

Understanding dentists' antibiotic prescribing behaviour in Spain: a focus group study

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Background: Dentists are responsible for 10% of all antibiotic prescriptions. It is estimated that, in certain situations, up to 80% of antibiotic prescriptions in dentistry may be inappropriate. The aim of this study was to explore Spanish dentists' attitudes, perceptions, and contextual factors influencing antibiotic use and misuse in clinical practice.

Methods: From July to December 2022, we conducted focus groups with 31 dentists from Spain. Data were analysed using thematic analysis with a pragmatic orientation to address the research objectives. Inclusion criteria required participants to be dentistry graduates or oral medicine specialists (stomatologists) and actively working as dentists. The sample was selected through key informants and the snowball method. We ensured methodological quality by adhering to the COREQ checklist.

Results: We formed seven synchronous online focus groups with 31 participants. Dentists acknowledged the problem of antibiotic resistance, identifying fear, working conditions and burnout and patient trust as factors contributing to inappropriate prescribing. Despite this awareness, dentists did not see themselves as key agents of change in combating antibiotic resistance. However, they expressed interest in further education on the topic.

Conclusions: These findings underscore the need for educational interventions that highlight dentists' role in antimicrobial stewardship. By situating these interventions within the One Health framework, dentists can be empowered to translate their leadership in oral health into active participation in the prudent use of antibiotics. Strengthening this role has practical implications for multidisciplinary strategies to combat antimicrobial resistance.

Introduction

Antimicrobial resistance is currently one of the greatest threats to world health, food security and development.^{1,2} Since 2015, the World Health Organization (WHO) has led to the Global Action Plan on Antimicrobial Resistance, which aims to promote coordinated strategies and actions that would resolve this problem.^{3,4} One of its main strategic objectives is to reduce the inappropriate prescription and use, while fostering responsible prescribing practices of assured quality.^{5,6}

Spain is one of the European countries with the highest levels of antibiotic use, reporting 23.22 defined daily doses per 1000

inhabitants in 2022.⁷ Dentists remain a relatively understudied group, with most research focusing on primary care physicians and veterinary surgeons.^{8,9} The limited evidence available on dentists in Spain suggests that antibiotic prescribing may be inappropriate in more than 28.6% of cases, depending on the clinical situation.¹⁰

Despite the limited indications for antibiotics in dental care,^{11,12} an estimated that 80% of dentist prescriptions do not meet established accuracy standards.¹³ Furthermore, some research indicates that dentists themselves acknowledge prescribing antibiotics more frequently than clinically required, often as a precautionary measure.^{14,15}

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Given their high prescribing rates and direct accessibility to the population, dentists occupy a key position to influence antibiotic stewardship. Understanding the factors that drive antibiotic prescribing in dentistry, as well as dentists' perceptions of their role and the barriers they face in promoting rational use, is therefore essential. Accordingly, the aim of this study was to explore Spanish dentists' attitudes, perceptions, and contextual factors influencing antibiotic use and misuse in clinical practice.

Methods

Setting

The study was conducted in Spain, where dental care is provided by the National Health System (NHS) and private dental clinics. The NHS covers oral surgery and pharmacological treatment for infections or inflammatory conditions of the oral cavity in adults, while most other services are provided privately. Dentistry is a regulated profession requiring a degree in dentistry or certification in stomatology, and antibiotics are dispensed exclusively by prescription in pharmacies.

Study design

A qualitative study was conducted using focus groups (FG) to explore dentists' attitudes and perceptions regarding antibiotic prescribing. This approach would allow for an in-depth and contextualized grasp of the factors that influence the prescribing of antibiotics in this setting.^{16–18}

The reporting of this study was guided by the COREQ checklist, which provided a structured framework for transparent and comprehensive reporting.¹⁹

Selection, sample and procedures

Participants were purposively recruited to achieve maximum variation across regions, urban/rural areas, public/private sectors, years of experience, and practice types. Recruitment proceeded via professional chat groups (WhatsApp/Telegram) reached through key informants and via targeted email invitations to dentists from previous studies¹⁰ who had consented to be recontacted, thereby capturing less-connected voices.

