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Antibiotic prescribing for the future:

exploring the attitudes of trainees in general practice

Abstract

Background
Antibiotic resistance is a public health concern worldwide. A high proportion of antibiotics are prescribed in primary care, often for conditions where there is no evidence of benefit. Without a change in these prescribing patterns, resistance will persist as a significant problem in the future. Little is known about how trainees in general practice perceive and develop their prescribing.

Aim
To explore the attitudes of trainees in general practice towards antibiotic use and resistance, and the perceived influences on their prescribing.

Design and setting
A qualitative study of 17 vocational trainees in general practice (GP registrars) in both rural and urban areas in Australia employing semi-structured interviews and a focus group.

Method
Maximum variation purposive sampling of GP registrars from diverse backgrounds and training stages continued until thematic saturation was achieved. Topics of discussion included awareness of antibiotic resistance, use of evidence-based guidelines, and perceived influences on prescribing. Transcribed interviews were coded independently by two researchers. Data collection and analysis were concurrent and cumulative, using a process of iterative thematic analysis.

Results
Registrars were aware of the importance of evidence-based antibiotic prescribing and the impact of their decisions on resistance. Many expressed a sense of dissonance between their knowledge and behaviours. Contextual influences on their decisions included patient and system factors, diagnostic uncertainty, transitioning from hospital medicine, and the habits of, and relationship with, their supervisor.

Conclusion
Understanding how trainees in general practice perceive and develop antibiotic prescribing habits will enable targeted educational interventions to be designed and implemented at a crucial stage in training, working towards ensuring appropriate antibiotic prescribing in the future.

Keywords
antibacterial agents; drug resistance, general practice; graduate medical education; microbial; physician prescribing patterns.

INTRODUCTION

Antibiotic resistance is an ongoing public health concern, and is linked to the overprescription of antibiotics.[1] Antibiotics are often prescribed in conditions for which there is no evidence of benefit, for example upper respiratory tract infections (URTIs)[2] and acute bronchitis.[3] The bulk of antibiotic prescribing occurs in primary care, with 17.4 million prescriptions written by Australian GPs in 2010 to 2011.[4] To date, educational interventions to improve prescribing in primary care have had limited success.[5,6]

Antibiotic prescribing occurs in a context of professional and social norms that often contribute to overprescription.[7] This 'non-pharmacological' basis of prescribing is well described in the literature.[8] Qualitative studies have demonstrated that clinicians attempt to balance best practice against perceived patient satisfaction.[9] There has been much research into how patient, doctor and system factors influence prescribing,[10] but little attention has been given to trainees in primary care and how their habits develop. Given the volume of antibiotic prescribing occurring in primary care, the influences on registrar prescribing are important to explore, so that targeted educational interventions to encourage rational prescribing can be delivered early in a doctor's career.

This qualitative study aimed to explore GP registrars' perceptions of the influences on their prescribing and their attitudes towards antibiotic use and resistance.

METHOD

The participants in this study were Australian general practice registrars (doctors in vocational training). GP training in Australia is divided into four terms of 6 months' duration. Training is administered by geographically based regional training providers (RTPs), and registrars are placed in private practices under the supervision of an experienced GP trainer in an apprenticeship model.

Participant registrars were enrolled in training in three of 18 RTPs across two of Australia's six states. These RTPs were chosen to allow for a range of urban and rural locations within geographical proximity to the research team. They were recruited by email and newsletter notices distributed by the participating RTPs. Interested registrars contacted the research team directly. Maximum variation sampling aimed to produce a mix of sex, training terms (classified as basic [GPT1&2], and advanced [GPT3&4] terms), those with primary qualifications in Australia and overseas, and based in rural and urban practices.

Data were obtained via focus groups or semi-structured interviews. A choice of focus group or interview was offered to maximise convenience to participants and to allow for data collection from a variety of geographical locations. In addition, it was thought that participants may disclose different information during a peer discussion when compared with an individual interview. Sampling continued until thematic

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How this fits in

Rational use of antibiotics in general practice is important in the fight against resistance. Little is known about how GP trainees perceive and develop antibiotic prescribing habits. This qualitative study of Australian GP trainees explores the influences on their prescribing, and will assist in developing targeted educational interventions for the next generation of prescribers.

saturation (the point at which no new themes are observed in the data) was achieved.

