What factors influence the provision of preventive care by general dental practitioners?

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IN BRIEF

- To inform the reader of the factors that influence a general dental practitioner to offer preventive care to patients.
- To provide a model of how dental practices come to be oriented towards either preventive or restorative care.
- To highlight the resources that dentists require for providing leadership towards preventive care.

RESEARCH

Background What factors influence a general dental practitioner to offer preventive care to patients? A potential answer to this question is presented based on the findings of a qualitative study recently undertaken in general dental practice in Australia. **Method** A model of how practices come to be oriented towards preventive or restorative care is described, condensing all of the findings of the study into a single framework. Eight practices were studied and highlighted the interaction between two factors: leadership in practice and prioritisation of cultural, social and economic resources. **Results** In this model, dentists' leadership to reorient the prioritisation of resources towards preventive care was crucial. Ideally a whole practice changed to preventive philosophy, but change was also possible in a single dentist within a practice. Prioritisation of resources was also key and interacted with dentist leadership. Prioritisation could be seen in the reorganisation of space, routines and fee schedules. During this process, one key support factor for dentists was their external networks of trusted peers and respected practicing dentists. These peers were crucial for transferring preventive knowledge within small networks of dentists who trusted one another; their influence was reportedly more important than centrally produced guidelines or academic advice. In order to help dentists change their practices towards preventive care, the findings from our study suggest that it is important to intervene in these local networks by identifying local dental opinion leaders. During this study, the key conditions needed for practices to reorient to preventive care included the presence of a committed leader with a prevention-supportive peer network, and the reorientation of space, routines and fee schedules to support preventive practice.

INTRODUCTION

This study was built on a previous randomised controlled trial (RCT) undertaken in private general dental practices in New South Wales (NSW), Australia.[1] Intervention practices in the RCT were provided with evidence-based preventive protocols to offer a less invasive approach to the treatment of dental caries.[2] The protocols advised dentists to systematically apply preventive techniques to prevent new dental caries and to arrest the early stages of dental caries, thereby reducing the need for restorative care. The protocols focused on primary prevention of new dental caries (via tooth brushing with high concentration fluoride toothpaste and dietary advice) and intensive secondary prevention through professional treatment to arrest dental caries progress (applying fluoride varnish and monitoring the success of tooth brushing by recording the levels of dental plaque on the teeth).[2] Dentists, members of the dental team and patients from the practices involved in the RCT were invited to participate in this qualitative study.

The context of this study: general dental practices in Australia

This study was conducted in Australia where more than 80% of dentists work in private general dental practices.[3] General dentists provide the majority of care and dental hygienists are employed in only a minority of practices.[3,4] The majority of dentists are independent self-employed practitioners; they own their practices and lead their dental team.

The problem: dentists' management of dental caries

The restorative approach to dealing with all forms of dental caries is common practice for general dental practitioners worldwide, despite the plethora of evidence that a non-operative preventive approach should be the first clinical option when dealing with early carious lesions.[5–10] The scale of the information gap between science and practice can be demonstrated by the findings from surveys in different countries. Evidence from surveys of dentists in Australia and overseas suggests that restorative care has been the dominant approach used to manage the initial stages of dental caries, which could have been controlled with preventive non-operative care.[11–14]

What does preventive dental care mean to dentists?

A recent review in the *British Dental Journal* (*BDJ*) concluded that 'there is a lack of evidence relating to dentists' perceptions of prevention and its application in practice'.[15] The author suggested that qualitative research was needed to explore the 'meaning of prevention' and

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its 'application' in dental practice.[15] This article responds to this suggestion by consolidating the findings of a grounded theory study completed in general dental practices in Australia.[16,17] All grounded theory studies aim to produce an overall explanation that brings all of the analysis together.

This paper presents that overall explanation; which is more abstract than the other empirical papers published out of this study because it brings the entire context together into a single explanatory framework. A model is presented explaining how practices came to be oriented towards either preventive or restorative care. This model demonstrates an interaction between two key factors:

1. Dentists' leadership
2. Prioritisation of the cultural, social and economic resources available within practices towards prevention.

