Socially responsible antibiotic choices in primary care: a qualitative study of GPs’ decisions to prescribe broad-spectrum and fluoroquinolone antibiotics

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Background. There is considerable variation within and between countries in general medical practitioners’ (GPs’) prescribing of broad-spectrum antibiotics such as fluoroquinolones, and resistance to these agents is increasing worldwide. Urgently promoting cautious fluoroquinolone prescribing in primary care may limit increase in resistance.

Objective. We therefore interviewed 40 GPs in order to explore the reasons for their choice of prescribed antibiotic, in particular their decision to prescribe fluoroquinolones.

Methods. We used a grounded theory approach to data collection and analysis, incorporating purposive and theoretical sampling, based on high and average fluoroquinolone prescribing. Interviews were conducted with 26 GPs from practices known to be high prescribers of fluoroquinolone antibiotics and 14 from average fluoroquinolone prescribing practices.

Results. Chosing to prescribe a broad-spectrum antibiotic such as a fluoroquinolone, rather than a narrow-spectrum antibiotic, related to a number of clinical considerations, perceptions of patient expectations and organizational influences. GPs from high fluoroquinolone prescribing practices were more likely to prioritize patients’ immediate needs, whereas GPs from average prescribing practices were more likely to consider longer term issues. GPs from both high and average fluoroquinolone prescribing practices justified their antibiotic choices on the basis of a desire to do their best for their patients and society.

Conclusion. Choosing to prescribe powerful, broad-spectrum antibiotics such as fluoroquinolones, as well as choosing to keep these agents in reserve, was justified on the basis of social responsibility. Strategies to change fluoroquinolone and broad-spectrum antibiotic prescribing will need to take into account clinicians’ perceptions of social responsibility.

Keywords. Drug resistance, prescribing, qualitative research.

Introduction

The widespread use of broad-spectrum antibiotics contributes to antibiotic resistance which is a major threat to public health.1,2 Up to 80% of all courses of antibiotics are prescribed in primary care and around 50% of these are probably unnecessary.3 Although antibiotic prescribing to ambulatory patients has declined in developed countries,4–6 there are still concerns that broad-spectrum antibiotics are often used inappropriately.4,7,8 and some commentators have argued that broad-spectrum antibiotics should almost never be used in primary care as a first-line agent.9 Ideally, the narrowest spectrum antibiotic most appropriate to the infecting organism should be used, for a range of reasons including antimicrobial resistance, limiting side-effects and cost.10 However, most general medical practitioners (GPs) are faced with having to decide upon therapy before organisms are isolated and sensitivities known.

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Fluoroquinolones are a broad-spectrum and expensive class of antibiotics. During the 1990s in the US, fluoroquinolone use in the community increased from 8% to 16% of all antimicrobial prescriptions and this has been associated with increased antimicrobial resistance to these agents. However, they are relatively infrequently, yet increasingly, used in primary care in the UK and promoting cautious use of these agents in settings such as this may prevent a rapid rise in fluoroquinolone resistance. There is considerable variation in fluoroquinolone prescribing between general practices which cannot be accounted for by variation in practice demographic factors or variation in the incidence of infections.

Previous qualitative research has provided insights into GPs’ decisions whether or not to prescribe antibiotics in primary care, highlighting perceived patient expectation and demand, the influence of the doctor–patient relationship, personal habit, presenting symptoms and previous experience of the consequences of non-prescribing. Other researchers have explored prescribing patterns by conducting detailed studies of how doctors chose drugs in individual cases. However, little is known about why GPs choose to prescribe a particular antibiotic. The study reported here seeks to understand GPs’ ‘choice’ of antibiotic class, in particular the decision to prescribe fluoroquinolones. Deeper understanding of these decisions will be crucial to developing strategies to promote the prudent use of fluoroquinolones and other antibiotic agents that may lose effectiveness through overuse driving resistance.

Methods

We used a qualitative approach as this is best suited to achieving a deep understanding of complex social and psychological processes. Sampling, data collection and data analysis were guided by grounded theory, an inductive method of research, in which theory is built from observations. The approach requires a cyclical process of collecting data, analysing it by the indexing of data to analytical categories, developing an emerging theory and collecting further data to enhance the theory until a point of theoretical saturation is reached when categories are no longer elaborated. The constant comparison of analytical categories and cases is central to this process.

