

Identification of Parents' Perceptions of Antibiotic Use for Individualized Community Education

Global Pediatric Health
Volume 3: 1–7
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DOI: 10.1177/2333794X16654067
gph.sagepub.com



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Abstract

The purpose of this project was to evaluate parents' perceptions of antibiotics to better understand the barriers related to judicious antibiotic use and for selection of educational resources. A descriptive survey design was distributed electronically to a convenience sample of parents in Omaha, Nebraska, using the Parental Perception on Antibiotics scale. A total of 170 completed surveys were evaluated. Nearly all parents (97%) disagreed with the statement "antibiotics are needed for the common cold," and 90% were in agreement that antibiotics treat bacterial infections. Respondents did not expect an antibiotic after being seen for the common cold. All reported they "never" changed doctors when antibiotics were not prescribed. The parents completing this survey were knowledgeable about antibiotic use. Results demonstrate implications for both education efforts and patient-provider interactions. This project supports the need for community-specific identification of parents' perceptions for individualized education and promotion of proper antibiotic use.

Keywords

antibiotics, antibiotic prescribing, antibiotic resistance, PAPA scale, parent perceptions

Received May 6, 2016. Accepted for publication May 12, 2016.

Identification of Parents' Perceptions of Antibiotic Use

Antibiotics are powerful medications used in the treatment of major and minor infections. There are more than 100 types of antibiotics; they are the most commonly prescribed medications.¹ Although an essential piece of health care, these widely used drugs have led to problems with resistance. Over time, bacteria have emerged that are resistant to the effects of antibiotics; this has occurred through the natural process of exposure as well as misuse.² Misdirected use, overprescribing, and uneducated consumers are leading causes of preventable resistance.³

Antibiotic resistance has become a major issue in the United States. The Centers for Disease Control and Prevention (CDC) reports that "each year in the United States, at least 2 million people become infected with bacteria that are resistant to antibiotics and at least 23 000 people die each year as a direct result of these infections." Resistance to antibiotics is a growing problem that affects the entire population. "The use of antibiotics is the single most important factor leading to antibiotic resistance around the world" and up to 50% of use is inappropriate.⁴

In pediatrics, misuse of antibiotics is an issue. The use of broad-spectrum antibiotics remains problematic and antibiotics are most often prescribed in respiratory illnesses where antibiotics are not indicated for treatment.⁵ The CDC reports that "antibiotic resistance in children is of particular concern because they have the highest rates of antibiotic use and often have fewer antibiotic choices since some antibiotics cannot be safely given to children." Children get sick as they are exposed to a variety of illnesses and, on average, develop 6 to 8 colds per year.⁶ It is estimated that 10 million unnecessary antibiotics are prescribed yearly and in a majority of cases broad-spectrum antibiotics are used; this results in more than 40 million dollars in costs for antibiotics to treat the common cold.^{5,7}

With more than 10 billion dollars spent on antibiotics in the United States in 2009, including 6.5 billion dollars

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among patients who visit physician offices, overuse of antibiotics is contributing to the rising health care costs.⁸ Antibiotic resistance affects the ability to fight illness and leads to a cascade of additional health concerns. In a recent report on antibiotic resistance, the CDC points out the impact antibiotics have on a host of health-related conditions—joint replacements, organ transplants, cancer therapy, and chronic illness. All of these depend on antibiotics to prevent or treat secondary infection and without effective medications these health activities will be largely affected.

