Cabral, C., Ingram, J. C., Lucas, P. J., Redmond, N. M., Kai, J., Hay, A. D., & Horwood, J. P. (2016). The influence of clinical communication on parents' antibiotic expectations for children with Respiratory Tract Infections. Annals of Family Medicine, 14(2), 141-147. 10.1370/afm.1892

The influence of clinical communication on parents' antibiotic expectations for children with Respiratory Tract Infections

Christie Cabral[1] PhD Christie.cabral@bristol.ac.uk

Jenny Ingram[3], PhD jenny.ingram@bristol.ac.uk

Patricia J Lucas[2] PhD patricia.lucas@bristol.ac.uk

Niamh M Redmond[1], PhD niamh.redmond@bristol.ac.uk

Joe Kai[4], PhD joe.kai@nottingham.ac.uk

Alastair D Hay[1], PhD Alastair.Hay@bristol.ac.uk

Jeremy Horwood[1], PhD j.horwood@bristol.ac.uk

[1] Centre for Academic Primary Care, School of Social and Community Medicine, University of Bristol, BS8 2PS.

[2]Centre for Child & Adolescent Health, School of Social and Community Medicine, University of Bristol, Bristol BS8 2BN.

[3] Centre for Health & Social Care, School of Policy Studies, University of Bristol, 8 Priory Road, Bristol BS8 1TZ

[4] School of Medicine, University of Nottingham, Medical School, Nottingham, NG7 2UH

Corresponding author: Christie Cabral 39 Whatley Road, Bristol BS8 2PS. Tel: 0117 3314569 christie.cabral@bristol.ac.uk

Funding: This research was funded by the Scientific Foundation Board of the Royal College of General Practitioners (grant reference SFB 2012-04).

Word Count:

No. Tables: 3

Abstract [250]

Aim: To understand clinicians and parents perceptions of communications within consultations for respiratory tract infections (RTI) in children and what influence clinician communication had on parents understandings of antibiotic treatment.

Method: We video recorded 60 primary care consultations, for children (3 months to 12 years) presenting with RTI with a cough, in 6 primary care practices in England. We then used purposive sampling to select 27 parents and 13 clinicians for semi-structured video-elicitation interviews. The videos were used as a prompt to investigate participants understanding and views of communication within the consultations. We analysed the interview data thematically.

Results: While clinicians commonly told parents that antibiotics do not treat viruses, this did not have much impact on parents' beliefs about the need to consult or on their antibiotic expectations. Parents believed that antibiotics were needed to treat more severe illnesses, a belief that was supported by the way in which clinicians accompanied viral diagnoses with problem minimising language and antibiotic prescriptions with more problem-oriented language. Antibiotic prescriptions tended to confirm parents' beliefs about what indicated illness severity, which often took into account the wider impact on a child's life. While antimicrobial resistance was poorly understood, most parents held beliefs that supported reduced antibiotic prescribing, although a minority attributed it to resource rationing.

Conclusions: Clinician communication and prescribing behaviour confirms parents' beliefs that antibiotics are needed to treat more severe illnesses. Interventions to reduce antibiotic expectations need to address within consultation communication, prescribing behaviour and lay beliefs.

Key words

Antibiotics, child, parent, respiratory tract infections, communication, treatment

Introduction

Antibiotic resistance presents a major strategic risk to health services; without effective antibiotics mortality rates from infectious illness and surgery would increase markedly.[1] Around 80% of antibiotics are prescribed in primary care, most commonly for respiratory tract infections (RTI).[2] Despite the implementation of a range of initiatives to reduce the use of antibiotics, antibiotic prescribing for coughs and colds (upper RTI) in the UK has been following a trend of gradual increase since 1999.[3] The use of antibiotics is an important driver of antibiotic resistance,[4 5] which has the potential to result in increasing mortality rates from infectious disease.[1]

Patient and parent expectation of antibiotic treatment has been identified as a driver of antibiotic prescribing by clinicians.[6-8] There have been numerous campaigns to increase public awareness regarding appropriate use of antibiotics, many aiming to communicate the message that most RTI are caused by viruses and cannot be treated with antibiotics.[9] However, greater public knowledge does not necessarily lead to reduced consumption of antibiotics.[10]