All FG were conducted online via Microsoft Teams between June and December 2022, lasting ~60 min. Sessions were recorded with participants' consent. To minimize dominance and social desirability, moderators used round-robin turns, directed turn-taking with light timekeeping, neutral/non-leading prompts, targeted invitations to quieter participants, and explicit invitations to disconfirming views; brief summaries were used to verify understanding and elicit divergent perspectives. Inclusion criteria were: (i) being a qualified dentist or specialist in stomatology, and (ii) actively practicing dentistry at the time of the study. No participant received any remuneration for taking part.

A discussion guide was developed based on a literature review and previous research with other health professionals,^{17,20–26} and was piloted prior to data collection. Transcripts were anonymized (participants coded by gender and groups by number, e.g. FG1, FG2), manually transcribed by one researcher, and reviewed by another to ensure accuracy.

Data collection continued until thematic saturation—assessed at both the domain and theme levels—was reached, that is, when no new categories or relevant information emerged in subsequent FG; no further groups were scheduled once this point was attained.²⁷

Both moderators (one dentist and one public-health physician) had formal training in qualitative methods and no prior personal or professional relationships with participants. We acknowledged our team's commitment to prudent antibiotic use and managed potential influence through reflexive bracketing/memos, a non-leading interview guide, immediate debriefings and consensus meetings with non-moderating

researchers, an audit trail of coding decisions, and the active search for disconfirming/negative cases.

Data analysis

Data were analysed using thematic analysis with a pragmatic orientation aligned to the study aim. All data management and analysis were conducted in Spanish. After the manuscript was drafted and illustrative quotations were selected for reporting, these excerpts were translated into English by a professional native English translator with full access to the complete Spanish materials. Two bilingual investigators independently cross-checked each translation against the original text; discrepancies were resolved by consensus, and targeted back-translation was used when necessary to ensure semantic equivalence. To enhance credibility, results were shared with participants for feedback ('member checking').

Ethical aspects

The study was evaluated and approved by the University of Santiago de Compostela-Lugo Bioethics Committee (reference USC32/2021, June 18, 2021).

Results

Characteristics of participants

From July to December 2022, seven FG were conducted, each comprising 3 to 6 participants, totalling 31 individuals. Among these, 23 were women, 19 worked in the private sector, and participants had a mean work experience of 19.86 years (SD 7.5) (Table 1) only one individual missed their scheduled session due to conflicting commitments. Key factors and attitudes identified during the discussions are summarized in Table 2, and verbatim extracts are presented in Table 3.

Lack of training and confidence in antibiotic prescribing

Participants highlighted a lack of academic training and insufficient continuing education opportunities. This was evident even among the most experienced professionals (Quotes 1, 2). The dentists reported lack of confidence when it came to prescribing

Table 1. Characteristics of focus groups

Focus Group	Sex F:M	Date	Experience mean (DS) ^a	Scope (num) ^b
1	2:0	20/06/22	18 (8.5)	Private (2) Public(1)
2	4:1	21/06/22	20 (8.3)	Private(4) Public (2)
3	4:2	04/07/22	18.9 (8.2)	Private (4) Public(3)
4	3:0	05/07/22	25.3 (3.2)	Private(1) Public(2)
5	2:3	09/12/22	14 (8.8)	Private(5) University(1)
6	4:1	12/12/22	19.8 (6.6)	Private(5) Public(1)
7	3:2	12/12/22	23 (2.5)	Private(1) Public(3) University(1)

F, Female; M, Male.

^aYears of professional experience.

^bNumber of participants working in the private sector, public sector, university, or multiple sectors. A participant may be involved in more than one sector.

Table 2. Coding of identified attitudes and perceptions

Attitudes/Perceptions	Definition
Confidence	Prescription of antibiotics due to the risk/comorbidities or social background factors presented by the patient
Fear	Prescription of antibiotics due to ignorance/doubts about the patient's treatments
	Prescription of antibiotics due to fear of: Complications in the patient's pathology Medico-legal complications
Complacency	Prescription of antibiotics is based on the healthcare professional's perception of fulfilling patient expectations, even when these expectations are not explicitly expressed. This is driven by a desire to satisfy the patient without a direct financial motive.
Economic Benefit	Prescription of antibiotics motivated by the potential for financial gain, such as retaining the patient, improving the reputation of the practice, or avoiding conflict that could lead to a loss of business
Health professional-patient relationship	Interaction between a patient and their healthcare professional to provide effective healthcare
Need to postpone the dental procedure	Prescription of antibiotics to delay treatment due to external factors, such as scheduling constraints or the patient's personal circumstances (e.g. time to accept the procedure, vacations).
Working condition/Burnout	Circumstances surrounding the work environment of healthcare professionals, including workload, schedules, resources, physical environment, and organizational support, which can lead to professional exhaustion and reduced commitment to patient care
Own responsibility	Considers that dentists play an important role in the development of resistance
Responsibility of others	Considers other professionals as responsible for the problem, or not a sufficiently high amount of prescriptions to be regarded as a problem of their own.
Interested	Interest in updates
	Interest in population education strategies
Optimism	Considers that the situation will improve favorably in the future due to the reduction in consumption

