

Can Improving Knowledge of Antibiotic-Associated Adverse Drug Events Reduce Parent and Patient Demand for Antibiotics?

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Abstract

Background: According to the Centers for Disease Control and Prevention, at least 2 million people are infected and 23,000 die each year in the United States as a result of antibiotic-resistant bacterial infections. Antibiotic use is the most important factor contributing to antibiotic resistance and overuse is common, especially for upper respiratory tract infections. There is a perception among the public, as well as some health care providers, that antibiotics are harmless. We conducted formative research to explore patient and parent knowledge and attitudes relating to antibiotic use and adverse drug events (ADEs).

Methods: Six computer-assisted telephone focus groups were conducted in October and November 2010 with adult patients and mothers of young children. The focus groups were developed to engage participants in discussion about their knowledge and attitudes regarding antibiotic resistance and ADEs associated with antibiotic use.

Results: Nearly all mothers were familiar with the possibility of “side effects” with prescription medications, including antibiotics. However, very few mothers were familiar with severe antibiotic-associated ADEs and nearly all felt strongly that this information should be shared with parents at the time a prescription is recommended or written for their child. Adult participants did not believe that the potential for ADEs was a significant issue for adults and most reported never discussing the potential for adverse events with their provider.

Conclusions: Parents were receptive to appropriate antibiotic use messaging around ADEs. We learned that ADE messages did not resonate with adults in the same way they did with mothers of young children.

Keywords

antibiotics, adverse drug events, upper respiratory infections, focus groups

Background

According to a report by the Centers for Disease Control and Prevention (CDC), *Antibiotic Resistance Threats in the United States*, 2013, at least 2 million people are infected and 23,000 die each year from bacterial infections that are resistant to one or more antibiotics.¹ Antibiotic use has been linked to antibiotic resistance in the United States,²⁻⁴ and a large percentage of antibiotics prescribed in the outpatient setting are for upper respiratory tract infections (URIs).^{5,6} Physicians acknowledge that most patients with URIs do not benefit from antibiotic treatment,⁷ yet antibiotics are commonly prescribed in outpatient settings for URIs in both children and adults.⁸⁻¹¹

In an effort to better understand and address factors that drive overprescribing, CDC launched a campaign to improve antibiotic use in the community in 1995,¹² which was subsequently branded “Get Smart: Know When Antibiotics Work”

(Get Smart) in 2003. Qualitative data from focus groups and interviews were used to develop educational tools and strategies to influence consumer and provider knowledge, attitudes, and practices to improve antibiotic use. The initial messages emphasized the threat of antibiotic resistance and the need for appropriate antibiotic prescribing for URIs. Despite evidence

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of a reduction in prescribing in recent years, antibiotics are still commonly prescribed for conditions for which there is no benefit.³ Providers cite time limitations, diagnostic uncertainty, and patient demand as reasons for overprescribing.⁷ Recent findings from interviews with primary care providers also suggest fear of litigation and pressure to receive positive patient satisfaction reviews as additional factors.¹³ Prior, unpublished qualitative studies with providers and patients by the authors, as well as other published reports, have found that there is a perception among the public and some providers that antibiotics are harmless.^{14,15} One study showed that antibiotics are commonly prescribed for placebo effect.¹⁶ As a result, the Get Smart program sought additional approaches to reduce patient demand for antibiotics when they are not needed. One approach considered was to inform patients of the potential for adverse drug events (ADEs) associated with antibiotic use.

Examples of more common ADEs include allergic reactions, dizziness, and diarrhea. Although these ADEs may be considered relatively inconsequential, other rare and severe reactions contribute to significant morbidity and mortality. An estimated 701,547 individuals are treated for ADEs in emergency departments annually,¹⁷ and researchers identified antibiotics as the leading culprit, responsible for 1 in every 8 cases. Serious cases of diarrhea, known as *Clostridium difficile* colitis, are becoming increasingly common in the community. A recent study indicated that in communities with higher rates of antibiotic prescribing there are also higher rates of *C difficile* colitis.¹⁸

We wanted to better understand how parents and healthy adults would respond if they were informed about ADEs and linkages to antibiotic use. We hypothesize that increased knowledge about ADEs could reduce unnecessary antibiotic use by decreasing demand for antibiotics when unnecessary. However, during previous, unpublished, in-depth interviews with providers, concerns were raised that increasing knowledge of ADEs could potentially reduce adherence when an antibiotic prescription is needed. To explore these issues, we designed a study to understand participants' knowledge and attitudes regarding antibiotic-associated ADEs.