The communication occurring within the consultation can influence the treatment decision both for and against antibiotic prescription.[11-13] Previous research has found that parents and clinicians can have different understandings of consultations. When parents and their child consult with an RTI, they are often ambivalent about antibiotic treatment but are seeking a medical evaluation and a view from a clinician about what treatment is needed.[14] During the consultation, parents assess the credibility of the diagnosis and sometimes find a viral diagnosis inadequate, often when they feel the clinician has not taken their concerns seriously or when they perceive the severity of the illness is at odds with the diagnosis.[15] Clinicians can assume that most parents want antibiotics[16] and while direct requests are rare, various parental communication behaviours are commonly interpreted by clinicians as indicating a desire for antibiotics.[17 18] No previous studies of RTI in children have interviewed parents and clinicians

about their intentions and understandings with regard to directly observed (rather than reported) communication in the consultation.

We undertook an innovative study that used video recordings of consultations within in-depth follow up interviews with both the clinician and parent involved, in order to examine communication within those consultations. In this paper we report findings based primarily on the thematic analysis of the interviews which describes how clinician communication about antibiotics influences parent understanding and expectation of antibiotic treatment.

Methods

We recruited 6 primary care practices in South West England serving a range of deprived through to affluent areas, using the practice level indices of multiple deprivation (IMD) scores.[19] GPs and prescribing nurses with a range of primary care experience were recruited and a schedule of recruiting days was agreed with each practice. 67 parents of children aged 3 months to 12 years presenting with an acute RTI with a cough were invited to consent to their consultation being videoed; 6 declined and 1 withdrew after the consultation. Children over 5 years had the study explained to them and were asked for assent. Where more than one family member was present, all adults provided written consent.

We video-recorded primary care consultations between May and December 2013. A digital video camera with a wide angle facility was positioned in the consulting room such that all participants (clinician, child, parent and other family members) would be visible. The camera was positioned as discretely as possible at the start of the session and was covered with a cloth while not in use. CC obtained written consent from parents in the waiting room and a message was sent to clinicians to inform them when their next patient was included in the study. Clinicians would start the video recording usually before the parent and child entered the room and would stop the recording at the end of the consultation.

Semi-structured video elicitation interviews [20] were conducted with a purposeful sample of parents. Parents were sampled to capture maximum variation in terms of the level of

deprivation of their home neighbourhood (measured as IMD of home postcode), age of parent and child, and treatment decisions (for example antibiotic or other medication prescribed or no prescription). A separate video elicitation interview was conducted with clinicians who participated in the same consultations as these parents. Interviews were arranged for the earliest possible date (for the participant) after the consultation, in practice this was 2-4 weeks later for parents and 2-12 weeks later for clinicians. The use of the video supported recall and the interviews involved a mixture of "recall, reliving and reflection"[20] with parents being most able to recall the encounter, while clinicians combined some recall of particular encounters with more reflection on their practice in general, as found in other studies using this method.[20] CC conducted the interviews, which lasted between 30 and 60 minutes. Parents and clinicians were shown the consultation video on a laptop and asked to describe their thought processes and feelings at key points. Interview topic guides (appendix 1) explored communication intentions, understanding, underlying beliefs which informed their communication or understanding, and views on effective communication. The topic guides were developed by the authors, informed by previous research, revised during data collection as new topics emerged and were tailored to particular consultations. Interviews with parents took place in the parent's home and interviews with clinicians took place in their consulting rooms. This study was approved by the NHS Ethics Committee Frenchay (ref. 13/SW/0008). A Patient and Public Involvement group of local parents advised on parent facing study materials, recruitment strategy, and reviewed and commented on the findings.

We conducted the analysis in parallel to the collection of data and interviews continued until data saturation was reached.[21] The consultation videos and interview audio recordings were transcribed verbatim and imported into NVivo10 to aid data analysis. We used a thematic analysis approach.[22] One member of the research team (CC) examined the interview transcripts and corresponding transcript of the consultation and identified thematic codes which were grounded primarily in the interview data. Since our aim was to examine views and perceptions of the communication, we used the interview transcripts as the primary data source, while the transcripts of the consultations enabled us to identify the actual form of

words used in a consultation that led to a particular understanding. To enhance analysis and interpretation JH independently coded a sub set (10%) of the interview transcripts purposefully selected by CC to represent a range of cases. The list of codes were then reviewed and discussed with the research team after completion of 42% of the interviews and again after 80% were complete. A consensus was reached about the final list of themes.