The Interagency Task Force on Antimicrobial Resistance works with the CDC, Food and Drug Administration, and National Institutes of Health.⁹ Through the recognition of antibiotic resistance, the task force has developed an action plan for public safety. The newest update to this task force is the National Action Plan to Combat Antibiotic-Resistant Bacteria and has allotted more than 1.2 billion dollars for the initiative.¹⁰ As a part of the task force, the CDC launched a “Get Smart” health campaign that includes resources for both providers and the community. For example, links include information for health care professionals, patients, and the general public. This newly implemented campaign has yet to be formally evaluated for desired outcomes but offers reliable information for patients.¹¹

In the United States, antibiotics are overprescribed and often unnecessarily prescribed to patients. While prescribing habits are generally improving with regard to antibiotics, barriers between provider and patient perceptions serve as the main influence in incorrect antibiotic use.^{12,13} Providers are aware of this issue and are knowledgeable about proper prescribing habits; however, there continues to be a problem. Studies show that providers’ perception of a patient’s view contribute to whether an antibiotic is prescribed.^{14,15} Providers often interpret patients as wanting antibiotics and feel pressure to prescribe simply from the behaviors of parents.^{16,17} Despite lack of overt pressure from parents, providers still perceive that parents want an antibiotic prescribed based on subtle communication behaviors.¹⁷ While a variety of factors contribute to a provider’s decision to prescribe antibiotics, a core theme is the assumption or feelings of pressure providers receive from patients regarding a desire for antibiotics.¹⁶⁻¹⁸

The information that exists regarding parents’ perceptions of antibiotic use shows that, in general, parents are concerned about antibiotic resistance. In a study by Finkelstein and colleagues,¹⁹ parents stated they do not want antibiotics unnecessarily prescribed and many are fairly knowledgeable about appropriate antibiotic use. Other studies indicate parents lack knowledge related to antibiotic use and most expected to receive an antibiotic

for common viral illnesses including upper-respiratory infections, ear infections, and pneumonia.^{15,20}

The most recent study on patient perceptions of antibiotic use was released by the World Health Organization (WHO) in November of 2015, with a study titled “Antibiotic Resistance: Multi-Country Public Awareness Survey.” Results of the WHO study demonstrate that there is an overall gap in knowledge when it comes to antibiotic knowledge and appropriate use. For instance, 64% believe that antibiotics are effective against viruses such as the cold and flu. While 72% of respondents believe that antibiotic resistance is a problem, a majority were unable to correctly identify what resistance means.

Antibiotics in the pediatric population continue to be misused and overprescribed, contributing to the problem of antibiotic resistance in the United States. National agendas have prioritized the concern with the development of action plans and guidelines. Research examining parent perceptions on antibiotic use is varied and range from misconceptions to knowledgeable populations. While current initiatives are focused on fighting resistance from the provider perspective, limited attention has been given to parents’ perceptions. Identification of parents’ perceptions are necessary to understand the barriers related to judicious antibiotic use for community specific education efforts.

The purpose of this Doctor of Nursing Practice project was to examine perceptions of antibiotic use from the parents’ perspective. Understanding the perceptions parents have on antibiotics helped identify contributing factors related to misuse as well as barriers affecting the fight against resistance. The findings supported the selection of community-specific, parent-centered educational resources specifically tailored to these parents. These resources were used to increase awareness and reinforce proper use of antibiotics in an attempt to enhance interactions between the parent, patient, and provider.

Methods

A descriptive survey design was used to assess parental perceptions of antibiotic use. The validated Parental Perception on Antibiotics (PAPA) scale was used to support the selection of individualized educational resources for parents. Permission to use the PAPA scale for this pilot project was obtained from the developer and author, Arwa Alumra. Written permission to participate was obtained from the directors of the selected child care facilities. A brief description of the project was provided to participants prior to the invitation to participate in the survey. Participant consent was inferred through the questionnaire completion. Institutional review board review was completed through Creighton University.

Participants/Study Sites

Sites included 3 child care centers in Omaha, Nebraska, and 2 local parenting organizations. Local child care centers were identified in different areas throughout the city for a varied demographic sample, and facility directors were extended an invitation to participate.

Participants were recruited through a convenience sampling method. After receiving approval from the participating child care centers, parents of early childhood aged children were invited to complete the survey. Participating local parenting groups made the questionnaire available to group members by posting an accessible link on their organization's website.

