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Early Antibiotics and Childhood Obesity: Do Future Risks Matter to Parents and Physicians?

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Abstract

To understand how parents and physicians make decisions regarding antibiotics and whether a potential associated risk of obesity would alter decisions, we conducted a qualitative study of parents and physicians who care for children. Parent focus groups and physician interviews used a guide focused on experience with antibiotics and perceptions of risks and benefits, including obesity. Content analysis was used to understand how a risk of obesity would influence antibiotic decisions. Most parents (n=59) and physicians (n=22) reported limited discussion about any risks at the time of antibiotic prescriptions. With an acute illness, most parents prioritized symptomatic improvement and chose to start antibiotics. Physicians' treatment preferences were varied. An obesity risk did not change most parents' or physicians' preferences. Given that parent-physician discussion at the time of acute illness is unlikely to change preferences, public health messaging may be a more successful approach to counter obesity and antibiotics overuse.

Keywords

Antibiotics; Obesity; Risk Perception; Risk Communication; Primary Care

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Introduction

Little is known about how parents' and physicians' treatment decisions are impacted by risks, particularly in the setting of a child with acute illness. As a common medical decision, decisions about antibiotics, may serve as a model for studying how both near-term and long-term risks are integrated into pediatric decision making.

In some situations, antibiotics are required as the standard of current medical practice and can be lifesaving. For other diagnoses, such as otitis media in certain age groups,¹ the use of antibiotics may be more discretionary, a preference-sensitive decision which should be based on family preferences, values, and subjective contextual factors.^{2,3} With viral infections, antibiotics are clearly not indicated but are often given because of real or perceived parental expectations.^{4,5} As such, physicians and parents need to work together to make an appropriate treatment decision, incorporating medical facts, risks, benefits and personal or family goals and values.⁶ However little is known about how parents and physicians use information about common risks and benefits in making decisions about antibiotics, let alone how potential long-term risks are incorporated into decision making..

One such potential long-term risk is obesity. Multiple studies have investigated the association between antibiotics and obesity.⁷⁻¹¹ While their findings vary, the potential of such an association provides an opportunity to assess its implications on clinical decisions. Whether parents and physicians would alter decisions based on this association, or how they generally consider future risks of treatments, is unclear.

The goals of this study were two-fold. First we sought to understand parents' experiences with antibiotics for their young children, particularly their consideration of risks and benefits including the potential risk of future obesity. Second we explored how physicians caring for children discuss and consider risks and benefits, including a potential risk of obesity, when making decisions about antibiotics.

Methods

Sample

Parent Focus Groups—Parents and caregivers (hereafter referred to as parents) of children under age 7 years, who spoke English, were recruited by staff of four contributing institutions to the National Patient-Centered Clinical Research Network (PCORnet). We chose sites to ensure geographic and sociodemographic diversity, as well as parents of children with and without chronic conditions. Each site recruited parents using methods appropriate to their setting, including posted flyers, invitational letters and outreach by community health workers.

Physician Interviews—Physicians who care for young children were recruited via recommendations from PCORnet collaborators at each site. We then used snowball recruitment¹² and asked participants to recommend 2–3 physicians who differ from them in at least one of three key characteristics (i.e., geographic region of the country, practice location, payer mix). We sent potential participants an e-mail or letter introducing the study

with instructions for opting out. Those providers that did not opt out within 10 days were emailed or called to arrange a time for a telephone interview.

The institutional review board of Cincinnati Children's Hospital Medical Center approved all components of the study. The institutional review boards of Boston Children's Hospital and each focus group site approved the focus group portion of the study. Participants received \$50 compensation.

Data Collection

The parent focus group guide included general questions on participants' experiences with antibiotics and their risks and benefits, while the physician interview guide addressed how participants engage parents in antibiotic decision making for minor infections. We then gave both parents and physicians vignettes (see table 1) that described a child with symptoms of an ear infection. For parents the vignette included information about antibiotic risks, such as allergic reaction and diarrhea, and benefits; a second vignette added information on the risk of obesity. During their development, the guides underwent several revisions based on feedback from stakeholders including researchers, healthcare providers and parents.