Results

In total, 70 adult carers, 74 children and 19 clinicians took part in the 60 videoed consultations. In 9 consultations more than one carer (parents or grandparents) was present and in 13 consultations other children (siblings of the patient) were present, in 2 cases 2 siblings had been brought for medical evaluation to the same consultation. Twenty-seven parents and 13 clinicians took part in the interviews. Parents involved in the video consultation varied in terms of the level of deprivation of their home neighbourhood, education level, ethnicity, and number of children and clinicians varied in terms of their role and level of experience (Table 1). A diverse range of parents were interviewed in relation to home neighbourhood deprivation and representation from a variety of ethnic groups. Cases were also purposefully selected to include different treatment outcomes (Table 1).

Three major themes were identified: 1) Meaning of a viral diagnosis; 2) Meaning of treatment explanations and 3) Parents' perceptions and beliefs regarding antibiotic treatment. Quotes representing the major themes from the interviews, together with the corresponding dialogue from the consultation, are presented in Tables 2 and 3. All names refer to pseudonyms.

1. Meaning of a viral diagnosis

In identifying the illness as having a viral cause, clinicians intended to communicate more than just the diagnosis. They were trying to reassure (Table 2: 2.1) and often accompanied a viral diagnosis with language which minimised the health problem (Table 2:2.1, 2.2, 2.3). Clinicians were sometimes trying to communicate that they were intending to make a no-antibiotic treatment recommendation, either implicitly (Table 2: 2.1) or more explicitly (Table 2: 2.4).

Parents understood that a viral diagnosis carried an implication that antibiotic treatment was not indicated (Table 2: 2.3, 2.4), but whether or not parents were reassured depended on their perception of their child's illness and of the consultation. Where the diagnostic explanation aligned with parent expectations and their concerns were addressed (by the physical examination or explanation), parents were reassured (Table 2: 2.1). However, where this was not the case, parents heard the viral diagnosis as trivialising their child's illness (Table 2: 2.2) or even as meaning the clinician was not going to do anything to help their child (Table 2: 2.3).

2. Meaning of treatment explanations

Clinicians attempted to educate parents not to expect antibiotic treatment for coughs mainly by explaining that antibiotics do not treat viruses (Table 2: 2.3). For parents this is a familiar message but had little impact on their perception of the illness or need for consultation (Table 2: 2.4, 2.5). During the physical examination, clinicians often emphasised that the "chest" or "lungs" were "clear" or free of infection, presenting this as definite observable evidence which supported their conclusion that the illness was viral and no antibiotics were needed (Table 2: 2.2, 2.3). In contrast, when antibiotics were prescribed, these were justified in relation to problematic or potentially worsening symptoms (Table 2: 2.5, 2.6, 2.7). This reinforced the parent's perception that antibiotics were used for more severe illness and that the physical examination differentiated between those that did and didn't need antibiotics (Table 2: 2.4, 2.5).

Antibiotic prescriptions also tended to confirm parents' beliefs about what symptoms indicated the need for antibiotic treatment. When the explanation for an antibiotic prescription was not clear or specific, parents felt this confirmed their beliefs about what indicated severity or need for antibiotics, including beliefs about sleep disruption (Table 2: 2.6) and illness durations of a few days (Table 2: 2.7). Clinicians sometimes justified an antibiotic prescription by the presence of a specific sign, including yellow phlegm (Table 2: 2.6) or fever (Table 2: 2.7), reinforcing parental beliefs that these symptoms warranted antibiotic treatment.

3. Parent's perceptions and beliefs around antibiotic treatment

When parents had an expectation of antibiotic treatment it was because they believed that antibiotics were used to treat more severe illness, not because they believed that antibiotics treated viruses (Table 3: 3.1). The indicators used by parents to identify more severe illness included not just symptoms such as fever but also the degree of impact on the child's life including sleep disruption or missed school (Table 3: 3.2, 3.3). Parents were unsure about interpreting symptoms (Table 3: 3.4) and sought a clinician's opinion. Even when parents had recently had a cough in a sibling diagnosed as viral, they consulted when a new child developed a similar cough and were reassured by the clinician's examination of the chest and pronouncement that the lungs were clear, rather than from the viral diagnosis (Table 2: 2.3).