antibiotics, especially in situations that lay outside their routine practice or in cases where they did not have access to the patient's clinical history (Quotes 3, 4). Furthermore, the participants in three FG expressed uncertainty about the treatment of patients who were receiving biological medications or monoclonal antibodies, because they did not know whether this might affect the need to prescribe antibiotics (Quote 5).

Fear of consequences

Dentists in 5FG acknowledged prescribing antibiotics for fear of an unfavourable clinical course, and because of the medical-legal consequences in the event of not prescribing an antibiotic where required (Quotes 6, 7). Even this action was justified by perceiving unnecessary antibiotics as 'not contraindicated,' thereby distinguishing between an antibiotic being not indicated (because it is not clinically required) and being contraindicated (because its use could cause harm). (Quote 8).

Patient expectations and complacency

Another factor influencing antibiotic prescribing was complacency in attempting to meet patients' expectations. Dentists reported feeling pressured by their patients in the surgery, particularly as patients increasingly demand immediate solutions and attribute this efficacy to antibiotics, while emphasizing the importance of empathy in these interactions (Quotes 9–11). However, a disconfirming perspective emerged from a paediatric dentist, who reported rarely prescribing antibiotics except in severe cases, citing concerns about antimicrobial resistance and

noting that small abscesses often resolve through procedures such as tooth extraction or proper pulpectomy (Quote 12). This illustrates that not all dentists experience patient pressure in the same way and highlights variability in prescribing practices.

Economic benefits

They contended that this could sometimes affect their reputation and, thus, have an impact on their economic benefits in the event of losing discontented patients, particularly in the private sector. We did not capture verbatim statements explicitly rejecting any economic influence on prescribing. Nonetheless, participants differentiated practice organization and patient management between public and private settings without linking these differences to financial motives (Quotes 13, 14).

Health professional-patient relationship

One FG, however, identified the loss of these types of patients positively, since it reflected the poor professional-patient relationship generated from the very first visit, and the patient's lack of trust in and adherence to professional advice. (Quote 15).

Scheduling constraints

On the other hand, dentists in 5 FG reported that inappropriate prescribing was occasionally required due to the need to postpone the treatment or dental procedure, whether because of the patient's insistence or because of a lack of time in the health professional's timetable (Quotes 16–17).