Sampling strategy

We confirmed that there was considerable variation in GPs’ fluoroquinolone prescribing in Wales by examining Prescribing Audit Reports and Catalogues (PARC) data, which provide details of the number and cost of items dispensed in the community, for 513 general practices in Wales for three-quarters in 2002. The mean fluoroquinolone prescribing was 6.6 prescriptions per 1000 patients per quarter. The top 50 practices prescribed a mean of 16.9 prescriptions per 1000 patients per quarter. We decided to focus our research on South East Wales as this area incorporates the majority of the Welsh population and includes a variety of settings such as urban, rural and deprived post-industrial communities. Our sampling strategy fell into two phases. The first phase used purposive sampling which involves the selection of cases on the basis of the researcher’s judgement about who will be the most useful to the research question. GPs from practices which were the highest prescribers of fluoroquinolones were therefore chosen to develop a theory explaining high fluoroquinolone use in primary care. We identified the highest prescribing practices from seven-quarters of PARC data for general practices in South East Wales from 2002 to 2003. We were not able to obtain data for individual prescribers. Starting with the highest prescribing practice, all partners in the practice were invited to be interviewed by letter and accompanying information sheet followed by a telephone call. GPs were told that the purpose of the interview was to explore decision making surrounding antibiotic choice, particularly relating to broad-spectrum fluoroquinolone prescribing. We continued inviting GPs to participate in the study until 26 GPs had been interviewed from 19 practices, the point at which categories became saturated by data from the purposive sample.

The second phase involved theoretical sampling, that is, the selection of cases which serve to confirm or contrast an emerging theory. We approached GPs prescribing fluoroquinolones around the South East Wales mean. Data from this theoretical sample were used to develop our substantive theory and we continued theoretical sampling until our categories were no longer elaborated, which was after 13 practices had been approached and 14 additional interviews had been undertaken.

Data collection and analysis

Qualitative interviews were conducted by two non-clinical researchers (FW and SS) at respondents’ surgeries between July 2004 and April 2005. Written consent was obtained prior to the interview. Questions focused on practice context, prescribing strategy, influences on prescribing choices and views of fluoroquinolones, but GPs were encouraged to raise issues that they felt were important to the issue of antibiotic choice. The interview schedule incorporated questions which explored GPs’ accounts of their general preferences for certain types of antibiotics, but the schedule also included questions which encouraged GPs to think about the circumstances under which their prescribing ‘rules of thumb’ might alter. The final interview topic guide, which underwent iterative revisions during early data analysis, is provided in Box 1. All
Interviews were audio-recorded with the exception of two, where the recording device failed, and two where the GP requested that the interview was not recorded. In these cases, the interviewer made additional, detailed field notes. Recordings were transcribed verbatim. Data were indexed into analytical categories, supported by qualitative data analysis software (NUDIST). Analysis and data collection were conducted in parallel. Reliability of our coding was maintained by 20% of the data being coded by more than one researcher. This enabled us to resolve ambiguities by discussion among the researchers and also to refine the coding frame. This sample was also used to explore GPs’ views of antimicrobial resistance, but here we report on the development of a grounded theory of antibiotic prescribing choice.

Results

Forty interviews were conducted in total: 26 from the purposive sample of high fluoroquinolone prescribing practices and 14 from the theoretical sample of average fluoroquinolone prescribing practices. Table 1 shows the demographic characteristics of GPs who were interviewed.

A total of 83 GPs were approached, representing a response rate of 48%. For high fluoroquinolone prescribing practices, 47 GPs were approached (55% response rate) and for average fluoroquinolone prescribing practices 36 GPs were approached (39% response rate). Table 2 displays the practice sizes and response rates by average and high fluoroquinolone prescribing practices. While the response rates were not high, they are not unusually low for qualitative research involving GPs and reflect the time pressures that restrict GPs participating in research.

Of the total 32 practices approached, nine (four high fluoroquinolone prescribing practices and five average fluoroquinolone prescribing practices) did not yield interviews with any GPs. All GPs were interviewed in six practices (four high fluoroquinolone prescribing practices and two average fluoroquinolone prescribing practices), and over half of the GPs in a further 11 practices (eight high fluoroquinolone prescribing practices and three average fluoroquinolone prescribing practices).