Parents were aware that the over-use of antibiotics was a problem (Table 3: 3.5). Most parents believed that it was the individual that developed resistance to antibiotics and many also believed antibiotics could hinder the development of a child's 'natural' immune response (Table 3: 3.6). These beliefs supported a no-antibiotic treatment preference because parents believed it was better for their child to fight off the infection themselves (Table 3: 3.7). A minority of parents believed that clinicians were reluctant to prescribe antibiotics due to rationing of NHS resources and felt rationing might be affecting quality of care (Table 3: 3.8 & 3.9).

Discussion

Although clinicians communicated the message that antibiotics do not treat viruses, this had little influence on parental beliefs about when antibiotics were needed. There has been a progressive improvement in public knowledge about antibiotic use over recent years, with the most recent survey in 2011 showing 69% agreed that antibiotics are not an effective treatment for viral infections compared with 57% in 2003.[10 23] However, that knowledge has not led to a change in people's expectations for antibiotic treatment for RTI.[23] Our research offers a possible explanation of this apparent contradiction. The parents in this study believed that antibiotics were needed to treat more severe illnesses, where severity was indicated by particular symptoms and the extent of disruption in their lives. Clinicians offered minimal explanations of the diagnostic decision, perhaps because of their desire for shorter consultations[14], and used language that equated a viral diagnosis with less severe illness. If

these exchanges are common to other conditions and other patients, they may explain why the public accepts that antibiotics do not treat viruses, but have unchanged antibiotic expectations for particular symptoms or particularly disruptive illnesses.

Clinician communication and prescribing behaviour within the consultation and parents' lay beliefs tend to influence each other in a way that could promote over-prescription of antibiotics. Clinicians often use problem minimising language during consultations as part of a pre-emptive move to signal a 'viral' diagnosis.[24 25] If this aligns with a parent's diagnostic expectations (i.e. the parent consulted expecting to be reassured that the illness was a virus rather than something more severe) then parents are relieved, [15] but it could also confirm their belief that antibiotics are used to treat more severe illness. As in previous studies, when antibiotics were prescribed it was given and accepted as a unilateral pronouncement, with little explanation or discussion.[18 26] In addition, antibiotics were sometimes prescribed when current evidence indicates they were not necessarily needed, e.g. for yellow phlegm[27], a practice observed across many countries.[28]

In our study we see how the minimal explanation accompanying antibiotic prescriptions can confirm parents' beliefs about what indicates severity and a need for antibiotics. Most parents are seeking a medical evaluation and defer the treatment decision to the clinician [14] but when they perceive the illness to be more severe, they may have a higher expectation of antibiotic treatment. Perceived expectations for antibiotics can influence clinicians to prescribe,[29] which in turn may reinforce the beliefs that led to the expectation.

The lay belief that it is the body rather than bacteria that become resistant to antibiotics and that antibiotics inhibit the natural immune response has been reported by previous studies.[30-33] However, this is the first study to describe the lay belief that antibiotics are being withheld due to resource rationing. Stories about overwhelming demand for NHS resources and controversies over NHS rationing policies are regularly covered in the media. Although the reasons for restricting antibiotic use are very different, our research may indicate that NHS resource rationing reports are being drawn on by the public to explain the more cautious approach to antibiotic prescription. The implication is that patients are competing for a scare

resource and that only the cases with the most need will receive treatment. Further research is needed to understand how common this belief is and whether it has any impact on antibiotic prescribing.

Strengths and limitations

This is the first time the method of video elicitation,[20] combining video recording of the interaction with interviews with participants, has been used to examine how the within consultation communication impacts on parents' beliefs. Previous studies have either examined communication within the consultation itself [25 34-37] or interviewed participants without an accurate record of what was actually said within the consultation.[15 38] It is possible that participants may have modified their behaviour because they knew they were being videoed, although both parents and clinicians assured us these consultations did not seem different to them. This study recruited parents from a wide range of neighbourhoods and although we deliberately included parents from a wide range of ethnicities (including families from the Black-African and Eastern European communities), very few of Asian ethnicity were recruited. In 5 of the 6 practices, clinicians had no influence over which consultations were recorded since parents were recruited by the researcher before being seen. In one practice all patients requesting same day appointments were triaged and while clinician selection cannot be ruled out, these 10 consultations did not differ from the others in terms of treatment outcomes or communication behaviours observed. Clinicians with a range of different professional training and years of experience were recruited, however as participation in the study was based on an 'opt-in' choice, they may differ from clinicians who did not agree to be videoed. The sample was drawn from a limited geographical area, and as with all qualitative studies, although we achieved data saturation, caution should be exercised in generalising findings.