The question schedule for focus groups and interviews followed a theme list drafted by the research team with reference to existing literature[5,7,8,10] and the study aims. The questions focused on URTI and acute bronchitis, as these are indications for which evidence-based guidelines recommend clearly against the use of antibiotics.[11] Discussions were informant-led as much as possible. Data collection and analysis were concurrent and cumulative, using a process of iterative thematic analysis and constant comparison. Results from earlier interviews were used to inform subsequent data collection, as questions were refocused and adapted in response to emerging themes.[12] Specific focus was given to the themes that were particularly relevant to early career doctors in primary care.

Focus groups and interviews were digitally audiorecorded and transcribed. Transcripts were coded independently by two researchers utilising NVivo10. Coded data segments were collated and the relationships between the resultant codes mapped. Differences of researcher perspective were resolved by negotiation and consensus. Reflexivity was inherent in this process through awareness and consideration of the influence of the researchers' professional backgrounds (a GP registrar and a nurse academic).[13]

Ethics

Participation was voluntary. Consent forms were signed by each participant. Focus group participants agreed to keep the content of group discussions confidential. Recordings and transcripts were de-identified.

RESULTS

One focus group with three participants was facilitated by the primary investigator. Semi-structured interviews were conducted by the primary investigator with the remaining participants by telephone. Thematic saturation was achieved at a total of 17 participants (Table 1).

Themes emerging from the data are presented here. These have been grouped to outline registrar attitudes to antibiotic prescribing, their understanding of resistance, and the interaction of these attitudes with the use of guidelines. Themes related to the discrepancy between these attitudes and their clinical practice are then explored. To understand the reasons for this discrepancy, factors that impact on the prescribing decisions are described, including patient and system factors, with particular reference to those factors specific to early career doctors in training. These include diagnostic uncertainty, the transition from hospital medicine, and the relationship with a supervisor.

Attitudes to antibiotic prescribing in respiratory tract infections

Registrars described seeing patients with acute presentations seemingly more often than their supervisors who have an established patient base. All registrars had experience of, and many had been challenged by, negotiating antibiotic prescribing decisions. Registrars were aware that antibiotics were not indicated for URTI and acute bronchitis, yet still prescribed them for a variety of reasons. Comments of '*giving in*', or similar phrases, were common. Many registrars expressed a view that prescribing an antibiotic was taking '*the easy way out*

Table 1. Participant demographics

Participant number	Sex	GP training term	Practice location	Overseas trained
1	F	1	Urban	No
2	F	2	Rural	Yes
3	F	2	Urban	No
4	F	2	Urban	No
5	M	2	Rural	Yes
6	F	3	Rural	No
7	F	3	Urban	No
8	F	3	Urban	No
9	F	3	Rural	No
10	F	3	Rural	No
11	F	3	Urban	No
12	F	3	Rural	Yes
13	F	3	Rural	No
14	F	4	Urban	No
15	F	4	Rural	No
16	M	4	Urban	Yes
17	M	4	Rural	No

or being lazy, and that it took more effort to explain to a patient why antibiotics were not required than to write a prescription. Consequently, some cited being too busy or tiredness as reasons for prescribing. Combative language ('*talking the patient out of it*', '*you're in for a fight*') was used in relation to discussions with patients who had requested antibiotics.

Many registrars acknowledged the potential adverse consequences of overprescription of antibiotics. The link to increasing resistance was often a consideration in their prescribing decisions. Some registrars, however, believed this was mitigated by some specific antibiotics being '*useless*' (and thus it not being problematic to contribute to their resistance patterns):

'I guess I probably tend to think "oh look it's just amoxicillin". Like, amoxicillin is not useful for anything anyway. You know, you're not going to be using that in intensive care to treat people with multiple resistant things. Is it really going to do you that much harm just to give this patient a bit of amoxicillin?' (Registrar 14)

Understanding of antibiotic resistance and attitudes towards guidelines

Registrars described frequent use of the Therapeutic Guidelines (Australian evidence-based guidelines for prescribers) when prescribing antibiotics. The Guidelines were considered easy to access and use, and helpful in guiding and justifying prescribing decisions to patients:

