

## Parents' perceptions of antibiotic use and antibiotic resistance (PAUSE): a qualitative interview study

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**Background:** There remains public misconception about antibiotic use and resistance. Preschool children are at particular risk of receiving unnecessary antibiotics because they commonly present in primary care and many childhood infections are self-limiting.

**Objectives:** The aim of our study was to explore parents' perceptions and understanding of antibiotic use and resistance in the context of their young child with an acute respiratory tract infection (RTI) and to explore strategies parents would find acceptable to minimize antibiotic resistance for their families.

**Methods:** Semi-structured interviews were conducted with 23 parents of preschool children who recently had an acute RTI across greater Oxfordshire, UK (2016–17 winter). We explored their beliefs about antibiotics, understanding of antibiotic resistance and views on current public antibiotic awareness campaigns at the time. Thematic analysis was used to analyse the data.

**Results:** Parents had a sense of optimism and considered their families to be at low risk of antibiotic resistance because their families were 'low users' of antibiotics. Very few parents considered antibiotic resistance as a possible harm of antibiotics. Parents thought they were acting morally responsibly by following campaign messages. They wanted future campaigns to have a relevant, accessible message for families about the impact of antibiotic resistance.

**Conclusions:** Future communication about the potential impact of unnecessary antibiotic use and antibiotic resistance needs to focus on outcomes that parents of young children can relate to (e.g. infection recurrence) and in a format that parents will engage with (e.g. face-to-face dissemination at playgroups and parent/child community events) to make a more informed decision about the risks and benefits of antibiotics for their child.

### Introduction

Antibiotic resistance is an important societal health issue. The main driver for antibiotic resistance is antibiotic use.<sup>1,2</sup> Preschool children are at particular risk of receiving unnecessary antibiotics for acute respiratory tract infections (RTIs) because they frequently attend in ambulatory care and many childhood infections are self-limiting.<sup>3,4</sup>

Public misconceptions about antibiotic use and resistance persist.<sup>5</sup> Many members of the public do not perceive a link between resistant bacteria and antibiotic use. This is reflected in disappointing results from national antibiotic awareness campaigns and surveys.<sup>6–8</sup> For example, individuals with better knowledge of when antibiotics should be used still report being able to obtain antibiotics without prescription and self-treat with antibiotics.<sup>8</sup>

Previous surveys have tried to quantify parental beliefs about the benefits and harms of antibiotics for children with acute RTIs.<sup>9–15</sup> These quantitative studies with parents of young children reiterate public misconceptions about antibiotic use for common self-limiting infections. For example, in one study, although parents accepted that most RTIs had a self-limiting course, three-quarters would expect an antibiotic for such a diagnosis.<sup>13</sup> Likewise, although the majority of parents were aware that antibiotic misuse drives antibiotic resistance, a quarter of parents would still give their child antibiotics for an upper RTI.<sup>13</sup> In addition, parents appeared to be concerned about specific symptoms, with earache being a common presentation for which parents expected antibiotics.<sup>10,13</sup> Yet these studies do not explore how parents consider the benefits and harms of antibiotics as they relate to antibiotic resistance specifically.

To date, qualitative studies with parents have centred on healthcare-seeking behaviour and managing RTIs in children in the community.<sup>5,16-18</sup> A few qualitative studies have specifically explored parental views of antibiotic resistance.<sup>19-23</sup> Of the latter, studies have all been conducted outside the UK (the USA, Sweden and Hong Kong). The same misconceptions about antibiotic resistance were evident. For example, in a recent study from the USA, very few parents expressed any concerns about antibiotic resistance directly affecting their family and reported they would only become concerned about resistance if their child received antibiotics frequently.<sup>23</sup>

It is important to understand how parents think about antibiotic use and the potential significance of antibiotic resistance as it influences antibiotic use. Such knowledge can inform a bottom-up approach to improve public campaigns and interventions to help parents better understand the impact of antibiotic use for their families.<sup>24,25</sup> This study explores parents' perceptions and understanding of antibiotic use and resistance in the context of their young child with an acute RTI and explores the acceptability of strategies aimed at parents to reduce unnecessary antibiotic consumption.