Conclusion & Implications

Clinician communication and prescribing behaviour within primary care consultations for children with RTIs reinforce parents' belief that antibiotics are indicated for more severe illness. Parents' expectations for antibiotics follow from this belief that severity indicates a need for

antibiotics, not a belief that antibiotics treat viruses. This may in turn influence prescribing decisions within the consultation. This study suggests that within consultation communication aimed at reducing antibiotic expectations would be more effective if it acknowledged that viral illness can be severe (e.g. bronchiolitis or viral pneumonia) and that bacterial infections can be self-limiting.[39] It also suggests that clearer explanations of the symptoms and signs of a child's illness that indicate when antibiotics are, and are not, warranted would help reduce misconceptions. As would reducing antibiotic prescribing practices which are not supported by the evidence base (such as prescribing for yellow phlegm). Interventions to reduce antibiotic prescribing need to address within consultation communication, prescribing behaviour and lay beliefs simultaneously to avoid one undermining the other.

Acknowledgements: We would like to thank all the parents and primary care clinicians who kindly agreed to allow us to film their consultations and to be interviewed and our parent PPI group who advised on study procedures. This research was funded by the Scientific Foundation Board of the Royal College of General Practitioners (grant reference SFB 2012-04).

Competing interests: The authors declare no competing interests.

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Table 1: Interview Sample

Parents	
Home neighbourhood IMD	
(most deprived) 1	7
2	6
3	5
4	6
(most affluent) 5	3
Ethnicity	
White British	17
Mixed	2
Asian	1
Black	6
Eastern European	1
Treatment decision	
Antibiotics	6
Other medication prescribed (inhaler, analgesic, cough medicine)	7
Home care advised	14

Clinicians	
Role	
General Practitioner	9
Nurse Prescriber	3
Physician Assistant	1
Primary Care Experience	
<5yrs	4
5-14 yrs	4
15+ yrs	5
No. Consultations videoed	
1-3	5
4-6	7
10	1

Table 2: Quotes of reflections on within consultation communication

	Excerpts from video of consultations	Excerpts from interview with clinician	Excerpts from interview with parent
2.1	**Consultation #01: Boy 2yrs** C: *Looks like it's a typical virus. And viruses tend to raise our body temperature (...) Our body responds to it because our body wants to cook the virus, um and so it … gives us fever. But sometimes if the temperature is too high it's not exactly right for the brain and er – and that sort of gives sort of like delirium. (…)But as long as the temperature doesn't go too high then that's OK.* P: *Just general fluctuations with the virus then?* C: *Yes, yes*	**Clinician #202: Physician Associate, 3 yrs in Primary Care** C: *That's to reassure the – because a lot of parents come in and say, "I want anti" – in their mind they want antibiotics for their child. They just think that's going to – that's good for the child, and they haven't really thought really whether it is good or not. So talking about 'typical virus' helps reassure them: the fact that it's typical means that it's not unusual and so it's not frightening and it's not at an extreme. (…) You know, it's a typical virus: these come and these go. And the fact that it's a virus, then they understand, and if they don't then I can explain to them, that a virus isn't helped by antibiotics, and it's better to keep antibiotics for when they really need it. So if I use the word 'typical virus' it's for that.*	**Parent #01: Father, WB, SES 3, 2 children: 4m & 2 yrs** P: *it was already what I was expecting really I was just expecting him not to prescribe anything really or say anything I just wanted to give him a check over and make sure there wasn't anything on top of that.*
2.2	**Consultation #30: Boy 8 yrs** C: *The likelihood is that he has one of these winter virus infections, which, erm, have given him such problems over previous winters, er, and that's what's given him, giving him the cough. There's absolutely no sign of anything wrong with his chest, it's, the air is going in and out of his chest fine. There's no wheeze,*	**Clinician #18: GP, 20 years in Primary Care** C: *the reason for saying it's a virus though is slightly different, isn't it? Because saying it's a virus um allows me to say things like there's no treatment for virus infections, there's no um – and that antibiotics don't work against virus infections, but they are simple infections which go away by themselves*	**Parent #30: Mother, British-Asian, SES 1, 3 children: 10, 8 & 4 yrs** P: *I feel he just like, er, any other patient comes in, and most parents complain about this, that, and that and I think they're used to hearing all these things. For them it's just simple thing, it's a viral thing, don't worry about it.*