Suggestions are made of some conditions that are necessary for dentists to provide leadership toward preventive care.

METHODS

A previous paper has described the sampling, data collection, analysis and interpretation in detail.[16] During the study, Charmaz's grounded theory methodology[18] was employed to examine the social process of adopting preventive dental care in dental practices. Charmaz's methodology suggests a systematic set of procedures to study and understand social processes, actions and interactions between individuals.[18] Accordingly, this study was interested in what it meant to dentists to practice preventive dentistry; how it felt to adopt new routines; what happened during the process and how people interacted while adopting preventive care.

Research questions

Grounded theory studies begin with open questions: researchers begin by assuming that they may know little about the meanings that drive the actions of their participants.[18] Accordingly, research questions asked were open and focused on social processes. The initial research questions were:

- What was the process of implementing (or not-implementing) the preventive protocols (from the perspective of dentists, members of the dental team, and patients)?
- How did this process vary?

Sampling strategy

All qualitative research starts with purposive sampling: sampling the participants best placed to answer the research questions. In grounded theory this is followed by theoretical sampling, in which constant analysis of the data guides further sampling decisions.[18] Participants in the previous RCT were invited, by letter, to participate in this qualitative study. Eight dental practices agreed to participate (Table 1).

Sample of dentists and practice staff

During the previous RCT, the numbers of decayed, missing and filled teeth (DMFT) were monitored over time. Interviews began with participants from Dental Practice 1, where substantial DMFT reductions were achieved in the RCT, providing the best possible access to the process of successfully implementing the protocols.[16] After the analysis of the initial interviews, participants from Dental Practice 2 were theoretically sampled. In this practice the uptake of the preventive protocols had been very limited according to data from the RCT trial.[16] This strategy allowed comparisons between two practices in which outcomes had been different and considered to be a proxy for the degree to which the preventive protocols had been implemented. After analysing interviews from Dental Practice 2, participants from another six practices were recruited. This included two intervention practices that had achieved moderate DMFT reductions, for comparison with Dental Practices 1 and 2. It soon became apparent that some practices had followed, or continued to follow, other preventive protocols. In these practices, the interviewees compared their experiences in implementing the preventive protocols provided during the RCT with those of other protocols. Thus, professionals from four control practices in the RCT were sampled to examine the process of adopting preventive methods in general.

Sample of patients

Two dental practices (Dental Practice 1 and 2), which had offered the preventive care program during the previous RCT, consented to send letters of invitation to participate in this study to their patients. These participants were purposively selected based on their clinically measured risk of developing dental caries: some whose risk status had decreased, some whose risk status had increased and some whose risk status had stayed the same over the previous RCT study were selected. This purposive sampling allowed comparisons between dental care experiences of participants with different clinical outcomes. After analysing the first round of interview data from Dental Practice 1, participants from Dental Practice 2 were interviewed. This allowed comparisons between patients in a practice where the preventive protocols were successfully implemented and those who were treated in a practice where the program had been less successful.

Interviews

All participants were interviewed for approximately one hour in locations convenient to them such as dental practices, community centres or homes. Some preferred to be interviewed over the phone, when the same format was used as for face-to-face interviews. Sturges and Hanrahan have reported that telephone interviews give the same in-depth data as face-to-face interviews.[19] Semi-structured interviews based on the research questions were digitally recorded and professionally transcribed in detail. Transcripts were checked against the recordings.