Clinical considerations

Antibiotic choice was often based on the clinical characteristics of the presenting patient including...
co-morbidity, elderly/frail patients and severity of the illness. GPs from high fluoroquinolone prescribing practices were more likely to say they would use a ‘strong’ broad-spectrum antibiotic first line with severely ill or elderly patients or if they wanted to be sure of a good result. Four GPs said they fairly regularly prescribed fluoroquinolones first line. Their justification was that early effective treatment prevents serious decline of the patient:

GP4: A very old person who has got bronchial-pneumonia who has already got congestive failure, you want to use something that you can be sure will hit hard from day one, rather than go through the motions of saying OK we will use a first line thing and give it 3 or 4 days. In 3 or 4 days you might find that failure is 10 times worse and they have got a more established infection. (High fluoroquinolone practice)

The likely infecting organism was also reported as a major influence on which antibiotic to prescribe. However, many GPs felt their ability to select an antibiotic on the basis of the infecting agent was hampered by not having sensitivities available at the point of prescription, and consequently were required to prescribe empirically. Although urine samples were frequently sent to the laboratory, sampling was far less frequent for other infections. Even when samples were sent, GPs felt under pressure to treat the patient immediately both because of patient expectation and their concern that delay would cause deterioration. GPs from high fluoroquinolone prescribing practices were more likely to express how, in such circumstances, they chose a broad-spectrum antibiotic or even a ‘cocktail’ of antibiotics, in order to increase the odds of ‘covering’ possible infecting organisms:

GP14: I think that the problem is that we’re not always certain what the microbe is that’s causing the infection and so choosing an antimicrobial agent that targets that germ specifically is more of a challenge. So for example with respiratory germs, there are atypical germs which may not be covered by standard amoxicillin that other agents may get and so there is a temptation to broaden the antibiotic to try to increase the odds that the antibiotic is going to cover the germs which you’re trying to treat. (High fluoroquinolone practice)

In contrast, GPs from average fluoroquinolone prescribing practices had more faith in the effectiveness of older or narrow-spectrum antibiotics. These GPs were more likely to explain that they would need a very good reason for prescribing a fluoroquinolone (on microbiological advice) and that there were very few organisms which would not respond to penicillin or macrolides:

GP33: And I am fully in favour of listening to the microbiologists and taking their advice. It is their business after all. So yeah, we do try and prescribe narrowly because lets be honest there are very few bugs out there that don’t respond to amoxicillin or erythromycin, really. (Average fluoroquinolone practice)

Awareness and concern about antimicrobial resistance clearly did influence GPs’ choice of antibiotic. Although some GPs from high prescribing practices acknowledged that future resistance to fluoroquinolones could be a problem, most of them justified their current liberal prescribing of fluoroquinolones on the basis of their duty to do the best for ‘the patient in front of them’, frequent treatment failure with narrower spectrum antibiotics, their desire to reduce re-presentations and their concern to prevent costly admissions to hospital which could result in additional problems for the patient and the health service. In comparison, GPs from average fluoroquinolone prescribing practices were more concerned to reserve fluoroquinolones in case of resistance at some point in the future or for those with proven resistance now. Both groups therefore regarded their behaviour as socially responsible:

GP26: Whilst all the studies would suggest that there’s no difference, experience suggests to us or to me, that prescribing broad spectrum you are probably less likely to get treatment failures and less likely to get them coming back. OK treatment resistance is, um, a long term problem, but because it doesn’t hit you with patients coming back after five days no better, then one tends to prioritize it less. (High fluoroquinolone practice)

GP34: I am aware of resistance, potential resistance problems, with obviously broader spectrum antibiotics we are going to cause a problem if we keep using them too much, because we’ll run out of new antibiotics that will cover things. So I am very cautious, I do not give ciprofloxacin without thinking about the resistance element or can I use something simpler first. (Average fluoroquinolone practice)

Some GPs felt that prescribing antibiotics not according to guidelines was justified when they felt that this might be in the best interests of an individual patient. These tended to be GPs from higher prescribing fluoroquinolone practices. They often argued this on the basis that the evidence base for these guidelines was flawed, since clinical trial populations were not like their patients who frequently had greater co-morbidity and worse living conditions:

GP19: In the end, the patient [in front of you] is not the guy in the trial. You have to think that
way … Your duty is to him, not to all the trials, not to all the guidelines from NICE [National Institute of Clinical Excellence] or whoever, in the end your first duty is to them. You could take notice of the trials but in the end you’ve got to consider the patient as an individual. (High fluroquinolone practice)

GPs from high prescribing practices also described how prescribing a broader spectrum antibiotic lessened the need for the patient to re-present due to treatment failure. Coping with extremely busy surgeries and re-presenting patients was a major priority for GPs who stressed that demand from their practice population was particularly high:

GP14: A lot of it is down to the management of uncertainty and, you know, how cautious you are and how careful you want to be and how much you want to help your patients, without them getting worse in the interim period and how much you want to save further appointments, because the patient has to come back as their first treatment hasn’t worked. (High fluroquinolone practice)

Patient preferences
Many GPs explained how fluroquinolones were popular with a range of patients due to the low incidence of side-effects and the twice daily dosing. These factors had obvious benefits for patient compliance, particularly if the patient was elderly and on multiple medications, or a patient the GP believed would not take their medication consistently. Patients expressing preferences for fluroquinolones was particularly stressed by GPs from high fluroquinolone prescribing practices. GPs also experienced difficulties when faced with patients reporting allergies to penicillin and intolerance to macrolides. Even if the reported allergy was not considered to be serious, some GPs were reluctant to risk prescribing antibiotics such as penicillin due to possible repercussions. They then felt that they had little other choice but to prescribe a broad-spectrum antibiotic such as a fluroquinolone:

GP12: I think they’re [fluroquinolones] very well tolerated. And they certainly help compliance with them being either once a day or twice a day. So I think they’re nice drugs because they’re effective with some pretty stubborn bugs and yet they don’t seem to cause that much damage to the person taking them. (High fluroquinolone practice)

P21: I mean anybody can obviously get a reaction to anything, but actually with cipro I haven’t come across any, which is where I found it very useful, when you are getting a bit stuck when they’ve been allergic to this and allergic to that, you know so that’s probably where I have used it more. (High fluroquinolone practice)

Organizational factors
The organizational factors which had the strongest influence on choice of antibiotic were incentives set by Local Health Boards (the Welsh equivalent of Primary Care Trusts), and audit visits from the Local Health Board prescribing advisors which were generally, but not universally, valued. Although cost was an explicit factor for a few GPs, the cost of antibiotics was mentioned by nine GPs in relation to the cost of hospital admissions fluroquinolones might prevent:

GP25: If you have a good antibiotic and you’re rational about it and you’ve got common sense approach to it, then why limit it? I mean if you can save a hospital admission, which is £250 a day, you can save a bed in a winter crisis. (Average fluroquinolone practice)

GPs’ prescribing choices were also influenced by discussions with other GPs at practice meetings or while undertaking training, practice formularies and contact with secondary care physicians. Visits from representatives of pharmaceutical companies were not considered to influence GPs’ choice of antibiotic as it was widely felt that pharmaceutical representatives hardly ever promoted antibiotics these days. Evidence from journals and guidelines were mentioned as influences, although some GPs remained cynical about the possible cost saving incentives behind such guidance.

Views of fluroquinolones
All respondents described fluroquinolones as a very effective antibiotic class due to speed of action and wide spectrum of activity. In addition, they were considered to be safe and well tolerated by patients. Only five GPs discussed serious side-effects associated with fluroquinolones (tendon damage, fits, psychosis). However, only one GP had first hand experience of any of these complications. Ciprofloxacin was by far the most frequently prescribed fluroquinolone. Indeed, many GPs were unaware of other agents within this antibiotic class. While most GPs recognized that they needed to keep broad-spectrum antibiotics in reserve for severely ill patients, the extent to which a GP would maintain this rhetoric varied:

GP1: I have a great faith in them [fluroquinolones] because most of the time I have seen it, it works very well. Especially I have found that they are great for the skin infections and for the UTIs. And for say the chest infection as well.

FW: So they are very effective for a number of conditions?
INTENDED BEHAVIOUR AND DOCTORS' ACTUAL PRESCRIBING

21. Tors choose drugs using hypothetical cases to explore habitual with only a minority submitted to active
previous research has shown that prescribing decisions are habitual with only a minority submitted to active
the perceived best interests of their patients and the health service, and not borne out of ignorance, or irrational prescribing behaviour.

discussion

A grounded theory approach to data collection and analysis incorporating purposive and theoretical sampling revealed that GPs form both high and average fluoroquinolone prescribing practices justified their antibiotic choices on the basis of a desire to do their best for their patients and society. Perceptions of resistance influenced choice of antibiotic for both high and average prescribers. However, while GPs from high prescribing practices were more likely to prescribe fluoroquinolones specifically because of perceived resistance to narrow-spectrum antibiotics, GPs from average fluoroquinolone prescribing practices were more concerned to reserve broad-spectrum antibiotics for the same reasons. Choosing to prescribe a broad rather than a narrow-spectrum antibiotic therefore appears to be related to how the GP views the problem of resistance and their own perceived capacity to deal with short-term treatment failure in the community. Decisions to prescribe or not prescribe a fluoroquinolone antibiotic are therefore the product of negotiating a complex path between guidelines and evidence and the perceived best interests of their patients and the health service, and not borne out of ignorance, or irrational prescribing behaviour.