Methods

Six computer-assisted telephone focus groups were conducted in October and November 2010 with adults and mothers of young children. For both groups, a professional recruitment firm contacted potential participants from national databases, administered a screening questionnaire, and invited and scheduled those who qualified to participate. The focus groups were developed to engage participants in discussion about their knowledge and attitudes regarding antibiotic resistance and use as well as ADEs associated with antibiotic use. The facilitators guide for the focus groups was developed by an interdisciplinary team with subject matter expertise in antibiotic use in the outpatient setting, communications, and formative research. Approval was obtained through CDC's institutional review board prior to data collection. Three groups consisted of mothers aged 21 to 45 years who had children aged 2 to 11 years. Mothers were targeted because

Table 1. Demographics and Select Characteristics of Focus Group Respondents.

	Number (%)
Educational attainment (all participants n = 45)	
Master's degree	7 (16)
Four-year degree	24 (53)
Some college	12 (27)
High school diploma	2 (4)
Race/ethnicity (all participants n = 45)	
White	19 (43)
Black	10 (22)
Hispanic	10 (22)
Asian/other	6 (13)
Select characteristics of mothers (n = 22)	
Age range of mothers	24-45 years
One child younger than the age of 12	8 (36)
Two children younger than the age of 12	6 (27)
Three children younger than the age of 12	7 (32)
Four or more children younger than the age of 12	1 (5)
Select characteristic of adults (n = 23)	
Age range of adults	25-53 years
Men	9 (39)
Women	14 (61)

research has shown that they are the primary health decision makers for most families.¹⁹ This group discussed their experience of URIs and use of antibiotics for their children. Three groups consisted of adults aged 25 to 55 years who discussed their personal experiences with URIs and antibiotics.

A total of 45 people participated in the 6 focus groups. The demographics of the focus group participants are reported in Table 1. The focus groups were 90 minutes each and were audio-recorded and transcribed. Participants were provided with a handout that contained ADE educational messages and information on treating URIs appropriately and were asked for their reactions. Each participant was offered a nominal cash incentive to participate.

Grounded theory, which is a process for analyzing qualitative data by allowing themes to emerge from the data during a coding process, was used to analyze the data from the focus groups.²⁰ Questions were created that we expected to be answered based on the focus group discussions. Similar questions were grouped together to create themed categories. A coding form was then developed to reflect the themes. Using the focus group transcripts, 2 researchers independently coded language into each category. Intercooder reliability was calculated on 20% of the final transcripts to ensure that coding was consistent across researchers. After 2 rounds of coding, agreement was acceptable (Cohen κ = .67). Content was then assigned to categories in order to identify emergent themes. Themes were further developed based on perceived importance and emphasis, rather than frequency.

Results

Mothers of Young Children

Most of the participating mothers assumed their child had a cold when symptoms such as cough, runny nose, sore throat,

and earache appeared. Most, but not all, of these mothers also waited before calling their health care provider when their child exhibited these symptoms. Of those who did contact a health care provider to schedule a visit, participants indicated their purpose for visiting the provider was to have their child thoroughly examined to rule out a serious infection that may require antibiotic treatment. Only a few mothers indicated they “expected the doctor to make it go away right away” with a “quick solution” such as antibiotics.

Nearly all mothers were familiar with the possibility of “side effects” with prescription medications, including antibiotics, such as rash or diarrhea. Overwhelmingly, these were considered to be common, relatively benign, and even an expected consequence of antibiotic use. However, very few participants were familiar with severe antibiotic-associated ADEs, such as *C difficile* infection or anaphylactic shock. Very few participants reported having been educated about possible antibiotic ADEs by their health care provider when an antibiotic was prescribed for their child, although some had received education from their pharmacist when the prescription was filled. Nearly all participants felt strongly that this information should be shared with parents at the time a prescription is recommended or written. One mother stated “I’ve never really had the conversation with my child’s pediatrician about the risks, and I really would like to know more about the specific risk. I think that is the conversation I would like to have in the near future.” Participants viewed ADE messages in various formats and expressed frustration that they had not been informed about ADEs by their providers. Most also agreed that information about ADEs would lead to increased vigilance on their part to ensure antibiotics were only used when needed but would not interfere with adherence to antibiotic prescriptions when deemed necessary by their health care provider. One mother noted “I would probably question my doctor more now . . . [ask] what the risks are and see what he has to say.”

Adults

The adult focus group participants recognized traditional URI symptoms (runny nose, sore throat, fever, etc) as signs of the common cold and reported that they did not typically seek treatment from a health care provider for these symptoms. The majority reported treating the symptoms with over-the-counter medications and expected the symptoms to resolve on their own. Some participants reported rarely or never calling their provider for URI symptoms; however, others did call their provider when symptoms had not resolved within two weeks or when symptoms worsened. At this point, most expected a prescription from their provider, and some reported simply calling their provider’s office and requesting an antibiotic when they had URI symptoms that had been “treated by an antibiotic in the past.”