The interview process was designed to gain an in-depth understanding of each dentist and practice staff's experience of adopting prevention in their practices. Participants were encouraged to talk at length, to tell their story of using protocols or of learning to work preventively and to explain what this process meant to them. For example, all interviews started with an invitation to describe a 'typical day' in the practice and then progressed with specific questions about participants' experiences of implementing protocols such as:

1. '*How easily were you able to implement preventive protocols in this practice?*'
2. '*What did this implementation process entail?*'[16]

Table 1 Characteristics of participants (n = 40)

Site	Participants	Previous RCT group
Dental Practice 1	1 dentist, 2 dental hygienists	intervention
	5 dental assistants, 1 practice manager, 12 patients	
Dental Practice 2	3 dentists	intervention
	4 dental assistants, 1 practice manager, 5 patients	
Dental Practice 3	1 dentist	control
Dental Practice 4	1 dentist	control
Dental Practice 5	1 dentist	control
Dental Practice 6	1 dentist	control
Dental Practice 7	1 dentist	intervention
Dental Practice 8	1 dentist	intervention

Participants from the control practices were asked similar questions about preventive protocols or guidelines they had applied. Patients were asked about their experience of dental care, what dental care and preventive care meant to them in general, how and why they did or did not adopt the prescribed preventive care and how this was influenced by their social context.[16] As the study progressed, the understanding about how protocols were adopted began to consolidate and a theoretical framework was developed to explain the process. New interview questions were added to further investigate insights developed during the analysis of transcripts from earlier interviews.[16] All dentists were interviewed more than once which contributed to the refinement of theoretical concepts.

Data analysis

Coding and the constant comparative method instead of comparison method

Charmaz's iteration[18] of the constant comparative method was used during the data analysis. This involved coding of interview transcripts, detailed memo-writing and drawing diagrams. The transcripts were analysed as soon as possible after each round of interviews in each dental practice. Coding was conducted primarily by the author, supported by team meetings and discussions when researchers compared their interpretations.

Coding occurred in stages. In initial coding, as many ideas as possible were generated inductively from early data. In Charmaz's form of grounded theory, codes take the form of gerunds (verbs ending in 'ing') which emphasises actions and processes. In focused coding, a selected set of central codes were pursued throughout the entire dataset and the study. This required decisions about which initial codes were most prevalent or important and which contributed most to the analysis. In theoretical coding, the final categories were refined and related to one another.[18]

Memo-writing

The primary analyst wrote extensive memos, which documented the development of the codes, what they meant, how they varied, and how they related to the raw data (transcripts). Two types of memos were written: case-based and conceptual memos.[16] Case-based memos were written after each interview, containing the interviewer's impressions about the participants' experiences and the interviewer's reactions. Memos were also used systematically to question some of our pre-existing ideas in relation to what had been said in the interview. Conceptual memos, on the other hand, were a form of:

1. Making sense of initial codes
2. Examining participants' meanings
3. Understanding processes, including when they occurred and changed and what their consequences were.

In these memos, data were compared in order to find similarities and differences. Ideas were systematically indexed in memos. This process raised new questions, which were investigated in continuing interviews.

Consolidating and interpreting all findings

After the writing of previous papers had ceased, I went back and I reviewed interviews, memos, field notes and diagrams used during data analysis. It was clear that there were important elements within dental practices that interacted to allow the adaptation to preventive care to occur. Those elements provided an overall explanation about the factors that influence the provision of preventive care by general dental practitioners. Dentists and dental team members described two key elements shaping adaptation to evidence-based preventive care: leadership in practices, and prioritisation of a practice's cultural, social and economic resources. The distinction between cultural, economic and social resources was drawn from Bourdieu.[20]

Sample size and saturation

Sample size in qualitative studies is determined by reaching a complete understanding of the problem being studied – referred to as saturation – and not by statistical power considerations.[18,21] Saturation is determined by the data analyst. When new interviews became repetitive with prior interviews and central concepts were fully understood, the analyst determined that saturation was reached.[21] In this study, data from the last three participants interviewed (three dentists) confirmed findings rather than adding new concepts. Therefore data collection ceased. In total, 40 participants, ranging in age from 18 to 65-years-old, participated in the interview process (Table 1).

Ethics approval for the study was obtained from the Human Research Ethics Committee at the University of Sydney.