## Methods

The PAUSE study used qualitative research methods involving narrative (i.e. people's own stories) and semi-structured face-to-face interviews with parents (or carers) of preschool children (aged 5 or under) across a sub-region of South-East England (Thames Valley region: Berkshire, Buckinghamshire and Oxfordshire, 2016-17 winter).

### Participants and setting

Parents were recruited using two approaches: through general practices and community networks. Eight general practices within the Oxfordshire Clinical Commissioning Group (healthcare services region) were selected to recruit parents based on their locality (urban versus semi-rural), level of social deprivation [index of multiple deprivation (IMD) score by practice post-code] and antibiotic prescriptions per practice list size. Practices were asked to identify participants during routine consultations with either a GP or nurse practitioner. Participants were provided with promotional written information about the study by their health practitioner and asked to contact the research team directly if they were interested in taking part. We also recruited through parent baby/toddler groups within Oxfordshire and through adverts on social media (e.g. Facebook and Mumsnet). The study researcher contacted local baby/toddler groups listed online (<https://www.oxfordshire.gov.uk/cms/content/toddler-groups>) and attended their groups, inviting participants to participate and/or advertise the study to their friends and extended family. During these visits, the study researcher spent between 45 min and 1 h each time inviting participants to the study and handing out promotional material. All but one group had at least 20 parents or carers in attendance. The study was advertised on social media for two set periods (November 2016, 1 week; and February 2017, 2 weeks).

Children had to have had a recent acute RTI within the previous 3 months. Parents or carers, aged  $\geq 18$  years, included any primary caregiver of the child (e.g. parent, adoptive parent or step-parent). We were interested in three parent groups to capture a variety of experiences of parents managing their child's RTI: group 1, parents who did not attend a healthcare facility (e.g. primary care/walk-in centre/emergency department); group 2, those who consulted in primary or ambulatory care and were not prescribed an antibiotic; and group 3, those who consulted and were prescribed an antibiotic. A maximum variation, purposive sample of

parents was sought to interview based on age, gender, number of children, ethnicity and child's age.<sup>26</sup>

### Interviews

Interviews followed a topic guide, which asked about caring for a child with an RTI, beliefs about antibiotics, understanding of antibiotic resistance and views on current public antibiotic awareness campaigns at the time. The topic guide was informed by Social Cognitive Theory and other theoretical behaviour change theories,<sup>27,28</sup> and existing literature.<sup>9,18-22,29,30</sup> The use of theory ensured that questions asked about likely determinants of parent behaviour and included questions about parents' perceptions of attitudes of significant others (e.g. family and friends) and beliefs about confidence in carrying out specific behaviours (e.g. self-care of RTI). Participants were shown an example of a current public health campaign at the time (see the [Supplementary data](#) available at JAC Online). This was before the latest antibiotic awareness campaign ('Keep Antibiotics Working') that was released in October 2017.

Interviews were conducted by O. V. H. at the participant's home or other suitable setting of their preference. Written informed consent was obtained prior to interview. Interviews were audio-recorded and transcribed verbatim. In recognition of their contribution, interviewed participants received a £20 gift voucher.

### Analysis

Transcripts were checked for accuracy against the recording and anonymized. Anonymized transcripts were analysed using thematic analysis aided by specialist software (NVivo version 11) to organize data.<sup>31</sup> Constant comparison was used to compare data across interviews, taking an inductive approach.<sup>32</sup> Codes were compared with one another to create categories, grouping similar codes together. Categories were organized into a framework to provide themes and subthemes based on 10 coded interviews. This coding framework was an iterative process and was applied to subsequent transcripts. Agreement on themes and subthemes, and coding was sought between members of the research team, and a sample of 20% of the transcripts were coded by both O. V. H. and S. T.-C.

### Ethics

Ethical approval was obtained from the Health Research Authority, with reference 16/NW/0779, on 9 November 2016.

## Results

A total of 34 eligible parents contacted the researchers to express interest in being interviewed. Twenty-three parents were interviewed between November 2016 and July 2017. The majority of participants were mothers, with one child, with an average age of 35 years old (Table 1). Around two-thirds of parents identified themselves as white British. Most parents were recruited through parent community groups or through social media advertising; only one parent was recruited through a GP practice. Following purposive sampling, around a quarter of parents managed their child's acute RTI symptoms at home. The remaining 17 parents consulted a healthcare professional with their ill child, of which 9 were prescribed an antibiotic. Data saturation was indicated after 18 interviews. We conducted a further five interviews to confirm this.