Inclusion criteria were: parent or direct caregiver of a child that had access to the questionnaire, able to read English, and only those age 19 or older.

Survey Methods

The validated PAPA instrument was the primary source of data collection.²¹ This 43-item scale is the first of its kind; it provides information on factors influencing the use of antibiotics from parents. The tool was developed by a thorough literature review and reviewed with a panel of experts from pertinent fields including infectious disease, pediatrics, family medicine, psychology and counseling, and social sciences. Content and face validity of the tool was conducted through a group brainstorming process and a 3-round Delphi process with the expert panel. Results of this first validation study demonstrated reliability with overall Cronbach's α of .87 and individual subscales ranging from .771 to .794.²¹ A follow-up study was conducted to further assess the construct validity and reliability of the tool.²²

Knowledge/beliefs, behaviors, information sources, adherence, awareness about antibiotic resistance, and parents' perception on doctors' prescribing behaviors were determined through the analysis of data obtained from the PAPA scale. The PAPA scale measures parents' perception based on 3 target areas: (1) Antibiotics and Health Related Information, (2) Experience with Antibiotics and Health Professionals, and (3) Personal Attitudes and Beliefs about Antibiotics. Responses are measured on a 5-point Likert-type scale. In addition, an introductory section offers questions related to demographics and overall health of the child. The Flesch reading ease is set at 72.6, and the Flesch-Kincaid Grade level is 5.4.

Data Analysis

The one-time PAPA questionnaire was completed by parents from an electronic source. Returned questionnaires via the electronic route were kept anonymous, ensuring

privacy. The questionnaire was provided in a link sent directly to the parent/guardian via email list by the director of the organization or distributed to parenting organization members via the director. The data and results were collected using Typeform. Typeform is a cloud-based, secure program designed for online forms including surveys and questionnaires. First and last names were not included on the questionnaire, and only group data were used for analysis. Data collected from the questionnaire were password protected ensuring only the designated investigators had access to the results.

Outcome measures were analyzed based on 170 parent responses. Quantitative analysis was completed using relative frequencies on the Typeform platform. Every question was reviewed and included detailed response distribution. Demographic information was summarized.

Identified factors related to the perception of antibiotics from parents of the early childhood population supported the individualized distribution of educational resources for parents. Education included information to assist in health management based on responses to the questionnaire. The goal was to raise awareness of the problem of antibiotic resistance through education to parents that targeted their specific needs.

Information from validated medical resources was distributed to parents after an analysis of the Omaha community responses. In yet another effort combat resistance, the CDC developed the *Get Smart About Antibiotics* program that includes resources that providers and communities are encouraged to use.¹¹ There are a variety of materials to choose from targeting different topics related to antibiotics. For this project, the material was reviewed and 2 pamphlets from the CDC's *Get Smart About Antibiotics* were selected. As a pilot intervention, this material was distributed but additional research will need to be completed to assess outcomes.

Results

The questionnaire was distributed to parents between September and December 2015. Questionnaires were directly emailed to approximately 500 parents. In addition, the questionnaire was posted via social media avenues for private local parenting groups. A total of 170 surveys were completed. A majority of respondents identified themselves as a mother (84%) aged 30 to 35 years (32%). While the term parent is used throughout this article, it should be noted that this term is used interchangeably with caregiver as the questionnaire provides the choice of "mother," "father," or "other." Only 25% identified as being trained in medical, nursing, or paramedic field. Sixty-eight percent were employed full-time and 22% identified as a stay-at-home parent. Part-time employment, full-time student, and "other" represented the additional 10%. No respondent

reported being unemployed or retired. The majority identified as having completed college-level education or higher (87%), with only 14% reporting a high school education or less. More than half (52%) reported their youngest child having a cold 2 to 3 times over the past year, while only 4% described common cold illness greater than 6 times over the past year. Forty-five percent reported their youngest child either did not receive antibiotics (40%) or received them once over the past year (29%). The minority of respondents answered “yes” when asked if any of their children have ever suffered a serious infectious disease in the last year (14%) or chronic illness (16%).