	and there's no sign of infection in his chest, at all. So the cough really is coming from the… P: *No, sorry.* C: *From high up here, alright? Okay, so, so, roll on… Okay, the cough is coming from in his throat and the back of his nose where the virus infection is.*		
2.3	**Consultation #15: Boy 9 m** C: *So there's no sign of anything on his lungs, and there's no wheeze at all, like last time as well, which is really good.* P: *Yeah*. C: *So lungs sound really clear. Um he's got a little bit of a red throat, he's got a little bit of a gland up there, but his ears look absolutely fine and I think it's most likely to be a viral infection.* P: *Yeah*. C: *And if you're happy with that.* [moves on to address parent's concerns about dehydration]	**Clinician #201: GP, 3 years in Primary Care** R: *Do you have any sense of whether she was accepting? Did you think she was happy about the diagnosis?* C: *Yeah*. R: *Do you think she had any residual concerns?* C: *No*. R: *You felt confident that you'd kind* of answered what she'd come for and ? C: *Yeah*.	**Parent #15:Mother, WB, SES 3, 1 child: 9m** R: *so you've had the, 'it's a virus'.* P: *A thousand times.* R: *A thousand times. What do you understand by that, what does that mean to you?* P: *That means that he's ill and they're not willing to give any antibiotics or anything, because it won't work apparently*. R: *You say apparently, like you're not really sure.* P: *Well, I, because I'm not a doctor I don't know, but I think something surely is better than nothing. If, like, say he's ill and he's been ill for a few days, something has surely got to be better than nothing*
2.4	**Consultation #11: Boy 1 yr** C: *I don't think it's likely to be a chest infection with a bacteria. It's more likely, considering the fact that all the other bits are red up here as well, that it's more likely to be a viral infection that he's got.*	**Clinician #201: GP, 3 years in Primary Care** C: *It's … probably something I regularly explain, because it's a problem we've got nationwide with overprescribing of antibiotics, and patients not understanding the difference between viral infections*	**Parent #11: Mother, WB, SES 5, 1 yr old triplets** P: *you can't kill viral things you've just got to let them, help them with calpol and stuff if they've got a temperature and they've got to kill it off themselves*

	P: *OK.* C: *The problem we've got is that viruses are little small organisms that just can't be killed by an antibiotic: they just escape an antibiotic.* P: *So it's just the Calpol?* C: *The difficulty we've got is we can't kill it with an antibiotic. So I think it's a case of supporting his body through it while he kills it off himself. What I'd recommend is regular doses of Calpol and Ibuprofen.* P: *OK.*	*and bacterial infections. And it's something ingrained in me that every time somebody comes with those sorts of symptoms, whether it be adults or children, it's kind of one of our duties to sort of educate and explain to patients that sometimes these sorts of symptoms are not going to respond to what they think it's going to respond. But having said that, we're not quite sure in her eyes what her concern was, but that's something that I would probably do anyway.*	*because antibiotics is for bacterial isn't it, so antibiotics wouldn't have done anything anyway.* […] R: *Is that a familiar story?* P: *That's always the story, […] because I took Archie last week … [he] sounded really chesty last week, … [but] it wasn't in his lungs it was viral. So yeah...* R: *So … why do you think she's telling you that bit?* P: *To sort of, in case I wanted antibiotics, or thought that antibiotics was going to clear it, she's explained it so obviously I know that antibiotics would be useless anyway so there's no point in having it, because it's pointless.* R: *And how did you know that, where did you know that from?* P: *Just when she checked and said his lungs were clear it was like oh there's nothing bacterial then, she's going to say it's viral then.*
2.5	**Consultation #51: Boy 1 yr** C: *Because he is snotty and the ear drum looks in pain, it's likely to be just part and parcel of the viral infection so as this is day 3 I wouldn't give him antibiotics at the moment but I will give you the prescription. Okay? … I would hope that he turns a corner sort of overnight by tomorrow, and that his*	**Clinician #203: GP, 5 years in Primary Care** C: *Trying to explain an otitis media compared to an ear infection, as opposed to an RTI, like when something would need antibiotics. Erm, I think it is a lot of information to take in and I'm never convinced that they actually understand what I'm saying 'cause even if you try and clarify that. So I mean, in terms of*	**Parent #51: Mother, WB, SES 4, 1 child: 1 yr** R: *Do you think you would be able to tell if he had … the kind of infection that did need antibiotics?* P: *No, I, I wouldn't know what would need it and what wouldn't really.* R: *So you've got to go and see them just to find out?*

