n* varies because of missing data.

out” rather than take the time to discuss issues with patients.

Discussion

Knowledge, attitudes and reported practices among OB/GYNs regarding the treatment of URIs were similar to those of previously surveyed primary care providers [9, 10, 25–29]. In our study, providers were aware of the risk of resistant infections with increasing antibiotic use, but reported inappropriate prescribing practices and expressed attitudes that might promote these practices.

A high proportion of respondents reported that they would prescribe antibiotics for two common conditions, uncomplicated bronchitis and the common cold, for which antibiotics are not usually indicated. Previous studies have shown similar rates of prescribing among a variety of specialties, ranging from 66% to 80% for uncomplicated bronchitis and 25% to 60% for the common cold [10, 28–30]. In a study by Gonzales et al. [28], the investigators found that rural practitioners were more likely than were non-rural practitioners to prescribe antibiotics for URIs in adults. One finding unique to our study was the association of male gender of the practitioner, independent of the number of years of experience, with attitudes that might promote inappropriate prescribing for URIs. It is likely that there are other factors associated with male gender that influence antibiotic prescribing that we were unable to assess in our survey. In addition, the finding that providers with the fewest years of experience reported less antibiotic prescribing for these conditions than did those with the most experience may be a function of proximity to postgraduate training, a time when appropriate antibiotic use messages may be more frequently conveyed.

Historically, provider attitudes and prescribing have been linked to patient demand for antibiotics as well as to physician perception of these demands [10, 29]. Although we did not look at actual

prescribing as it is related to particular attitudes in our study, our findings suggest that the respondents who reported that it was hard to withhold antibiotics felt this way because they believed that their patients expected antibiotics for URI symptoms and that, if these patients did not receive an antibiotic, they would not be satisfied and would then seek care elsewhere. In addition, physicians might consider an antibiotic necessary because of patient expectation, rather than basing the decision on clinical indications.

Although the majority of respondents appreciated the relationship between antibiotic use and resistance, they felt that the presence of purulent discharge from the respiratory tract, which is not an accurate indicator of a bacterial infection that requires antibiotic therapy [31, 32], warranted an antibiotic. However, in the absence of other symptoms suggesting an acute bacterial infection, such as fever or purulent discharge for ≥ 7 days, antibiotics are not indicated. In a study by Watson et al. [10], surveyed pediatricians and family physicians felt that antibiotics would decrease the numbers of days of illness in a child with purulent nasal discharge, and this belief may have been prevalent among our respondents as well.

Some important limitations to our study are worth mentioning. The survey response rate was low, especially in comparison with the 60% to 70% response rates that are typical for surveys administered among this group. This low response rate may be attributable to the subject matter, since the usual surveys focus on OB/GYN-specific issues rather than on primary care matters. Because this questionnaire was anonymous, we were unable to compare the characteristics of a sample of non-respondents with those of the respondents. This survey was a self-administered questionnaire relying on recall and reported practices. Since this study was not designed to link attitudes to actual prescribing, there may have been information bias towards providing answers that the respondent thought the investigators wanted

to hear. This possibility could have led to underestimates of the prevalence of inappropriate attitudes and prescribing behaviors.

Educational interventions for appropriate antibiotic use for URIs in the USA are ongoing. Studies evaluating these programs have demonstrated a decrease in inappropriate antibiotic prescribing as a result [16–18, 24]. Although OB/GYN knowledge, attitudes and reported practices were similar to those of other providers, our study, as well as previous studies, suggested that URIs account for a small proportion of office visits to this specialty group [33, 34]. Therefore, additional interventions focusing on OB/GYNs alone may not be justified, since such interventions would have a small impact on the overall inappropriate use of antibiotics in the USA. However, including OB/GYNs in the ongoing interventions directed at other primary care providers would be a useful way to provide education regarding the treatment of URIs among OB/GYNs providing primary care.

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