Most of the parents answered correctly to knowledge-based questions about antibiotics. Where 1 is *strongly disagree* and 5 is *strongly agree*, for the question “antibiotics are needed for the common cold” the average score was a 1.23 and only one responded in agreement. For the statement, “Antibiotics treat bacterial infections” the average score was 4.45 with 62% in strong agreement. Over half (55%) strongly disagreed with the statement, “Antibiotics are needed for a sore throat.” For the item “Antibiotics treat viral infections” similar results were obtained, with 72% strongly disagreeing to this statement for an average score of 1.51. To further emphasize, 75% strongly disagreed with the statement “antibiotics can cure ALL types of infections.” Seventy-one percent of parents strongly disagreed that “children with the common cold get better faster when antibiotics are given.”

Parents do not agree that their child will be sick longer if they do not receive an antibiotic for a cough, cold, or flu-like symptoms (strongly disagree 62%; disagree 24%). Only 5% believe “antibiotics have cured my child’s cold symptoms.” They also disagree that if their child has a cough or cold it is best to get an antibiotic to get rid of it (strongly disagree 71%; disagree 24%).

Questions related to safety yielded more neutral results. The statement “antibiotics are generally safe” resulted in an average score of 3.39, with the majority responding with agree (36%) or neutral (35%). “Antibiotics can be harmful to one’s health” averaged 3.42. However, with regard to resistance, the average was a 4.42 when asked “some germs are becoming harder to treat with antibiotics,” and 64% strongly agreed that “some germs can become resistant to antibiotics if taken in inadequate doses.” Only 2 participants agreed that “skipping 1 or 2 antibiotic doses doesn’t make much difference.” A large majority responded in strong disagreement (78%) to the statement, “If my child’s condition is mild I would give the antibiotic according to what I see is suitable for their condition.”

Results varied on items regarding where parents obtained their health-related information. A majority agreed with receiving health information from nurses

and/or other allied health professionals (49% agreed; 32% strongly agreed). More than half of the participants agreed that health-related information comes from previous experience (51% agreed; 14% strongly agreed). The majority disagreed (34%) or strongly disagreed (19%) with the statement, “I get my health-related information from family and/or friends.”

The majority agreed (51%) with the statement, “I think doctors prescribe too many antibiotics.” In contrast, the majority disagreed (46%) with the statement, “Doctors aren’t well informed about judicious antibiotic use.” Although many remained neutral (35%), nearly half either disagreed (26%) or strongly disagreed (20%) that “doctors don’t inform the parents well about their child’s condition.” Most responded with rarely or never (88%) to the statement, “When I visit my doctor for my child’s common cold, I expect a prescription for medication, including antibiotics.” In addition, 100% of respondents answered “never” to the statement, “In the past, I have changed doctors when my doctor did not prescribe antibiotics for my child.”

Discussion

The results of this study are important for understanding parents’ perceptions of antibiotic use for both providers and public education efforts. While recent global data from the WHO 2015 survey suggests there is a gap in knowledge when it comes to antibiotic use, this study demonstrates parents in Omaha, Nebraska, are knowledgeable when it comes to antibiotics. The majority (95%) of participants correctly responded in disagreement to the statement, “Antibiotics are helpful in treating the common cold among children.” Eighty-seven percent were in disagreement that “antibiotics treat viral illness” and 90% correctly identified that “antibiotics treat bacterial infections.” This survey is consistent with results from recent research in the United States that used focus groups to identify that parents are knowledgeable when it comes to antibiotics.¹⁹ This, perhaps, shows that recent public health education efforts have been successful. Furthermore, these findings may suggest that to combat the problem of misuse and overuse of antibiotics, efforts should not only target community education but increase awareness of parent perceptions to providers.