Table 3. Quotes from the focus groups

Item	Quote number	Focus group-Gender Quote
Lack of training and confidence	Q1	FG1-F2: <i>I feel that, specifically in dentistry [as regards antibiotics], there's little updating.</i>
	Q2	FG7-M1: <i>Often, we don't have terribly clear protocols when it comes to indicating antibiotics. There are times when one is in two minds, even in cases where there's pain.</i>
	Q3	FG2-F4: <i>Having access to the [patient's] history helps a lot.</i>
	Q4	FG3-F1: <i>You give an 'amoxi' (amoxicillin) 500 mg and clavulanate combination and you sort of think... well... lets' see if it works... and if it doesn't, well, call me back in two days' time and maybe I'll increase your dose a little...</i>
	Q5	FG7-F3: <i>Yes, with all these immunobiological treatments you find yourself in a kind of limbo: it's like, so what do we do?, will they lower his defences?, could it complicate things?, should we give him an antibiotic already before doing the extraction? [...] Sometimes the person is in perfect condition, and so, what should I do? what shouldn't I do?, and then, all of a sudden,...you give him an antibiotic, just in case...</i>
Fear of cosequences	Q6	FG3-F3: <i>I think we sometimes prescribe out of fear, that's to say, we've got it perfectly straight in our minds and the associations say: 'Antibiotics: the fewest possible, for the shortest time possible.' But even so, we tell ourselves: what if he's in pain? and if he calls me on Monday?... So, we know that one shouldn't prescribe antibiotics but we ourselves say, oh ok, just in case.</i>
	Q7	FG4-F3: <i>I also think that there there's no doubt that more antibiotics are given than are necessary. But yes, the fact of not wanting to have problems at a health level, or legal problems, does perhaps have an influence.</i>
	Q8	FG3-F3: <i>Sometimes we prescribe antibiotics without any need, a little for our own comfort, to be on the safe side... I don't know. Admittedly, the prescription of an antibiotic is not always necessary... but then neither is it contraindicated.</i>
Patient Expectations and Complacency	Q9	FG5-F2: <i>I think we often feel a little pressured by the patient when it comes to prescribing an antibiotic. It's as though, if you didn't give him an antibiotic it might seem you weren't paying him any attention, ...so it's partly our fault for feeling pressured in this regard.</i>
	Q10	FG1-F2: <i>Sometimes I have no option -depending on which mothers [are involved]- I tell them, well fine, okay take it (the antibiotic)... because I know that they're very apprehensive or at some point are having doubts about whether you're doing the right thing, and so, for their peace of mind.</i>
	Q11	FG3-F1: <i>Basically you have to confront the patient, and we are in no position to confront patients ... so it comes to...What do you want? An antibiotic? Ok, fine</i>
	Q12	FG1-M1: <i>I work mainly with children, and unless I see a severe abscess, I do not prescribe antibiotics due to concerns about resistance. In many cases, small abscesses resolve simply with tooth extraction or a proper pulpectomy, so I do not see the need for antibiotics</i>
Economic benefit	Q13	FG1-M1: <i>Yes it does happen. It goes something like...'That woman, for heaven's sake! ... and I had to go to another doctor who gave me an antibiotic. The second one was obviously right. Imagine refusing to give me antibiotics with what I've got!...'</i>
	Q14	FG3-M1: <i>In the private sector we have to 'pamper' the patient more, (...). You're hearing patients outside in the waiting room because they're starting to build up. So, there comes a point when you say: look, there must be an infection, take an antibiotic for a few days, and tomorrow or the day after we'll try again. Sure, it is an abuse of an antibiotic, but it's something that we in the private sector sometimes have to resort to ...just because it IS private, simple as that.</i>
Health professional-patient relationship	Q15	FG4-F3: <i>Patients used to trust in your judgement and follow your advice, and if they didn't... they left and never came back. It was, well, a way of screening patients. If it was the first time a patient had come to you, for something trivial like a canker sore or something similar, and you didn't want to give him antibiotics and he wanted antibiotics, well it was a way of 'getting rid of a patient' who wasn't going to trust you.</i>
Need to postpone the dental procedure	Q16	FG4-F1: <i>I'll take this, the pain will go, and then, well I'll wait a little bit longer to have the treatment which is very expensive.</i>
	Q17	FG1-F2: <i>Because you've got a lot of patients, which is what usually happens, on one afternoon you've got 15 patients and you've got to do 15 extractions, and you're already doing too much... there comes a point when you prescribe an antibiotic because you just can't handle your appointments schedule.</i>