Five themes were identified to represent the data (Table 2), illustrated below with quotations. Although we explored parents' experiences of managing their child's RTI and consulting a health professional as a prelude to our main research objectives, this is an

**Table 1.** Characteristics of parents (n=23)

Participant code	Sex	Age (years)	Child age, boy or girl	No. of children	Child's primary complaint(s) according to parent	Ethnicity
Group 1. Did not attend GP (n=6)						
2	female	39	3 years, girl	3	chesty cough	white British
7	female	33	21 months, boy	1	cough	white British
10	male	36	16 months, girl	1	cough, blocked sinuses	white other
17	female	33	6 months, boy	2	cough	white British
20	male	33	2 years, girl	1	cough	white British
23	female	38	18 months, boy	1	cough	white British
Group 2. Attended GP and not prescribed antibiotics (n=8)						
3	female	35	2.5 years, girl	1	cough	white other
5	female	39	2 years, boy	3	chest infection	white British
11	female	33	20 months, boy	1	persistent cough	white British
12	female	34	2.5 years, boy	1	persistent cough	white other
13	female	33	15 months, girl	1	cough	white British
14	female	35	2.5 years, girl	1	cough	white other
15	female	36	11 months, boy	4	cough	British other
16	female	35	6 months, girl	2	cough	white British
Group 3. Attended GP and prescribed antibiotics (n=9)						
1	female	36	10 months, boy	1	chesty cough	white British
4	female	36	19 months, boy	2	ear infection	white British
6	male	40	5 years, girl	1	ear infection	white other
8	female	36	3 years, boy	1	tonsillitis, cough	white British
9	female	29	4 years, girl	2	ear infection	Asian
18	female	37	2 years, boy	3	chest infection	white British
19	female	39	3 years, boy	1	chest infection	white British
21	female	39	12 months, boy	1	ear infection	mixed race
22	female	34	18 months, boy	2	chest infection	mixed race

area that has been explored extensively in other published research. For the purposes of our main research objectives, emphasis is given to themes with original findings.

**Themes 1 and 2: awareness and understanding of antibiotic resistance and its potential implications**

All parents had heard of antibiotic resistance, although they had difficulty explaining the term. Some parents correctly understood that antibiotic resistance comes about when bacteria ‘learn to resist the effects of antibiotics’ (participant 3) or when bacteria mutate and resist the effects of a specific antibiotic. Other parents misunderstood antibiotic resistance as an individual becoming resistant to antibiotics. Only a minority of parents linked antibiotic resistance (or their interpretation thereof) as a potential harm of antibiotics.

*‘But I think maybe if you’re getting [antibiotics] too much, then you cannot do anything because then you’ve lowered your resistance.’*

(participant 14; group 2, one child)

Parents who had heard of the term were quick to point out that antibiotic resistance occurs due to inappropriate use. This they understood to be because of antibiotic overuse, using antibiotics

for inappropriate indications (e.g. viral infections) or not completing antibiotic courses.

Many parents realized that antibiotic resistance will make common infections more severe. Yet, parents were divided as to the likely wider impact of antibiotic resistance. Some felt that the risk of antibiotic resistance would be the same for everyone, whilst others perceived that antibiotic resistance would affect vulnerable populations more (e.g. chronic health problems, the young and the elderly). Only one parent identified antibiotic resistance as a community problem because resistant bacteria are transmissible between humans. However, other parents felt that humans will overcome antibiotic resistance because of an adaptable immunity.