While parents in the Omaha, Nebraska, region are knowledgeable when it comes to antibiotics, data from the literature indicate there is still some confusion surrounding proper use of the medication.^{20,23,24} This emphasizes the importance of individualizing community education efforts. In addition, the neutral responses to questions such as “antibiotics are generally safe” and “antibiotics can be harmful to one’s health” give clues to investigators that education efforts in this community should include

benefits and risks of medication and the importance of proper use. The CDC has a variety of community resources including fact sheets, pamphlets, and tables.¹¹ Identification of specific community needs is essential for selecting the proper education material to produce the best health outcomes.

Most respondents agreed (68%) that past experiences drive their knowledge about health and 81% agreed or strongly agreed that they receive health-related information from health professionals. Therefore, based on the high proportion of correct knowledge responses, the research could suggest that Omaha area providers have been informative in their care. However, more data would be necessary to determine specific associations.

Previous studies have shown that when a patient expects or hopes for an antibiotic, they are more likely to be prescribed, even when unnecessary.¹⁴ Although some may expect or hope for an antibiotic, findings from this project indicate that parents in the Omaha area believe their provider is knowledgeable and are aware that antibiotics are not always necessary treatment. This may indicate that efforts should center on better education and enhanced communication during office visits.

Over half of the parents in this study perceive that doctors prescribe too many antibiotics (59% agree or strongly agree); however, they also strongly disagreed (26%) or disagreed (35%) that “doctors aren’t well informed about judicious antibiotic use.” So, while parents feel their practitioner is knowledgeable, there may be still be concern regarding over prescribing. This suggests that both providers and parents are making assumptions about each other. It also is consistent with national trends in prescribing habits. On average, 21% of all pediatric ambulatory visits and 1 in 5 visits for upper respiratory infections resulted in a prescription for an antibiotic, whether an antibiotic was indicated or not.^{5,7} And nearly 70% of antibiotic use in children from 2004 to 2010 was for respiratory tract infections that are most commonly viral in nature.²⁵ National trends also indicate that the most common class of antibiotic prescribed are broad spectrum, which further contributes to resistant bacteria.¹ Providing this information from this questionnaire to outpatient practitioners would be helpful to prevent unnecessary antibiotic use. In addition, it may encourage efforts that are educational in nature as well as facilitate conversations for better patient-provider interaction to avoid inaccurate assumptions.

Education efforts should continue with media campaigns and Internet sources. Past programs such as the Massachusetts and Colorado community interventions proved successful by increasing public knowledge and decreased rates of antibiotic prescriptions for viral illness.^{26,27} However, since the majority of parents from this survey identified that they receive health information

from nurses and or other health professionals (vs varied responses to other avenues), resources should be available at clinic visits. In addition, more than half of the parents, from this questionnaire, agreed (68%) that health-related information comes from previous experience. This emphasizes the importance for prescribers to follow guidelines and judicious antibiotic use to promote positive, knowledgeable encounters.

For this study, as a follow-up to the questionnaire, parents were emailed education material recommended by the CDC. The material came directly from the CDC *Get Smart About Antibiotics* site and selected based on questionnaire results. Fact sheets that included harmful effects of antibiotics when not used appropriately as well as a parent antibiotic fact sheet that details the problem of resistance and how parents can help with prevention were the 2 primary materials provided. The specific items selected for Omaha area parents were *Antibiotics Aren’t Always the Answer* and the *Antibiotics: Will they work when you really need them?*¹¹

Antibiotics Aren’t Always the Answer includes a review of proper antibiotic use, a list of viral illnesses that may be mistaken for bacterial infections, and the risks associated with use of nonindicated medications. This source was primarily chosen for the section on risks associated with antibiotic use in children. The community surveyed responded with an average score of 3.4 to both statements: “Antibiotics are generally safe” and “Antibiotics can be harmful to one’s health.” This demonstrates a more varied perception when it comes to risks associated with use of antibiotics and suggests an important topic to review. The pamphlet also describes general facts regarding antibiotics. While parents are knowledgeable about general antibiotic use, this handout provided a good reminder.