Continued

Table 3. *Continued*

Item	Quote number	Focus group-Gender Quote
Burnout	Q18	FG3-M2: <i>Yes, I worked for just over 20 years in the private sector, but I attended emergency cases and 12/10 minutes. I got fed up and walked out half an hour later...</i>
	Q19	FG5-M1: <i>I'm convinced that professionals are fully aware that not everything that's prescribed should be given (antibiotics). One thing that is completely clear, however, is that, with the years, this convenience, this rush to attend to people, this 'don't mess me around anymore' [gets to you].</i>
Perceptions on clinical practice	Q20	FG5-M2: <i>Obviously, I imagine that resistance will begin to become more visible in the hospital setting with systemic infections, which is where they'll start being noticed, rather than at a dental level.</i>
	Q21	FG4-F3: <i>Certainly there are antibiotics that are more potent than others, more effective, but no... I don't note (that resistance may affect clinical practice). I see that the first-choice antibiotics which I prescribe, generally do the job, for the dental problems that I get to see...</i>
Internal responsibility	Q22	FG3-F3: <i>I feel that we dentists have indeed abused antibiotics, and I don't know whether they are also being abused nowadays because, increasingly... very often, in root canal work antibiotics should not be given, but they are sometimes abused and too many are prescribed. And I think that, to some degree, we still tend to overmedicate.</i>
Responsibility of others	Q23	FG3-M2: <i>I'd put another question to you: do we [really] prescribe so many antibiotics? Because -just think about it- we're talking about specific cases...</i>
	Q24	FG5-M3: <i>They've gone through emergencies and been given the message, listen I've got toothache and they've told him, well take an antibiotic and go to the dentist right away. ... I think we've all seen, experienced or been through that.</i>
	Q25	FG1-F1: <i>But if I have to substitute for someone and then make another appointment, and I know that this person insists that before taking anything out, he wants to give the patient an antibiotic, well I respect the guideline in that respect... more than anything else, because if the patient turns up and is then told, ah you didn't take it, so I'm not going to do the extraction.</i>
Interested	Q26	FG5-M2: <i>Training and updating, yes indeed, being clear about the indications. And that requires reforming the professional who often doesn't make the right diagnosis and so doesn't give the right treatment.</i>
Awareness	Q27	FG6-F2: <i>I feel that it's important to educate patients because many patients are convinced that without antibiotics, they can't be treated.</i>
Optimism	Q28	FG3-F1: <i>We treat a lot of infectious conditions and prescribe antibiotics, and I feel that we've prescribed many (antibiotics) throughout the history of dentistry, but I think we tend to prescribe fewer and fewer antibiotics, or at least that's my perception...</i>

In 7 FG, the lack of time in the appointments schedule was identified as poor working conditions and a reason for burnout of healthcare workers, especially in the public sector and among professionals with more years of clinical experience, who evinced a lack of interest in or apathy towards a change in the established routine (Quote 18). This shortage of time was also cited as a reason for complacency when faced with the demand for antibiotics by patients (Quote 19).

Perceptions of antibiotic resistance

In 4 of the 7 FG, the participants stated that the problem of antibiotic resistance did not affect their routine practice or arose only in exceptional situations (Quotes 20, 21). In all the groups, the dentists expressed worry about the advance of antimicrobial resistance as a global concern, and in more than half, highlighted the importance of the dental fraternity's role as part of the change in the culture of antibiotic use (Quote 22).

Nonetheless, three groups questioned the importance of their fraternity's role in the development of such resistance (Quote 23).

At all events, all the groups identified physicians and the general population as being those responsible for having the greatest involvement in this problem, thus pointing to external responsibility. Moreover, they emphasized that this issue was particularly pronounced on weekends when dental clinics were closed, leading patients to seek care from emergency services or primary care physicians. They noted that when a primary care physician or emergency doctor prescribed an antibiotic, the dentist often refrained from canceling the prescription, even if they believed the antibiotic was unnecessary (Quotes 24–25).

Education and guidelines

There was generalized agreement by all groups on the interest that attached to being updated and the need for common and accessible guidelines which brought theory into line with clinical practice (Quote 26). Furthermore, all the groups agreed on the importance of education on this topic at a general and professional level, and the need for well-designed awareness campaigns (Quote 27).

Optimism about the trend

Despite the shortcomings identified, they nevertheless displayed great optimism about the issue, since they felt that the trend in antibiotic use was steadily decreasing (Quote 28).

Discussion

To our knowledge, this is the first FG study on antibiotic use conducted on dentists in Spain. Our results indicate that dentists are aware of inappropriate prescribing practices, and that some of the factors underlying such misuse are complacency, fear, the need to postpone the dental procedure, and poor working conditions. Yet, even though professionals are considered to be fundamental in strategies pursued to slow the advance of resistance, not all perceive the problem as a threat to their daily work in the surgery.