'It's nice to have something that's easy for the patient to understand. You can just flick it up and show them that look, here are the guidelines that we are supposed to use, it's evidence based, and that [antibiotics are] *really not going to make much difference.'* (Registrar 7)

Registrars also described the guidelines as providing '*reassurance*' that their treatment course was appropriate:

'If you treat a patient as per the guidelines, even if the treatment fails we have a definite ground to stand on and I think that is more safe rather than choosing something else outside the guidelines.' (Registrar 2)

This dependence on an external source seemed to be used as a way to deal with uncertainty regarding diagnosis and treatment, and some registrars expressed a desire for '*more guidelines*':

'You just get so overwhelmed with the breadth and depth of what you have to know that you just want a protocol, with some parameters.' (Registrar 17)

Guidelines were considered useful to '*keep abreast of changes*' and maintain up-to-date treatment information. Failure to use guidelines was considered suboptimal practice by many. Although guidelines do not recommend the use of antibiotics, registrars still choose to prescribe for a variety of reasons. Using a rationale drawn from the treatment of other infections, prescribing first-line, narrow-spectrum antibiotics was the way in which many registrars considered resistance as they prescribed:

'I'd be using the first ones [antibiotics] *first. Because I'm aware that if you kind of go to the big guns first you're not going to have anything left.'* (Registrar 15)

Registrars recognised the relationship between inappropriate prescribing and antibiotic resistance, understanding their role as a steward over resources:

'One of my responsibilities is to not hand out too many antibiotics so that we have this problem of widespread resistance.' (Registrar 4)

Yet many registrars described a dissonance between their attitudes to guidelines and their prescribing behaviours, producing dissatisfaction with their own prescribing:

'I just don't want to be contributing to the over-prescribing of antibiotics for viral URTIs that will clear on their own. I just don't want to perpetuate it, but I do.' (Registrar 3)

'There's probably been times where I've given them the script and kind of felt a bit disappointed in myself afterwards.' (Registrar 14)

Discrepancy between attitudes and practice

Throughout the interviews, many registrars expressed a lack of certainty about the 'soundness' of their thinking regarding this topic. Most were able to identify flaws in their rationalisation of prescribing inconsistent with clinical indications or not in accordance with guidelines. For example, a registrar described a practice he had adopted and then reflected that he was not sure of his own reasoning:

'I guess you could say it's not best practice but I'll give them something like roxithromycin … rather than giving them the common amoxicillin because I think it's been used too widely now … I don't know how true that is though.' (Registrar 16)

Patient and system factors

Registrars were able to identify a variety of clinical and contextual factors that influenced their prescribing. Patient demographics (age, comorbidities, smoking) and clinical signs and symptoms (fever, productive cough, duration of illness, focal chest signs) were generally cited as key features they considered in their prescribing. Access to follow-up, geographical remoteness, and local disease patterns also influenced prescribing. Many registrars were concerned about patient safety and avoiding subsequent hospital presentations:

'I tend to probably cover things a bit more because…if something goes wrong I want to make sure that the patient is going to be safe.' (Registrar 9)

Registrars recognised the complexity of the factors influencing their prescribing, noting the patient and system factors that influence their decisions:

'General practice medicine is never just they come in, they have a fever, they must be treated. It's so-and-so doesn't have a lot of money who's kind of saved up for the appointment … They've taken time out of their busy schedule to come and see you, they've had to wait an hour and a half because you were running late … it's all those other things and they've come in saying 'all I need is my antibiotic script.' (Registrar 15)

Registrar factors: diagnostic uncertainty

In the early stages of training, registrars described struggling with concerns about a lack of clinical and diagnostic experience leading to more antibiotic prescribing:

'I think early on I was really hesitant about it and I probably shouldn't be giving antibiotics here but they look sick and they always get them. Whereas now I think I'm a lot more confident to say, no, you don't need antibiotics.' (Registrar 8)

This quote reflects two commonly mentioned concerns: first, a lack of confidence that a correct diagnosis has been made, and secondly that the patient has been given antibiotics in the past for similar presentations, thus the registrar questions their clinical acumen in the current situation. Another registrar described an interaction with her supervisor whom she had asked for advice regarding a diagnosis, and then was uncomfortable with their suggestion to prescribe an antibiotic:

'I think in the back of my mind "I don't know everything, maybe they've seen something like this before and it has been bacterial." I guess I'm just assuming that they have some kind of clinical knowledge that I don't.' (Registrar 9)

Diagnostic uncertainty led to a tendency to 'play it safe' (that is, prescribe an antibiotic), but with time and more confidence in their decision-making skills came less antibiotic prescribing. Learning communication skills and confidence to build therapeutic relationships was perceived to improve also:

'I think initially I was probably a lot less confident to say to patients no, and I think now it's become a lot easier because I'm not afraid that they're going to hate me and never come back.' (Registrar 9)

Transition to general practice

Registrars often come directly from the hospital system (where they had routinely prescribed antibiotics for respiratory infections) into primary care, and most described a period of adjustment as they became familiar with common presentations:

'The presentations I'm seeing in general practice are definitely not anything like I've seen in hospital.' (Registrar 1)

'I did a respiratory term in hospital and the majority of people who ended up in hospital end up on antibiotics…when I first started I was a little bit more likely to give antibiotics coming out of that sort of situation.' (Registrar 8)

Registrars found that experience, discussions with supervisors, and use of guidelines were helpful to adjust to the new context:

'I checked other people's prescription method. Also I followed the patient and then I realised what was the best option for the patient.' (Registrar 5)

Previous experience of seeing resistance in hospital patients, or experience of the impact of resistance when working in other countries was an important factor for many

registrars in desiring not to overprescribe antibiotics:

'[In] *my country, we have a higher antibiotic resistance ... So I choose some different kind of antibiotics for here. Still lower incidence so I don't want to prescribe antibiotics if I can avoid it.*' (Registrar 5)

'I did do an elective overseas ... so I have seen a culture that has been able to buy amoxicillin over the counter and developed complete resistance to it, to the point where nobody found any benefit from it anymore over there ... that does shape the way I prescribe for basic upper respiratory tract infections and things, that I won't just hand it out for every patient that comes along because I've seen the effects of it being so widely used.' (Registrar 4)

Most registrars said that their opinions about antibiotic use were formed prior to entering GP training, but that despite being aware of the impact on resistance they still experienced challenges prescribing rationally.

Supervisor influence on prescribing

A clear theme was the influence of the supervisor on registrar prescribing. Supervisors facilitated evidence-based prescribing by providing a good precedent and prescribing culture in their practices, and encouraging this in their registrars by formal and informal teaching and role-modelling:

'*The place where I am now they're quite ... up to date-they're quite assiduous about ongoing learning and that sort of thing-supervisors, principals, and everybody.*' (Registrar 6)

'Initially you didn't know how to argue with a patient and then you just give in and give antibiotics. Then after having a chat with my supervisor, he said you could try doing it this way, and that seems to work quite well.' (Registrar 16)

Barriers to evidence-based prescribing included role-modelling outdated practices, or setting a precedent of prescribing that created patient expectations and pressure on the registrar:

'I do know one supervisor in particular will give his patients antibiotics even for something that sounds very viral, and therefore when I see his patients, I feel I'm expected to do that as well, because his patients have been seeing him for many years. So they expect it too, so I'm definitely more likely to give his patients antibiotics even when I don't think it's justified.' (Registrar 10)

Some registrars described feeling undermined or criticised by their supervisors for their prescribing decisions. For some registrars, there are concerns that they need to '*do what they're told*' or fit in to a particular practice culture to prevent conflict and ensure career progression:

'GP registrars have been sent emails to say that they should prescribe antibiotics, because that's what patients expect, but that's coming down from the older generations.' (Registrar 10)

'It's a big power differential... You're still at the mercy of the training provider coming and doing visits, and your supervisor giving input on if you do what you're told or not.' (Registrar 17)

The relationship with the supervisor was a powerful dynamic described by many registrars. Trust and respect for a particular supervisor is recognised by registrars as an important factor in their prescribing decisions:

'... where they [the registrar] *really like the supervisor, really respect them, and just do whatever they do and don't think for themselves.'* (Registrar 17)

'*The supervisor has been practising for at least 30 years and is very experienced. So when he tells me something I usually believe it.*' (Registrar 1)

DISCUSSION

Summary

Registrars are aware of the importance of evidence-based antibiotic prescribing and the potential impact of their decisions on antibiotic resistance. They hold generally positive attitudes to the use of guidelines; however, it was noted that the context of prescribing influenced their decisions, including patient and system factors, diagnostic uncertainty, transitioning from hospital medicine to primary care, and the habits of, and relationship with, their supervisor. Some registrars expressed frustration or disappointment with the way these factors created barriers to evidence-based prescribing of antibiotics.