FINDINGS

In their interviews, dentists and the dental teams talked about adapting to evidence-based preventive care in the complex social environments of general dental practices. Patients reported different experiences of dental care in different practices. During data collection and analysis, differences between dental practices were observed. Some practices had a structured preventive approach in place (either the preventive protocols from the RCT or other protocols) while others had not.

At the 'structured preventive practices' dentists performed caries risk assessment for all patients, following some kind of preventive protocol and offering a mix of preventive products to patients. A preventive philosophy of care was the basis of the practice and a restoration was rarely placed if patients had bleeding gums or active caries lesions. On the other hand, at the 'restorative practices' dentists did not perform caries risk assessment and there were not preventive protocols in place. Preventive care was offered by chance without systematically considering patients' real need for it. Patients with irregular patterns of attendance, who might have benefited from preventive care, were offered restorations. Regular patients were offered applications of topical fluoride at every visit because they were used to it.

How can we explain the orientation towards preventive or restorative care in different dental practices?

When dentists and their teams changed their practices in line with the preventive protocols from the RCT or another preventive protocol, they did not follow protocols slavishly. Rather, they adapted protocols to incorporate them into their established practice management systems. Dentists and the dental teams described two key elements shaping adaptation to evidence-based preventive care: leadership in practices and prioritisation of a practice's cultural, social and economic resources.

The first key element was the dentists' leadership of other members of the dental team. In the beginning of this study, I had no preconceived idea about the role of leadership in the provision of preventive dental care. However, practice staff and patients talked about dentists' leadership a lot during interviews. Dental assistants, practice managers, dental hygienists and patients described a dentist who was the leader of their practice: the dentist-in-charge. This dentist was seen by all as 'the bonding agent': someone who was crucial for the practice to remain the great place it was, someone who inspired practice staff and patients and deserved their respect.

'*I think my dentist is a pretty good manager who gets things sorted out very well in here. My dentist is someone you truly learn to respect. From what I have seen in this practice I think that my dentist was born to lead these people.*' – Patient, Dental Practice 1.

To lead a practice, dentists had to be highly skilled clinicians, respected and trusted by their dental team. Leading a dental practice involved communicating ideas in an effective and precise manner to all staff, building relationships with all staff members and providing solutions for daily practical problems as they arose. Some dentists excelled in building relationships of trust and respect, which produced fruitful interactions with staff and patients.

'*The dentist-in-charge of this practice is very good to take new things on board and we do what we are told. We are all comfortable to tell the dentist-in-charge if we think it is not working [sic].*' – Dental assistant, Dental Practice 1.

'*To me it is a constant thing of trying to do it better; to deliver a better treatment for the patient and to make it a better environment for the staff. And my belief is that the day you do not want to make it better for the staff and you do not want to make it better for patients is the day you stop working as a dentist.*' – Dentist-in-charge, Dental Practice 1.

However, dentists also had to have effective leadership in terms of prioritising the allocation of different kinds of resources within practices. Intuitively, one might imagine that practices with more resources might be better able to change to implement preventive care. However, in this study all of the participating practices were well resourced. The most significant issue was not the possession of resources, but their prioritisation towards prevention. Prioritising resources towards prevention was not a simple task as it involved cultural, social and economic elements.[20]

Cultural resources were those elements that defined the dentists' identities within a social setting: who they were, what they did, what they trusted and what credentials they had. In this study, dentists defined who they were by describing their long-standing behaviours, attitudes, beliefs and dispositions. For example, many saw themselves as being 'dental surgeons' and 'performing surgery', that is intervening mechanically to repair and restore oral function. For 'performing surgery', dentists needed to possess particular goods which were present in all practices – namely state-of-the-art instruments, materials and equipment for providing the best possible dental care.