	temperature has started to come down. If not, start the antibiotics. P: *From tomorrow?* C: *Yes. The antibiotics aren't trying to get rid of the ear infection any quicker, it's basically trying to prevent any complications from it.*	*talking about where the infection is or even understand by infection. I haven't really don't know that, the answer to that. Erm, but it's me trying to safety net really and justify why they don't need antibiotics straight away* … C: *I think parents quite like that* [delayed antibiotics] *because it takes the worry off them that they don't need to (…) they've got clear guidance about having a temperature and if it's after a certain amount of time, then antibiotics. If not, know it's just gonna get better on its own*	P: *Yeah*. R: *If he had something similar in the future, would you still go and see the doctor to check or will it change what you did?* P: *I think I'd have to go back because, you know, you can't see that it's an infection. … I don't feel confident to know … whether he would need them [antibiotics] or not. … If he had a temperature, I wouldn't know if it was the same thing or not.*
2.6	**Consultation #39: Girl 8 yr** P: *then this morning, when she coughed up loads of phlegm, it was like a yellowy colour.* C: *Oh, was it? The actual phlegm was yellowy? Okay. I think if the phlegm was yellowy, it's probably worth using an antibiotic.* P: *Right, okay.* C: *I can't hear anything rattling around on your chest, which is really good, and the oxygen was really good as well, so that's wonderful.* [child coughs up phlegm and C offers her a paper towel to spit into so she can examine it]	**Clinician #213: GP,** C: *I mean, I think I probably prescribe slightly more often than the standard, I think I'm probably on that end of it. And it's, it's quite an interesting question as to why you do that. (…) however much research you read, I think your own personal experience always has more, (…) you only need one adult who (…) had an appalling bronchial pneumonia, when you didn't prescribe, to, to actually make you probably over prescribe.* C: *if I had chest signs, I would probably give something. But, if they're coughing up something, definitely coloured, and they haven't got much in the*	**Parent #39: Mother, White-British, SES 1, 2 children: 8 & 2 yrs** P: *she had a real bad cough and um it turned out she had a real bad chest infection. (…) so they gave her antibiotics for her, and plus an asthma pump.* R: *And so what was it about her cough that made you know that it was a bad one?* P: *because normally she'll sleep all night: come from about 2 o'clock in the morning she'd be up all night coughing, so that's how I knew.* […]

	C: *do you want to get us a little white towel there? Well, that'll be good. We can have a look at it and see what colour it is. You spit in there. Oh, just a little bit coloured, isn't it?*	*way of nasal symptoms, I might prescribe even, even if their chest is clear.*	P: *Um it weren't till she coughed and then looked at the phlegm that she realised um it was like a yellowy colour.* R: [video continues] *So it's that yellow phlegm that made her decide to use the antibiotics.* P: *Yeah*. […] R: *And what did you understand the diagnosis to be? Because she doesn't actually say.* P: *I just put it down to a chest infection.* R: *So if it's antibiotics then it's got to be chest infection?* P: *Yeah*.
2.7	**Consultation #06: Boy 6 yr** C: *I think he has an infection in his ear. And that might be why he's getting the temperatures and being sick. His chest sounds very clear, so I can't hear any problems on his chest. And I think he must be coughing because of the infection around his throat and his ears.* P: *We tried, we tried to cool him down, the temperature. … it's not going, it's not going away. So he refused to eat and he's just drinking milk and water.*	**Clinician #203: GP, 5 years in Primary Care** C: *I've given mixed signals there by saying it might well speed up the cough. So I've given quite a mixed message there.* […] C: *you don't want them to then be coming back when they have a cough 'cause they got given antibiotics last time when it would've sorted itself out anyway. (…) you know, unless it's getting worse or persisting (…) it's unlikely to be anything worrying that needs antibiotics, so…*	**Parent #06: Father, Black-African, SES 3** R: *And why did you think antibiotic might be appropriate for him?* P: *Because if he's got, he has not getting infection because I kept him at home for four days and that four days, if he's got cold or cough or even a virus it must go away within four days, you know that, if it's not going away within 4 days there is something wrong, he's got infection, on the chest, on the ear or on the throat.* R*: And that infection needs antibiotics.*