*‘In the long run we probably won’t be [sicker], maybe initially, but you’ve got a learned immunity. If you give your body a chance to fight [the infection] then maybe if you get it again you’ll be able to fight it more quickly, whereas if you’ve always relied on a drug to do the nitty gritty work for you, your immune system hasn’t had a chance to learn, and maybe that will be the way it works.’*

(participant 2; group 1, three children)

Parents appeared to have a sense of optimism about how antibiotic resistance was likely to affect their family. Most perceived their own family at low risk because they considered themselves to be

**Table 2.** Main themes and subthemes

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Theme 1. Parents' understanding of antibiotic resistance
1a. Description and knowledge of antibiotic resistance
1b. Frequent antibiotic use and inappropriate behaviours contribute to antibiotic resistance
Theme 2. Perceived consequences of antibiotic resistance
2a. Implications of antibiotic resistance for patients
2b. Impact of antibiotic resistance on close family
2c. Healthcare implications
Theme 3. Ways to reduce antibiotic resistance in response to campaign materials
3a. Healthy lifestyle choices to reduce antibiotic resistance
3b. Prudent use of antibiotics
Theme 4. Parents' reflections on current antibiotic awareness materials
4a. Perceived personal relevance of campaigns
4b. Perceptions of enablement of campaign messages
Theme 5. Social responsibility to inform parents about antibiotic resistance
5a. Better communication about antibiotics and resistance, and diagnostic tools during consultations
5b. Better public campaign strategies on antibiotic resistance in terms of content, timing and targeting populations

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low users of antibiotics. Others perceived that avoiding stringent hygiene measures would improve the development of the child's microbiome.

*'I would hope that because we try not to take [antibiotics] too often that perhaps [antibiotic resistance] wouldn't affect us as much compared to somebody who took them as a matter of course every time somebody was poorly.'*  
(participant 11; group 2, one child)

*'I would say we are relatively low risk. I'm of the school of let kids eat a bit of mud and don't blast everything with Dettol [antiseptic]. I think it's important that you have your own little healthy microbiome that helps your immune system function as well as it can.'*  
(participant 19; group 3, one child)

Parents recognized that antibiotic resistance might impact on health services by requiring further interventions to treat infections or requiring costlier third- and fourth-line antibiotics. Only a few parents recognized that resistant bacteria might affect routine hospital procedures.

Yet, some parents thought that the implications of antibiotic resistance, although a possibility, were a problem for the future and found them difficult to relate to. They thought that society would identify different ways of treating infections (e.g. discovery of new drugs).

*'Because it's not real at the moment, you know, it's not affected me [...] I haven't seen it affect anyone that I know, and I think those sorts of things are still very abstract.'*  
(participant 3; group 2, one child)

### **Themes 3 and 4: parents' views on current antibiotic awareness campaign materials**

Although they found the antibiotic awareness campaign materials informative, no parent reported seeing these previously (see the

Supplementary data available at JAC Online). One parent recognized that there was contradiction between public health messages that discuss antibiotics.

*'The problem is that there's a mixed [public health] message. [...] on the one hand, [for] the vast majority of infections, you can get well without antibiotics [...]. And then, on the other hand, they're saying that in the future where we don't have antibiotics, people might die. So, how do you balance it? [...] So, if people think [they] can get well without antibiotics, why should [they] be worried about a world without antibiotics.'*  
(participant 8; group 3, one child)

Parents presented themselves and their families as morally responsible by following public health guidance and medical advice. When viewing campaign material to reduce antibiotic consumption, most parents were happy to avoid antibiotics for simple 'low-level' symptoms they felt comfortable managing at home. However, parents slotted campaign messages into their own framework of what a problematic symptom was.

*'But if they're crying with pain, like I was [referring to earache], [...] then it's got to a point where it's just a bit too much to handle.'*  
(participant 17; group 1, two children)

Some perceived themselves as low users of antibiotics by using antibiotics 'only when needed' thereby reducing antibiotic resistance. Other parents were unsure as to how they could reduce antibiotic resistance themselves as the problem was part of a 'much bigger' picture and that a collective public effort was needed to use fewer antibiotics.

*'Don't take [antibiotics] for things when you don't need them.'*  
(participant 16; group 2, two children)

### Theme 5: social responsibility to inform parents about antibiotic resistance

Parents were aware that there is a drive for GPs to reduce antibiotic prescribing, but perceived that GPs often prescribed antibiotics to be safe. Parents urged clinicians to 'stick to their guns'. A few parents wanted more transparent communication about different treatment strategies available with a clear plan.