Focus group moderators were professionals with prior experience leading focus groups who also participated in a one-hour, study-specific training. Each site conducted 2 focus groups, lasting approximately 2 hours. After the first three groups, minor changes were made to the focus group guide based upon moderator feedback. Physician interviews were conducted by a single investigator (EL) and edits to the guide were made after the first 3 interviews including changing the patient's age from 4 years old to 2 years old as the first physicians interviewed stated that the current data on a possible association between antibiotics and later obesity was generally for exposure in children younger than 4 years old. Physicians were recruited until we reached thematic saturation.¹²

Data Coding and Analysis

All focus groups and interviews were recorded and transcribed verbatim. Transcriptions were verified and de-identified prior to analysis.

All transcripts were read by the coding researchers in their entirety prior to coding. Data were coded and analyzed using a content analysis approach.^{12,13} Two experienced researchers (EL, CD) coded each transcript using a coding structure developed based on review of the first 3 focus groups and physician interviews. As coding progressed and new codes emerged this structure underwent revisions, primarily consisting of adding subthemes to major themes. The researchers compared coding and resolved differences through discussion. Data coding confirmed that there had been thematic saturation,¹² with no new themes found in the last 2 focus groups and the last 2 physician interviews. Preliminary findings were discussed with co-investigators and focus group moderators to ensure that the analyses appropriately reflected the data from their site. We also presented the data to a panel of stakeholders as a means of respondent validation.¹⁴

Results

A total of 59 parents participated in one of eight focus groups (Table 2) and 22 physicians were interviewed (Table 3). Results are organized by topic with quotations illustrating the results presented in Table 4.

Discussing Antibiotic Risks

Nearly all parents reported experience with a child receiving antibiotics, often for an ear infection. When asked what “downsides, side effects or risks” had been discussed at the time of antibiotic prescription, most parents reported little or no discussion of risks and no discussion of the frequency of a particular risk. This report was consistent with physicians’ statements that they rarely discuss risk and benefits when prescribing antibiotics for minor infections. Instead, physicians indicated that they reserve discussion of antibiotic risks for when they are not prescribing antibiotics for illnesses that do not require them. In these cases they are most likely to discuss near-term risks, such as diarrhea, but may also mention more remote risks, such as the development of antibiotic-resistant bacteria. Most parents stated that they would like their doctor to discuss benefits and risks at the time of antibiotic prescription.

Antibiotics for Otitis Media

When presented with a description of a child with symptoms of an ear infection, along with general information on risks and benefits of antibiotics (table 1, vignette 1a), most parents would choose to start antibiotics. Helping the child to feel better and eliminating fever were highly prioritized. A few participants were unsure or preferred to avoid starting antibiotics. Physicians, on the other hand, (table 1, vignette 1b) had mixed responses, including preferences for immediate prescribing of antibiotics, a safety net antibiotic prescription¹⁵ or supportive care. Both parents and physicians noted that the context of the decision, especially non-medical concerns, may influence preferences and decisions related to antibiotics. Such influences included cost, which was likely to limit antibiotic use, and parents’ need to return to work, which may have led to increased use.

Considering the Risk of Obesity

After hearing the vignette with information that young children who are treated with antibiotics may have an increased chance of obesity in kindergarten (see table 1, vignette 2), parents’ preferences for antibiotics were mostly unchanged. The few parents who were uncertain about using antibiotics to begin with did move towards avoiding them. A small number of other parents who had chosen antibiotics for the first vignette now stated that if their child wasn’t “too uncomfortable” they might wait an additional day or two to start antibiotics. Other parents continued to prioritize symptomatic improvement and fever elimination. Physicians’ prescribing decisions were similarly unchanged when presented with information about a possible risk of obesity with antibiotics. Nearly universally they felt that the potential added risk did not impact whether or not the patient should be treated with antibiotics. However, one participant did indicate that if there were a strong family history of obesity, such a risk might make her reconsider her decision.