Some of our findings pertaining to complacency, fear and external responsibility are in line with those obtained for physicians and pharmacists in the same setting,^{28,29} and insofar as complacency is concerned, it was also observed in other studies carried out on dentists.^{14,21} This latter factor has been linked to the economic benefits which are inherently sought in any business, and in private dental clinics in particular.^{10,21} This creates a unique dynamic in the private dental sector, where patient demand and the need to maintain loyalty can influence clinical decisions, including antibiotic prescribing.²⁹ Yet, one participant of our FG offer a new perspective, since losing a patient who exerts pressure and does not trust professional advice was identified as beneficial for ensuring a solid professional-patient relationship from the very first visit. In this respect, numerous studies stress the importance of a good professional-patient relationship for preventing patient pressure, something confirmed by the patients themselves in studies conducted on the general population.³⁰

Fear of a poor clinical outcome and the ensuing medical-legal consequences is another of the factors identified in this study. Clinical decision-support systems and/or clinical practice guidelines and clear official protocols on which professionals can rely, even in the event of a potential claim, could benefit dentists by reducing fear, since these tools have already shown their effectiveness in previous studies conducted on physicians and pharmacists.²⁸

Factors related with healthcare organization were also identified in our study. Moreover, among dentists the rise in prescriptions was linked to the need to postpone the dental procedure,¹⁶ a phenomenon that, while previously reported,¹⁵ was confirmed in our FG. Notably, this pattern appears to differ from other healthcare professionals such as physicians²⁸ and pharmacists,²⁹ highlighting a unique contextual factor in dental practice that may influence prescribing behaviours.

A few participants suggested that heavy workload may contribute to burnout. Although this theme emerged only from a small number of dentists, it is consistent with literature indicating that burnout can affect healthcare professionals' ability to provide high-quality care and may lead to suboptimal prescribing.³¹ These observations suggest that strategies to mitigate burnout among dentists could potentially improve patient interactions and support more appropriate antibiotic prescribing, though further research is needed to confirm this effect.^{32,33}

Dentists of our study acknowledge that the lack of updating could lead to problems of confidence in their prescribing in given situations, especially in the case of the emergence of new treatments such as immunosuppressor drugs. Dentists' uncertainty is based on the fact that the existing scientific evidence about these drugs indicates that one of the most worrying side effects of currently used immunosuppressor drugs is the increase in the overall risk of infections.^{34,35} As these results have not been previously identified in other studies undertaken on dentists, they might well be taken into account when designing specific prescription courses with new content. Dentist education is one way of addressing uncertainty in prescribing. In addition, decision-support tools, such as online prescribing guides or applications, can also be beneficial. Studies indicate that these tools can stimulate greater compliance with antibiotic guidelines, ensuring more informed prescribing decisions.³⁶ Including this type of content has proved successful in other fields of medicine, such as the prescription of vaccines by reference to the date of administration of immunosuppressor drugs.³⁷

Then again, the dentists in our study, despite identifying the advance of resistance as a serious problem, did not perceive that it might directly affect their daily clinical practice. This is reflected in the fact that dentists point to the medical fraternity as responsible for inappropriate antibiotic use, and highlight the need for health education to be given to the general public. At the same time, some participants conveyed a certain optimism, noting that antibiotic prescribing in dentistry is gradually decreasing, which they interpreted as a positive sign of growing professional awareness. While encouraging, this perception may also contribute to underestimating the need for dentists to assume a more proactive role in stewardship initiatives.^{28,29}

The individualistic perceptions of the dentists in these FG is in contrast to international strategies as the core elements of antibiotics stewardship,⁵ which point to health professionals as being the agents of change and mouthpieces of health education that the population needs and professionals demand. Yet, the dentists who took part in our FG do not define and identify themselves as educators and actors of the required cultural change in antibiotic use.³⁸ This could be explained by the fact that most of the national plans and strategies for prudent use of antibiotics are designed to incentivize a reduction in prescribing and support responsible use, as outlined in the latest OECD report,^{9,39} but fail to confer on professionals the fundamental role of dentists in delivering comprehensive oral care, ensuring that antibiotics are used only when absolutely necessary.³⁸

Implications and future research

One possible framework that could be explored in future research is Game theory,⁴⁰ which may help understand dentists' perceptions regarding antibiotic use. It illustrates how individual decisions are influenced by the actions and expectations of others within a healthcare system. Dentists may perceive antibiotic overprescription as a collective problem rather than an individual failing, which underscores the need for a coordinated approach, such as One Health.⁴¹ This perspective suggests that without systemic changes, individual practices may not effectively reduce antibiotic resistance, as each dentist may hesitate to alter their prescribing habits if they believe others will not do the same.

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