Several studies have sought to understand how doctors choose drugs using hypothetical cases to explore intended behaviour and doctors' actual prescribing. 21 Previous research has shown that prescribing decisions are habitual with only a minority submitted to active deliberation. 20 In reality, choices may only be made from a limited set of two or three options with which they are familiar. 27 In this study, clinical considerations affecting antibiotic choice included the presenting condition, patient circumstances (particularly vulnerability and chronic ill health), the perceived need to treat the infection quickly and effectively, the likely infecting organism, perceptions of resistance and treatment failure, a duty to give patients a chance to benefit and the likelihood of re-presentation. Patient expectations influencing choice included the GPs' perception of patient preferences and a benign side-effect profile. Patients' expectations may be very different from the expectations that prescribers assume their patients to have. 28 Organizational factors included evidence and discussions with prescribing advisors, the desire to prevent hospital admissions and the influence of partners and practice formularies.

GPs balance providing immediate, effective empirical treatment against problems associated with overuse of a particular antibiotic. GPs from high fluoroquinolone prescribing practices believed that patients at highest risk of complications require strong broad-spectrum antibiotics as a first-line choice. In contrast, GPs from average prescribing practices retained more faith in the effectiveness of 'simpler', narrow-spectrum antibiotics. For GPs from high fluoroquinolone prescribing practices, using broad-spectrum antibiotics that currently have limited resistance was an attractive strategy that may meet the immediate needs of a sick patient. However, optimal prescribing from the perspective of the sick patient (treat with the most effective antibiotic) is not always compatible with optimal prescribing from the perspective of the community (reserve newer agents for specialist to use on the very sickest and for future use). 29 In the absence of clear research evidence supporting the use of narrow-spectrum agents to treat infections in complicated patients in primary care, broad-spectrum agents will probably continue to be used.

Recent qualitative research indicates barriers to physician adherence to prescribing guidelines in secondary care include low perception of the problem of resistance and loss of autonomy. 30 Furthermore, the adoption of new drugs within primary care is more complex than suggested by early theories of drug innovation, 31 and include factors such as drug company information, consultant prescribing and early positive experience of using a new drug. 32 We found that drug company representatives were perceived as less influential on GPs' choice of antibiotic and that GPs were instead influenced by their training and by guidance from the Local Health Board.

Although we aimed to interview as many GPs as possible from the very highest prescribing practices, response rates were not high and only one practitioner from some of these high prescribing practices agreed to be interviewed. These GPs may have not themselves been high prescribers of fluoroquinolones. We were not able to obtain prescribing data at the individual GP level. However, interview data from a close colleague of a higher prescriber was considered to be informative, and GPs were encouraged to reflect on the prescribing within the practice as a whole. Reliability was improved through inter-coder reliability checks, and judgements about applicability of our findings maximized by the participation of practices from urban, post-industrial and rural settings. The validity of using stated preferred prescribing as a measure of actual prescribing may have some problems, but the method has been found to come close to explaining the observed behaviour of doctors. 33 We remained alert to potential discrepancies between reported behaviour and actual practice and repeatedly stressed to respondents that it was not our intention to identify poor prescribing, but rather to understand GPs' decision making. Respondents did not appear defensive when describing their prescribing behaviour, but

GP1: They are very effective. In fact, if I get an infection, I take it myself. (High fluoroquinolone practice)
rather used the interview as an opportunity to express the reality of their busy clinical situations. Theoretical sampling helped us refine our theory, in that we discovered that GPs from both high and average fluoroquinolone prescribing practices argued their choices were socially responsible with high prescribers favouring the current interests of patients and society, and average prescribers emphasizing longer term concerns about resistance. Many qualitative studies claim to use grounded theory but do not use theoretical sampling to refine, elaborate and exhaust conceptual categories.22

GPs from both average and high fluoroquinolone prescribing practices felt they were making reasonable, patient-centred decisions, given the evidence available to them. Strategies to change fluoroquinolone and broad-spectrum antibiotic prescribing will need to take into account clinicians’ perceptions of social responsibility. Clinicians are more likely to adhere to clinical recommendations which are compatible with their values.34 Limiting fluoroquinolone usage will therefore require persuading high prescribers that narrow-spectrum antibiotics are the most responsible choice for their individual patients and for society both for now, and for the future.

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Declaration

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