Parents were generally concerned about the obesity risk; however they felt confident they could address obesity risk differently, making it an unnecessary consideration in the antibiotics decision. The multi-factorial nature of obesity led parents to believe they could counter an increased risk from one factor (antibiotics) with more effort at addressing other factors (diet or exercise). Physicians' decisions were also influenced by the context in which antibiotic decisions are made, as well as the complex, multi-factorial causes of obesity. Many physicians stated that parents do not want new information when their child is acutely ill and they would find it difficult to talk about obesity when addressing treatment of an acute illness.

Finally, we asked both parents and physicians how strong the association between antibiotics and obesity would need to be in order to influence their decisions about antibiotics. A few parents said that a 10–20% chance of obesity in kindergarten would influence their antibiotic decision making. However it was more common for parents to have a much higher threshold, up to about 70%. Although most parents could imagine a threshold at which the risk of obesity would matter to them, some expressed that the obesity risk would never matter if they felt antibiotics would make their child feel better. Similarly, physicians' responses ranged from 10–80% increase in the likelihood of being obese, with some stating that antibiotics would have to be the top cause of obesity to influence their antibiotics decisions.

Discussion and Conclusion

Discussion

In recent years, several studies have focused on interpersonal communication between parents and providers regarding antibiotics.^{16–20} This study adds new insights regarding those interactions, as well as parents' and physicians' use of risk information in antibiotic treatment decisions. In particular, we sought to address the question of how epidemiologic associations regarding long-term risks are assessed by parents and physicians and integrated into a common pediatric medical decision.

In general, parents expressed a clear preference for having their healthcare provider tell them about potential risks, both short and long-term, even when the risks did not change their decision. Because physicians endorse primarily discussing antibiotic risks as a means of discouraging unwarranted prescriptions, it is likely that many parents whose children are prescribed an antibiotic are not receiving the risk information they desire. This mismatch between information received and desired may have implications for the parent-physician relationship and could impact trust in the child's physician^{21–23} such trust may be particularly important as data on risks and benefits change.

This study utilized vignettes designed to reflect a likely “best case scenario” for communication in a busy primary care office (see table 1). Indeed, physician interviews reveal the vignettes' risk discussion to be aspirational. Improving risk communication would likely require the use of decision support tools, other members of the healthcare team providing some of the parent education, or physician participation in risk communication training.^{24,25} However, getting physicians to participate in such training or to use such tools

may be challenging given the limited value they placed on communicating risk information when prescribing antibiotics for acute infections. Whether physicians would be similarly disinclined to discuss long-term risks in the setting of other acute treatment decisions is unknown.

Our findings regarding the lack of change in decisions about antibiotics, even given an increase in long-term obesity risk, may represent an expected approach to considering a small, distant risk. This is particularly true for working parents, for whom there may be a measurable cost of missed work days associated with avoiding antibiotics,²⁶ while costs related to childhood obesity may not be as acute or readily apparent to them. Although economic studies use the concept of discounting to account for differences in perceptions of near and distant risks,²⁷ we are unaware of research examining how parents discount risks related to health conditions in their children nor how parents or physicians balance near term and distant risks more generally. Similarly, it is unknown whether the lack of impact suggested in our data is specific to obesity and/or to the relationship between antibiotics and obesity. Studies have found that parents may have limited recognition of, or concern about, obesity in their own child.^{28–30} At the same time, the use of heuristics in parents' decision making may lead to unrealistic optimism related to future risks.³¹ Future research should compare reactions to a future risk of obesity to other future health risks. In some settings, such as decisions about high-risk treatments for chronic illness, parents do consider long-term risks,³² indicating that there are at least some situations in which parents integrate both short and long-term risks into their decision process.

As a qualitative study, these findings are intended to provide a broad picture of a previously unexplored question. While the sample was not randomly selected or representative, we sought to recruit from diverse geographic and sociodemographic populations to ensure that multiple viewpoints were expressed. Our focus group vignette was intended to reflect typical communication, rather than using ideal methods of risk communication.³³ Additionally, most of the research considering the association between antibiotics and obesity considers antibiotic exposures at an age younger than the children in our vignettes. However we specifically chose ages for which guidelines state that antibiotics can often be avoided for otitis media,¹ to ensure it was a preference-sensitive decision. To the extent these ages biased our findings it was most likely in a conservative direction as parents and physicians are likely more inclined to give younger children antibiotics.