	C: *Well I think that will improve with the antibiotics for his ear. (…) If the breathing keeps being a problem, let me know: bring him back. (…) Because I don't think there's anything wrong with his chest, but if he keeps having breathing problems we should look at that again.*		P: *Yes, antibiotics, yeah that's what I know.*

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3 **Table 3: Quotes for Parent's perceptions and beliefs around Antibiotic treatment**

3.1	P: *bronchiolitis for babies is quite bad, and they literally didn't even give him antibiotics, (…) because they turned round and said that he, antibiotics don't work on it. What am I meant to do?* R: *And so you were expecting it to be treated with antibiotics.* P: *Yeah*. **#15:Mother, WB, SES 3, 1 child: 9m**
3.2	P: *It wasn't affecting me badly. But, yeah, I think um night time is quite a good judge of the health of your child, (…) they tend to only wake up if there's a reason – so, you know, if they're fine then they sleep through or, you know, they sleep alright. But if they wake up in the night (…) when you take everything else away, the distractions of the day and everything and whatever is going on, and it's just them, then that's when they notice their discomfort.* **#04: Mother, WB, SES 4, 2 children: 1, 4yrs**
3.3	P: *I wanted to see the doctor or nurse (…) because one week he's no goin' school. (…) he's cough, bad cough, yeah, really bad cough and history my [son] is have chest infection and then I'm afraid that one.* **#59: Mother, WB, SES 1, 4 children: 11m - 11yrs**
3.4	P: *'Cos you don't really know. (…) Trouble is, you don't know what's normal. You don't know how fast he's supposed to breathe or (…) But when you hear him kind of um breathing and he's all like chesty, you don't know what's going on. 'Cos obviously he sounded the same as what Aidan does* [Aiden is sibling who received antibiotics last week] **#35: Mother, WB, SES 3, 4 children: 1-12yrs**
3.5	P: *I think more generally as well, there's lots about antibiotics, isn't there, that we're using too much? And, I don't know, there's a lot in the press now about that we're using too much and it's becoming less effective. I don't want to not have the option of antibiotics in 20 years' time just because everybody took half the bottle.* **#04: Mother, WB, SES 4, 2 children: 1, 4yrs**
3.6	P: *I would rather we try to shift it [infection] ourselves and if we can't then you get antibiotics, but just to give them just like that I don't think that's very good because I don't think it's very good for your immune system.* **#10: Mother, WB, SES4, 2 children: 1 & 6yrs**

3.7	P: *When he checked and he said, "Everything is fine," then I felt he doesn't need antibiotic. Even if he said I'll give it or you want to wait come another day then I would feel "No, why does he need antibiotics?" Because I feel giving kids extra medicine doesn't really help, does it? (…) Like you don't want them to get into all these things. Where if your body can fight it itself, I feel that's more better, 'cause then that means they're strong enough to fight their own sort of sickness, because they said human body is like that.* **Parent #30: Mother, British-Asian, SES 1, 3 children: 10, 8 & 4 yrs**
3.8	R: *do you think they could do something and they're not?* P: *I don't know whether it's just because, do you know what I mean, they're trying to save money because they've given all their drugs out to the older people?(…) Because there are a lot of old people and there are a lot of old people on a lot of different drugs, so if everyone comes in and has to have the same amount of drugs as what, like, say, an older person does, that is a lot of drugs the NHS are giving out. (…) And they're already saying that they haven't got the money for budgets and all that crap.* **Parent #15:Mother, WB, SES 3, 1 child: 9m**
3.9	P: *Sometimes I feel, there are times when I'm thinking, "Why didn't they do that? Is it too expensive? Are they saving money or is it that?" It's so many things that goes behind you back. And you feel you can't get no answers.* **Parent #30: Mother, British-Asian, SES 1, 3 children: 10, 8 & 4 yrs**