Strengths and limitations

This qualitative study fills an important

gap in the literature surrounding antibiotic prescribing by early career doctors. The study design allowed exploration of themes relevant to this group. Although the recruitment to focus groups was less than anticipated, no large differences were observed between the themes emerging from peer discussion and individual interviews. Purposive sampling ensured that a range of registrars were represented, including those in regional areas and those trained outside Australia. This diversity in the sample is similar to that of Australian GP trainees more generally.[14]

A GP registrar was the primary investigator, possibly making registrars more comfortable to share their thoughts with a colleague at a similar career stage. Socially desirable responding is a potential limitation, however. Coming from a background similar to the participants made reflexivity essential, and the involvement of a qualitative researcher from a different health discipline in the data analysis was a strength of this approach.

Comparison with existing literature

In many registrars' descriptions there appears to be a sense of dissonance between theory and practice; what the registrar thinks they 'ought' to do, and what they actually do. This 'balancing' of scientific and practical considerations, including their relationship with the patient, colleagues, and society, and the impact of diagnostic uncertainty has been demonstrated in other studies of established GPs.[15] Registrars describe feeling disappointed in themselves for prescribing contrary to their ideals. The impact of these decisions on a prescriber's self-perception, and the variety of coping strategies that are employed have been explored in other studies.[16] Rationalising their choices and persisting in misconceptions about antibiotics are some of the 'strategies' seen in this sample. Underlying some decisions are knowledge deficits. At an early career stage, as habits are being formed, there may be greater potential for effective educational intervention.

Registrars are generally positive towards the use of guidelines. They may not, however, be following them for the variety of reasons already outlined.

The present results are similar to those of other studies of antibiotic prescribing, which describe patient and health system factors as the extrinsic factors involved in most doctors' prescribing decisions. Fear (of possible complications) and complacency (fulfilling perceived patient expectations) are commonly reported intrinsic attitudes of doctors that contribute to overprescribing.[10,17] The results of this study demonstrate similar pressures and attitudes to be perceived by registrars. In the context of lack of clinical experience for many registrars, these factors may be enhanced, contributing to increased antibiotic prescribing.

Supervisor behaviour also impacts on this process. Some registrars see their supervisors prescribing contrary to guidelines, and find this a challenging dynamic to negotiate, mainly because of a differential of power and experience between registrar and supervisor. This tension between 'experience and evidence' and managing the complexities of relating within a hierarchical medical culture are a common experience for the doctor in training.[18–20]

Similarly, qualitative studies of hospital trainees report that prescribing is influenced by the habits of senior supervising clinicians, who are the 'opinion leaders' as to how and when to deviate from guidelines.[21] Less experienced doctors may prescribe more appropriately according to guidelines,[22] but develop behaviours[23] and prescribing habits similar to their supervisors as training progresses.[22,24]

Implications for research and practice

Early career doctors are at a stage where future prescribing habits may be influenced. Individual clinician prescribing habits, rather than clinical presentation, have been shown to best predict antibiotic prescription,[25] and these habits tend to remain stable over time.[26] Given that trainees come to resemble their supervisors, the problem of antibiotic overprescription will not decrease in the future without intervention.

Educational interventions focused on overcoming some of the common barriers described by registrars in this study might include: appropriate use of antibiotics and use of guidelines; training in communication skills and responding to patient expectations;[27,28] managing relationships in hierarchical teams; education for supervisors on facilitating evidence-based medicine; and the translation of evidence into the practice of everyday prescribing decisions.

This study adds important insights into how early career doctors think about prescribing, and the influences on their habits, enabling more targeted educational interventions to be designed and implemented at a crucial stage in training. Improving the prescribing habits of the next generation of GP trainees will contribute, via less antibiotic resistance, to greater therapeutic options for infectious diseases in the future.

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Ethical approval

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Provenance

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Competing interests

The authors have declared no competing interests.

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