The adults did not believe that the potential for ADEs was a significant issue, and most reported never discussing ADEs with their provider. They reported relying on their providers’ professional judgment as well as their own experiences with using antibiotics in the past to determine whether antibiotics were

necessary. Some reported that by the time they seek medical attention for URI symptoms, they expect an antibiotic in order to return to normal activities. One participant acknowledged “I’m assuming that the doctor knows what he or she is doing in prescribing . . . So whatever they give me, I’m going to trust them that they’re doing the right thing and they’re giving me the right type of prescription.” The adults also admitted that the increased knowledge of the possibility of ADEs would not deter them from either requesting or adhering to an antibiotic prescription, although they may be more likely to ask questions about their diagnosis and recommended course of treatment. As 1 participant shared “None of this information is actually new to me so in terms of that, it’s not going to change how I do things later . . . when I go to the doctor I rely on the doctor’s judgment.”

Discussion

This is one of the first qualitative studies specifically looking at the impact of ADE messaging on behaviors and attitudes regarding antibiotic use. Prior quantitative studies have examined the knowledge and attitudes related to antibiotic use, with some including the potential for ADEs, but did not focus on the potential impact of ADE messaging as an educational opportunity.^{21,22} We found that parents were receptive to appropriate antibiotic use messaging around ADEs and they prefer to receive this information from their health care provider at the time of the visit. Based on the findings from these focus groups, health care providers should not fear that educating patients about the possibility of ADEs when prescribing antibiotics will lead to noncompliance with current or future prescriptions. In fact, it may have the opposite effect as participants reported an increase in trust when they receive complete information from their providers. Additionally, learning about the risk of ADEs may deter parents from demanding antibiotics for their children when they have URI symptoms and antibiotics are not necessary, but it would not deter them from giving antibiotics to their child when needed.

The ADE messages did not resonate with adults in the same way they did with mothers of young children. Adult participants did not agree that the risk of using antibiotics for URIs outweighed the benefits. Most reported using antibiotics their entire lives with no severe consequences and did not anticipate this change in spite of their new awareness. Most adult participants also reported never having discussed the possibility of ADEs with their health care provider.

Small sample size is a common limitation of qualitative research, and, therefore, our results may not be representative. Additionally, the individuals who agreed to participate may not be representative of mothers and adults in the general population and these results may not be generalizable to the US population.

Improving antibiotic use is a key strategy for addressing the threat of antibiotic resistance, but it is also important for improving health care quality and reducing ADEs. As a result of this study, new educational materials on antibiotic-associated ADEs were developed and are available at no cost to providers and the public through the Get Smart: Know When

Antibiotics Work website (www.cdc.gov/getsmart/community). These materials can be used by the providers to assure parents that not prescribing an antibiotic is sometimes the best care and to educate them on the possibility of ADEs when antibiotics are necessary. Knowledge, attitudes, and behaviors related to antibiotic use are likely evolving due to recent increased media attention regarding antibiotic use and antibiotic resistance. Additional studies will be needed to identify new messages and refine and improve existing messages to improve antibiotic use.