All dentists shared common training or credentials and this was for the most part focused on restorative care. This meant that they lacked established systems for practicing evidence-based preventive care. Two implicit 'rules' were also shared by all dentists and underpinned continued restorative treatment. They believed that some patients were too 'unreliable' to benefit from prevention and only tangible restorative treatment offered 'value for money', which would satisfy their patients.[16]

'*We just do not make the appointment anymore for those patients who just do not care; we just leave it up to them. We stress why it is important but they just do not even turn up to the appointment so we are not going to waste our time on unreliable people. So they come in when they need treatment, which is usually restorative.*' – Dentist-in-charge, Dental Practice 8.

'*Some patients may not want preventive when you mention using fluoride, duraphat varnish. It all takes time, and they may not want that if they are not getting anything back from their health fund.*' – Dentist-in-charge, Dental Practice 2.

Dentists also shared cultural norms and values about evidence. In particular, they valued results seen in their patients' mouths as important evidence and trusted this more than academic research.[17]

'*A lot of my evidence is based on my clinical experience and on what I have seen in my patients' mouths and feel will work on that particular patient.*' – Dentist-in-charge, Dental Practice 1.

'*I probably trust my own clinical experience more than anything, because, after all you keep doing something that is not working, you are going to stop, aren't you? My own clinical experience is what I trust the vast majority of the time.*' – Dentist-in-charge, Dental Practice 7.

Social resources were defined as a network of individuals whom dentists trusted and connected with. Dentists invested time and effort in establishing these relationships. There were networks inside and outside of dental practices. The internal network of a dental practice was made up of members of the dental team, clinical and

non-clinical working staff. External networks, in contrast, were a social resource for the individual dentist, not directly integrated with daily practice activities and the dental team. Dentists who were members of a professional society or association benefited from networking and exchanging valuable information with other members during meetings and social events. They also participated in less formal activities to establish networks and exchange information with peers, such as internet forums about dental products and techniques, study groups, and continuing education courses. For example, all individual dentists had a personal network of trusted peers and key opinion leaders. Members of these networks were practicing dentists. The dentists in this study said that non-clinical dental academics were not legitimate social resources, as they did not share their clinical experiences or understand the challenges of general practice.[17]

'*I and six other dentists meet and talk about patients' cases and I get to see what clearly has worked or not worked in my patients and what other dentists have done. And that all becomes part of my evidence base or my inherent knowledge of what I will do in practice.*' – Dentist-in-charge, Dental Practice 1.

Economic resources were defined as dental services exchanged for money. In the privatised landscape of Australian dentistry, dentists felt they were under constant pressure to remain financially viable – a predictable income and patient flow were critical resources to be protected.

'*A problem has been having to spend more time talking about disease prevention, I think, because traditionally we have seen that as non-productive time and I tend not to charge for that.*' – Dentist-in-charge, Dental Practice 4.

How did leadership and resources interact to explain adaptation to preventive care?

The interaction of leadership and resources was investigated by building a four quadrant model based on the contrasting circumstances that were observed across the eight practices participating in the study (Fig. 1).

The model shows four scenarios, which will be explained further below. First, it was observed that all participating dentists