Antibiotics: Will they work when you really need them? was also selected based on the more neutral responses to the safety statements. The fact sheet provides overall knowledge facts but mainly focuses on why antibiotic overuse is a problem and what the general public can do to help. Since parents in this community were knowledgeable, they can take the next step by being active participants in the fight against resistance.

Education initiatives have been credited with successful behavior change in health care. The increase in proper prescribing habits from providers is largely credited to educational interventions. Providing patient education and empowering patients to maintain their own health have shown to improve medication adherence.²⁸ Patients who are more confident in matters concerning their health do better with treatment regimens.²⁹

The small sample size is a limitation to generalizing to the community as well as the lack of diversity in demographics. The questionnaire was also limited to

the Omaha area. A majority of respondents were mothers and most had a college degree or higher. In addition, the questionnaire did not ask questions to determine any differences related to culture. This lack of diversity did not allow for comparisons between groups and a larger sample is needed. The nature of self-report in the survey contributes to questions of reliability. There may have been a bias related to what participants felt were “correct” responses. Those who chose to participate may also have been interested in the topic to begin with leading to a more knowledgeable participant.

In today’s health care arena, patient satisfaction is an emphasized outcome measure as well as contributing factor to health management plans. Multiple studies show that providers will prescribe antibiotics to patients even when not indicated in hopes of improving satisfaction.^{16,30-32} And, previous research indicates the perception of increased patient satisfaction is a main driver behind physician decision making when it comes to antibiotics.^{30,31} Primary care providers should feel confident in following guidelines and only prescribing antibiotics when necessary. According to this study, parents reported rarely or never to the statement, “When I visit my doctor for my child’s common cold, I expect a prescription for medication, including antibiotics.” In addition, 100% of respondents answered “never” to the statement, “In the past, I have changed doctors when my doctor did not prescribe antibiotics for my child.” This is crucial for providers who feel pressure to prescribe antibiotics for satisfaction measures.

The data from this project demonstrate that satisfaction goes beyond the prescription. Satisfaction may not depend solely on an antibiotic prescription; rather, it may be more concerned with the parent’s understanding of the illness and the provider’s ability to provide effective treatment recommendations. However, it cannot be determined from this study whether providers are accurately following guidelines when seeing patients. Meaning, parents may be receiving antibiotics unnecessarily, leading to increased satisfaction that would make them less likely to switch providers. Parents in this study indicate they are knowledgeable about antibiotics and when seeking care for viral-type infections may just need reassurance, education, or advice on supportive therapy. Practitioners should therefore ask questions to enhance communication about expectations for the visit and provide education tailored to the patient.

Conclusion

Overuse and misuse of antibiotics continues to be a global problem that affects the population in its entirety.

The WHO, the CDC, and community organizations recognize this problem and have been conducting research, developing resources, and creating evidenced-based guidelines. While education efforts are proving successful toward correct antibiotic use, efforts should continue that include supportive care for viral illness, prevention efforts, and when to see your health care professional. Understanding patient and provider perceptions is one area that can contribute information for more effective resources. While parents in this study are knowledgeable antibiotic consumers, additional research should focus on a larger sample that includes a variety of demographics to better individualize teaching and identify factors contributing to misuse of antibiotics.

Author Contributions

LH: Contributed to conception and design; contributed to acquisition, analysis, and interpretation; drafted manuscript; critically revised manuscript; gave final approval; agrees to be accountable for all aspects of work ensuring integrity and accuracy.

MS: Contributed to conception and design; contributed to interpretation; gave final approval; agrees to be accountable for all aspects of work ensuring integrity and accuracy.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

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