This study raises the important question of how researchers and policy makers can best communicate the impact of small effect sizes on individual and population health, as well as who should be the target of such messages. Given parents' prioritization of symptomatic relief, communicating such risks at the time of acute illness is likely to be ineffective, even if physicians were inclined to do so. Moreover, although physicians were amenable to discussing antibiotic risks, including obesity, with families, the information itself was unlikely to change prescribing behaviors. Therefore depending upon physicians to deliver public health messages, such as about the association between antibiotics and obesity, at the time of acute illness is unlikely to be successful.

It may seem counterintuitive to suggest the possibility of not discussing long-term risks at the time of antibiotic prescribing, however the idea of such discussions occurring at a time other than acute illness is consistent with the pediatric practice of anticipatory guidance.³⁴ Rather than waiting until the moment of decision making, presenting risk information at another time, such as when discussing other obesity risks, may lead to a more fruitful discussion and impact future decision making. Likewise, opportunities to increase understanding of antibiotic risks outside of the physician-parent interaction are crucial.³⁵ In the case of risks associated with antibiotics, pairing the information with related public health messaging, such as handwashing and other methods of illness avoidance, may be effective. In general, policymakers and public health officials might need to take a greater role in communicating information about risk and benefits, especially in situations, such as antibiotics and obesity, where the risk may be small and distant.

Conclusion

This study provides insight into the challenges of communicating epidemiologic data about long-term risks into medical decision making for children. Our results suggest that, in the setting of an acute illness, communicating data about an association between antibiotics and later obesity is unlikely to decrease antibiotic overuse. While there may be some families and physicians for whom this is an effective and important message, for the typical interaction around an ill child, other levers will be needed to impact both obesity and antibiotic overuse. It remains to be seen whether long-term risks impact medical decision making in the setting of other conditions, or whether, in the face of acute illness, the more immediate concerns about symptom relief and definitive treatment will always outweigh distant risks.

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Table 1:

Vignettes

Parent Vignette 1a: Typical Risks and Benefits	<p>Maria is four and has had a cold for the last week. For the last two nights she has woken up several times crying and complaining about her ear. This morning she has a fever. Her mother took her to the doctor who explained that Maria started out with a common cold but now might have a mild bacterial ear infection. The doctor tells her that we used to treat all ear infections with antibiotics. However, new guidelines say that in a kid Maria's age it is okay to consider waiting a few days to see if the infection goes away on its own.</p> <p>The doctor and Maria's mom discuss whether to start antibiotics to treat the ear infection. The doctor tells her that antibiotics sometimes shorten the course of illness—making it a little more likely the ear infection and pain will be gone within a week. They also decrease the chance of minor complications from the infection. The doctor tells Maria's mom that about a quarter of kids who take antibiotics for an ear infection get diarrhea, a rash or vomiting and a few develop an allergic reaction. While they are talking, Maria's mom remembers that she recently read a newspaper article that talked about how some bacteria are becoming resistant to common antibiotics.</p>
Physician Vignette 1b:	<p>Maria is a previously healthy two year old who has had a cold for about a week. For the last two nights she has woken up several times crying and complaining about her ear. Her mom reports that she had a fever last night. In your office she is well-appearing but a little clingy. She is afebrile. Her exam is normal except for clear rhinorrhea and an inflamed right ear drum that is full but not bulging. It has purulent fluid visible behind it.</p>
Parent Vignette 2: Risk of Obesity	<p>So, now, let's imagine that Maria's doctor tells Maria's mom that a new scientific study has come out that suggests young children who get antibiotics for minor infections, such as ear infections, have an increased chance of being obese in kindergarten or overweight in kindergarten.</p>

Table 2:

Parent Focus Groups Participant Characteristics

Characteristic	n (%)
Age, years	
18–29	19 (32)
30–44	32 (54)
45	8 (14)
Female	55 (93)
Race	
White	21 (36)
Black/ African American	25 (42)
Other	13 (22)
Hispanic	
Yes	22 (37)
Total Annual Household Income	
\$30,000	32 (54)
\$30,000-\$49,000	9 (15)
\$50,000-\$74,000	9 (15)
\$75,000	8 (14)
No response	1 (2)
Educational Attainment	
Did not finish high school or obtain GED	5 (9)
High school graduate or GED	9 (15)
Went to college but did not graduate	15 (25)
College graduate	26 (44)
Other	4 (7)
Children < 7 living in household, n (%)	
0	1 (2)
1	31 (52)
2	17 (29)
3	8 (14)
No response	2 (3)

Table 3:

Physician Interview Participant Characteristics

Characteristic	n (%)
Age, years	
0–40	5 (23)
41–50	9 (41)
>50	8 (36)
Female	16 (73)
Race	
White	18 (82)
Black/ African American	4 (18)
Other	0 (0)
Hispanic	
Yes	2 (9)
Geographic Location	
Northeastern U.S.	4 (18)
Southern U.S.	11 (50)
Midwestern U.S.	1 (5)
Western U.S.	6 (27)
Practice Type	
Pediatrics	19 (86)
Family Practice	2 (9)
Med Peds	1 (4)
Office Type	
Private Practice	8 (36)
Hospital/ Health System Owned Practice	13 (59)
FQHC	3 (13)
Clinic Location	
Suburban	9 (41)
Rural	4 (18)
Urban	9 (41)
Patients with Public Insurance	
75%	7 (32)
25–75%	9 (41)
< 25%	6 (27)

Table 4.

Supporting Quotations

	Parent	Physician
Treatment Decision Influences	<p>"...I don't like seeing them sick. So, I just think I just kind of jump into where I'm like, Doctor, just give me something for them."</p> <p>"I think that it'll get worse and they can lose their hearing and all kinds of stuff, so it's better to get it started."</p> <p>"...if they were also very expensive..I'll probably wait a little bit longer... and see if she could clear the infection herself."</p> <p>"I think it would really depend on the age of the child like if they were in daycare because I know a lot of facilities won't even let you bring them back unless you get treatment regardless of what the doctor says."</p>	<p>"Based on it's gone on for a week...the child is clearly suffering from, you know, no sleep the other night and there's evidence of inflammation in the ear."</p> <p>"There's also the social factor for the parent that they're missing day after day of work and it produces an extremely hard financial stress on the family."</p> <p>"Often kids in daycare whose parents work full time, they would like to do whatever they can do to fix this as quickly as possible."</p> <p>"....because my families don't know how to access the health care system that well, so they don't typically speak English. And so they can't call me two days later...."</p>
Reaction to Obesity Risk	<p>"... your child is still sick. You need something to get you better, whether you get obese or not."</p> <p>"I would give them the medication because you can, I mean, prevent them from being obese."</p> <p>"There's the park, pool, gym, all kinds of sort of stuff, so I will still take [the antibiotic]."</p> <p>"I will change eating habits...and things like that so that we can counter the effects of [the antibiotic]."</p> <p>"...if you start to see signs that your son or daughter is starting to get obese, that's where the parents take control."</p>	<p>"Well I can help this child now with a possible theoretical risk down the road, which to me even be able to negate if they do probiotics or if they eat well and exercise versus just getting nothing."</p> <p>"...that would be another piece of ammunition to potentially avoid antibiotics."</p>
Degree of Risk of Obesity that Matters	<p>"If you tell me it's a 75% chance, that's one thing. You tell me it's an increase like 5% chance of the normal population, that's not bad."</p> <p>"....if there's a 20% chance, I would start thinking about it."</p>	<p>"I think it would have to be very, very big. It would have to be the sentinel study that disproves that all that stuff [that causes obesity] matters and it was really antibiotics."</p> <p>"I'd say your risk is up by more than 50%"</p> <p>"I would prefer to see a causal relationship with no confounding factors."</p>