*'...it would give me more confidence to have a discussion with a GP around knowing the facts about why [antibiotics] were being prescribed.'*

(participant 4; group 3, two children)

Parents suggested that future stewardship campaigns should target people when not ill, using a simple relevant message 'directed' at families.

*'Aim it more at the patient and their family. Say what implications it could have for them directly in future. [...] Because you tend to read things like this [leaflet] and easily forget it, whereas if you realize it may have problems for your children in future for example, then you do start to worry a bit more, and it is something you remember.'*

(participant 1; group 3, one child)

They also wanted information about when antibiotics were likely to be needed for common childhood infections and the chances of speeding up recovery. Interestingly, one parent suggested refocusing campaign messages by moving away from a negative inculpatory tone to a positive one by building up a child's immune system with fewer antibiotics.

*'If we saw getting sick as a milestone, not serious [illness], but mild viral illness and even mild bacterial illnesses, [...] if we saw it as a milestone that our bodies can do [...]. So, a vaccine is [...] like a training programme for your immune system, whereas an antibiotic is not helping your immune system develop [...].'*

(participant 8; group 3, one child)

Although many parents suggested TV adverts, websites and social media may be good formats for campaigns, some parents felt these were impersonal without opportunity for dialogue. Instead, they proposed face-to-face dissemination at playgroups (e.g. National Childbirth Trust groups) and other health contact opportunities (e.g. health visitors).

## Discussion

### Summary of main findings

Parents had a sense of naive optimism about how antibiotic resistance was likely to affect their family. Very few parents considered antibiotic resistance as a possible harm of antibiotics. Parents thought they were acting morally responsibly by following campaign messages and interpreted campaign messages as not needing to do anything differently. They considered their families to be at low risk of antibiotic resistance because their families were 'low users' of antibiotics. This was regardless of whether they had consulted for their child's RTI.

Although new campaigns have been launched ('Keep Antibiotics Working') since our study was completed, our findings confirm that campaigns are not addressing what parents perceive as 'low [antibiotic] use'. Parents wanted better public campaign strategies on antibiotic resistance using a message relevant for them and their families and that fits into their daily lives. This has been shown to influence direct personal engagement when implementing health-based behaviour change in other public health interventions (e.g. hand hygiene at home).<sup>33,34</sup> They also suggested more face-to-face communication (e.g. during health visit or visits) as a means to deliver more personalized messages, thereby utilizing existing contact between parents and trusted sources of health information.

### Comparison with existing literature

Although the majority of parents linked antibiotic use and the risk of antibiotic resistance in general, many did not link their families' antibiotic consumption as contributing to societal antibiotic resistance, reaffirming findings from previous studies.<sup>29,35</sup> Parents saw their families as 'low users' of antibiotics, complementing findings from a recent study in the USA where parents were not worried about resistance because their children took antibiotics 'maybe twice a year'.<sup>23</sup>

Parents' reticence towards antibiotics for their children centred around the minor side effects of antibiotics and concerns about antibiotics weakening the immune system, as observed in previous studies.<sup>21,23,36</sup> Yet, some parents were unaware of any side effects or risk associated with antibiotics, resonating with other findings.<sup>5</sup> Very few parents linked antibiotic resistance as a potential harm of antibiotics. This was regardless of whether parents understood the term correctly or not. This is in contrast to other studies where parents' reluctance to use antibiotics clearly stemmed from their worries about the development of antibiotic resistance.<sup>20,36</sup> However, the findings of those studies may have been influenced by inclusion of 'self-proclaimed experts' and choice of different qualitative research methods (e.g. computer-assisted telephone interview survey).<sup>20,36</sup>

The findings of this study were consistent with other studies where parents suggested that limiting antibiotic use in (other) patients and completing antibiotic courses were important to stem the tide of antibiotic resistance.<sup>29,35</sup> Others felt that antibiotic resistance was 'much bigger' (overwhelming) for an individual to tackle, echoing previous studies.<sup>29,35</sup> Yet, parents did not propose to reduce their own families' antibiotic use.