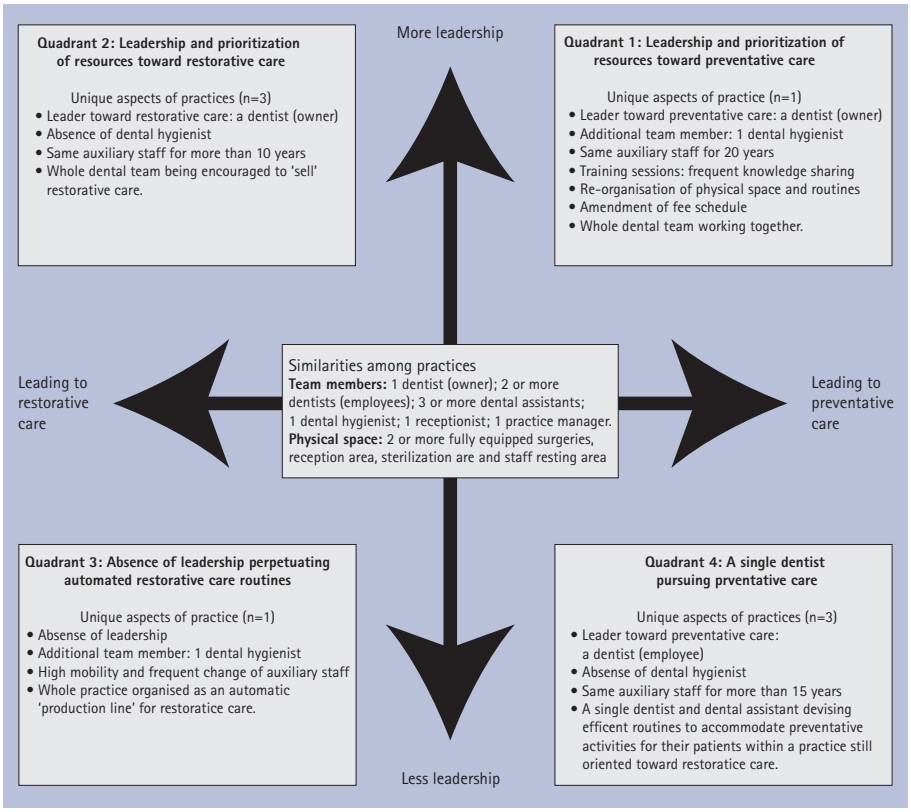

Fig. 1 The four quadrant model

talked about themselves as 'being preventively-oriented' as they 'put patients first' and educated them about their mouths, the role of saliva, life style (diet, smoking, alcohol consumption and exercise), oral hygiene and the use of preventive products. Avoiding the unnecessary removal of tooth structure during a restorative procedure was also part of their conceptualisation of a preventively-oriented dentist. However, although most participants talked about themselves as being 'preventively-oriented', actual practice varied widely. This variation is reflected in the differences identified for each of the four case-scenarios presented in Figure 1.

Explaining differences between dental practices

Figure 1 shows four hybrid hypothetical practices which were created from elements of the eight practices in this study and used to explain the differences observed across all eight practices. The model illustrates:

1. How social, cultural and economic resources worked in practice
2. The way that dentist's leadership changed the use of resources, that is, the way resources were prioritised towards or away from preventive care because of the leadership of the dentist.

The best case scenario for prevention (Quadrant 1) happened when a dentist (practice owner) was the leader for prevention and prioritised the resources of the whole practice towards preventive care. Conversely, the worst case scenario (Quadrant 3) happened when there was absence of leadership, which perpetuated habitual, reactive restorative care throughout a practice. Quadrant 2 shows a situation where dentists (practice owners) were leaders for restorative care and prioritised resources in that direction, leading to the uniform practice of restoration. In Quadrant 4, practice owners allowed a single employee to prioritise preventive care; the practice remained oriented to restorative care, but one small section of the practice systematically implemented prevention.

Quadrant 1: leadership and prioritisation of resources towards preventive care

Only one practice fell into Quadrant 1. This practice was deliberately selected as an extreme case to illustrate what could be achieved. It was led by a single dentist who owned the practice. All team members were extremely loyal to their employer and most staff had been in the

practice for more than 20 years. There was a strong tradition of internal continuing education and collegiality among all members of the dental team. This internal network of people shared knowledge, that is, cultural resources. For example, there were team meetings to discuss published case reports, educational courses (such as first aid) delivered at the dental practice, dental industry practical workshops about new products and practice management courses.

'*We do a lot of training here. So, they [practice staff] are always growing and learning. We have meetings every week or so when we discuss a paper in a magazine, or we might have someone to give us a talk about patient resuscitation or someone from a dental company who comes here and tells us what they have that is new for our practice.*' – Dentist-in-charge, Dental Practice 1.

These opportunities to meet and discuss various topics benefited all members of the dental team in two ways. Firstly it was a way of acquiring the cultural resource of new knowledge and secondly it strengthened their relationships, that is, internal social resources. The quality of the relationships among members of the dental team was important for achieving stability and cohesion during daily activities.