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Authors' Note

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

Declaration of Conflicting Interests

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References

- Centers for Disease Control and Prevention. *Antibiotic Resistance Threats in the United States*. Atlanta: Centers for Disease Control and Prevention; 2013.
- Hicks LA, Chien YW, Taylor TH Jr, Haber M, Klugman KP; Active Bacterial Core Surveillance Team. Outpatient antibiotic prescribing and nonsusceptible *Streptococcus pneumoniae* in the United States, 1996-2003. *Clin Infect Dis*. 2011;53(7):631-639.
- Edlin RS, Shapiro DJ, Hersh AL, Copp HL. Antibiotic resistance patterns of outpatient pediatric urinary tract infections. *J Urol*. 2013;190(1):222-227.
- Costelloe C, Metcalfe C, Lovering A, Mant D, Hay AD. Effect of antibiotic prescribing in primary care on antimicrobial resistance in individual patients: systematic review and meta-analysis. *BMJ*. 2010;340:c2096.
- Gonzales R, Camargo CA Jr, MacKenzie T, et al. Antibiotic treatment of acute respiratory infections in acute care settings. *Acad Emerg Med*. 2006;13(3):288-294.
- Gonzales R, Malone DC, Maselli JH, Sande MA. Excessive antibiotic use for acute respiratory infections in the United States. *Clin Infect Dis*. 2001;33(6):757-762.
- Barden L, Dowell S, Schwartz B, Lackey C. Current attitudes regarding use of antimicrobial agents: results from physician's and parents' focus group discussions. *Clin Pediatr*. 1998;37(11):665-671.
- Centers for Disease Control P. Office-related antibiotic prescribing for persons aged ≤ 14 years—United States, 1993-1994 to 2007-2008. *MMWR Morb Mortality Wkly Rep*. 2011;60(34):1153-1156.
- Hersh AL, Shapiro DJ, Pavia AT, Shah SS. Antibiotic prescribing in ambulatory pediatrics in the United States. *Pediatrics*. 2011;128(6):1053-1061.
- Shapiro DJ, Hicks LA, Pavia AT, Hersh AL. Antibiotic prescribing for adults in ambulatory care in the USA, 2007-09. *J Antimicrob Chemother*. 2014;69(1):234-240.
- Fairlie T, Shapiro DJ, Hersh AL, Hicks LA. National trends in visit rates and antibiotic prescribing for adults with acute sinusitis. *Arch Intern Med*. 2012;172(19):1513-1514.
- Weissman J, Besser RE. Promoting appropriate antibiotic use for pediatric patients: a social ecological framework. *Semin Pediatr Infect Dis*. 2004;15(1):41-51.
- Sanchez GV, Roberts RM, Albert AP, Johnson DD, Hicks LA. Effects of knowledge, attitudes, and practices of primary care providers on antibiotic selection, United States. *Emerg Infect Dis*. 2014;20(12):2041-2047.
- Butler CC, Rollnick S, Pill R, Maggs-Rapport F, Stott N. Understanding the culture of prescribing: qualitative study of general practitioners' and patients' perceptions of antibiotics for sore throats. *BMJ*. 1998;317(7159):637-642.
- Too Many Antibiotics! Patients and Prescribers Speak Up; 2014. Web site. <http://www.medscape.com/features/slideshow/public/antibiotic-misuse#1>. Accessed January 2, 2015.
- Tilburt JC, Emanuel EJ, Kaptchuk TJ, Curlin FA, Miller FG. Prescribing "placebo treatments": results of national survey of US internists and rheumatologists. *BMJ*. 2008;337:a1938.
- Budnitz D, Pollock D, Weidenbach K, Mendelsohn A, Schroeder T, Annet J. National surveillance of emergency department visits for outpatient adverse drug events. *JAMA*. 2006;296(15):1858-1866.
- Dantes R, Mu Y, Hicks L, et al. *Association Between Antibiotic Prescribing Practices and Community-Associated Clostridium difficile Infection*. San Francisco, CA: Infectious Diseases Society of America; 2013.
- General facts on women and job based health. Web site. <http://www.dol.gov/ebsa/newsroom/fshlth5.html>. Accessed January 2, 2015.
- Allan G. A critique of using grounded theory as a research method. *Electron J Bus Res Meth*. 2003;2(1).
- Vanden Eng J, Marcus R, Hadler JL, et al. Consumer attitudes and use of antibiotics. *Emerg Infect Dis*. 2003;9(9):1128-1135.
- Trepka MJ, Belongia EA, Chyou PH, Davis JP, Schwartz B. The effect of a community intervention trial on parental knowledge and awareness of antibiotic resistance and appropriate antibiotic use in children. *Pediatrics*. 2001;107(1):E6.

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Alison P. Albert, MPH, CHES completed her undergraduate degree in biology at Tufts University. After receiving her bachelor of science, she received her master of public health in behavioral sciences and health education from Emory University. While completing her MPH, she began working at the Centers for Disease Control and Prevention in Atlanta on the Get Smart: Know When Antibiotics Work program, and continued working with that program for seven years. Following her work on the Get Smart program, she became the lead health communication specialist in 2008 for CDC's Division of Bacterial Diseases in the National Center for Immunization and Respiratory Diseases.

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Lauri A. Hicks, DO is a medical epidemiologist at the Centers for Disease Control and Prevention. Prior to this, Dr. Hicks attended medical school at the Philadelphia College of Osteopathic Medicine and completed her internal medicine residency and chief medicine residency at the University of Connecticut. In 2003, she joined the United States Public Health Service as a CDC Epidemic Intelligence Service Officer with the Respiratory Diseases Branch. This was followed by a postdoctoral fellowship in infectious diseases at Brown University. In 2007, Dr. Hicks returned to the Respiratory Diseases Branch at CDC and in 2008 became the medical director for the "Get Smart: Know When Antibiotics Work" program.