### Strengths and limitations

To the best of our knowledge, this is the first UK study that specifically focuses on parents' perceptions of antibiotic resistance, its relevance for them and the strategies that might work to change behaviour and reduce antibiotic use for children with acute RTIs. Employing a bottom-up approach—incorporating parents' beliefs and understanding about antibiotics and understanding the drivers for a change in behaviour—is key to inform future behaviour change interventions. We used multiple recruitment strategies and sought to recruit participants with a variety of experiences. However, using three different parent groups did not offer anticipated contrasting findings. This may be explained in part because

all parents had attended a health professional with their child for routine consultations and/or had been prescribed an antibiotic at an earlier time. Our interviews acknowledged and adapted to relevant current media reports in the UK about sepsis campaigns and sepsis-related child deaths [but prior to the most recent 'Keep Antibiotics Working' UK campaign (winter 2017–18)]. This, however, did not seem to have unduly influenced parents' perceptions about the role of antibiotics or downplayed the risks of antibiotics and antibiotic resistance.

Interviews may lead participants to give socially desirable answers. However, parents appeared happy to speak freely about negative experiences of healthcare and/or when they were unsure about their own knowledge.<sup>37</sup> Although most parents were able to recall their child's illness experience in detail, interviews can only provide insight into parents' perspectives on past events. Sampling was biased towards white British mothers. We would have liked to recruit more parents from deprived backgrounds (e.g. based on IMD score by practice postcode), fathers, parents under 25 years old and parents of ethnic minorities. We were disappointed that more participants were not recruited via GP practices, which may be explained by our less intensive recruitment strategy (e.g. no face-to-face explanation of the study by the researcher). We accept that other opinions may be uncovered if repeated in other parts of the UK.

### Implications

Given that parents find it difficult to understand the term 'antibiotic resistance', it is not surprising that they lack any meaningful understanding of the impact of antibiotic resistance and antibiotic use for their families. They do not view antibiotic resistance as personally relevant and interpret campaigns in a way where they do not have to change their current behaviour. Clinicians therefore have a role to play in outlining the risks associated with antibiotics including antibiotic resistance.

Future antibiotic awareness campaigns need to refocus their efforts by emphasizing the potential positive impact of using fewer antibiotics versus using antibiotics. Likewise, although campaigns are including phrases such as 'using antibiotics when needed', this is not defined. Concurrent national public health campaigns may have presented conflicting messages for parents about antibiotic use in children (e.g. sepsis campaigns advocating early detection and antibiotic administration versus antibiotic awareness campaigns encouraging self-care and promoting the use of fewer antibiotics).

Public health campaigns around antibiotic stewardship need to be tailored to reach their intended audiences (e.g. parents) and in a format that they will engage with, by displaying information quickly, clearly and reliably. Parents proposed other avenues such as face-to-face dissemination at playgroups and charities (e.g. National Childbirth Trust groups) and other health contact opportunities (e.g. health visitors). Simple, clear and unambiguous terminology such as 'superbugs' or 'drug-resistant infections' is needed<sup>38</sup> to encourage parent engagement with health messages coupled with clear consequences of antibiotic resistance that have personal relevance for parents and their families. Policy makers should coordinate efforts when introducing concurrent national public health campaigns to avoid the public misinterpreting health messages. There also needs to be co-design of future campaign materials.

Lastly, to facilitate strategies parents would find acceptable to minimize antibiotic resistance for their children, better evidence on patient outcomes (e.g. number of common infections/year) is needed for those children using fewer antibiotics on an individual (or household) basis and marrying these findings to antibiotic resistance.

### Conclusions

Parents viewed their families as 'low users' of antibiotics and therefore felt that their families were protected from the impact of antibiotic resistance. Parents interpreted antibiotic campaigns as matching their current behaviour, with no perceived need to change either their family's consultation in primary care or their consumption of antibiotics. There are opportunities for campaigns to create tailored interventions to educate parents and optimize antibiotic use.

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### Transparency declarations

Conflicts of interest: none to declare.

O. V. H. affirms that the manuscript is an honest, accurate and transparent account of the study being reported, that no important aspects of the study have been omitted and that any discrepancies from the study as planned have been explained.

### Disclaimer

The views expressed are those of the authors and not necessarily those of the NHS, the NIHR or the Department of Health.

### Supplementary data

Supplementary data are available at JAC Online.

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