When the earlier RCT project[1] began, the lead dentist took actions to completely reorient the routines of the practice in the direction of preventive care, including but not limited to implementation of the RCT protocols.[16] The dentist hired a dental hygienist to deliver oral hygiene instruction and run maintenance visits; reorganised the physical environment and routines of the practice to accommodate preventive activities, such as coaching of tooth brushing and flossing; and changed the fee schedule to cover the delivery of preventive services to protect the income of the practice.[16]

'*I had to decide how to do it and to work out what we were doing with the protocols. To start with I kept looking at the protocols and thinking, 'God, what do you have to do?' Then, I would train the staff, and I used to constantly refer to the home fluoride measures and then after a while you just know them. So, then it became easy. I had the duraphat here. I had the high concentration fluoride toothpaste here. I had the stuff you need for saliva testing. I had the computer system. I had digital imaging. So, it was not a hard thing to do. It was more the mental thing and thinking, 'this is what I am doing' and I had to sell it to my staff and then I was selling it to my patients.*' – Dentist-in-charge, Dental Practice 1.

This set a new direction for the whole practice, through their reputation for prevention they gained new patient referrals and experienced increased sales of preventive products. The lead dentist felt stronger medico-legally as a consequence of prioritising resources towards preventive care. Participants also talked about practicing prevention as offering the best care for each patient.[16]

'*Prevention is a huge and now subconscious part of how I practice. My staff and I believe that we are doing the best thing for the patients and that is positive. I believe that we are doing it better than we used to do.*' – Dentist-in-charge, Dental Practice 1.

Quadrant 2: leadership and prioritisation of resources towards restorative care

Three practices were assigned to Quadrant 2. The lead dentists, who owned the practices, retained a strong commitment to restoration and were opposed to change. Members of the dental team were encouraged to 'sell' restorative care to every patient. Preventive activities were seen as 'unproductive time' and the focus was on restorative care including crowns, implants and aesthetic dentistry, particularly tooth whitening and veneers.

'*I just could not really see that a formal risk assessment was going to materially alter the outcomes for my patients. The patients come to us and they are expecting to be treated the way they have always been treated and have a check up, some x-rays and a filling and come back after one year for the same again.*' – Dentist-in-charge, Dental Practice 3.

Quadrant 3: absence of leadership perpetuating automated restorative care routines

As in Quadrant 1, only one practice was allocated to this quadrant and the case had been selected as an extreme case (of poor outcomes in the RCT) to allow for the full range of possibilities. It was discovered that in this practice, the absence of a team leader meant resources could not be prioritised towards preventive care. The owner and the employees practiced dentistry in a 'default mode', simply reacting to whatever clinical problem presented, but with a focus on predominately providing restorative care. Members of the dental team were either not interested or unaware of the potential value of preventive care. Dentistry was practiced as an assembly line perpetuating the automated routines of 'drilling and filling'. There was a sense of alienation as team members did not feel empowered in any way to help patients to improve their oral health. The dental assistants and dentists performed predictable, set tasks and the patients were passive participants.

'*I see 20 patients a day and it is mainly restorative work. I do not feel I can control any of the other people that work here in terms of what kind of care they provide.*' – Dentist-in-charge, Dental Practice 2.

'*We were a bit too busy to implement the protocols. I did not have time to teach the staff about them. The other thing was that our practice manager left and then we had a different one, but things are still a bit messy.*' – Dentist-in-charge, Dental Practice 2.

Quadrant 4: a single dentist pursuing preventive care

There were three different practices in Quadrant 4, with only one dentist in each practice with an interest in prevention. The practice owner and leader of the whole practice was not involved in the process, but allowed one employee to prioritise limited resources towards preventive care. The 'preventive dentist' shared knowledge with a dental assistant in the practice, who developed an interest in preventive care. As a result, preventive activities were included as part of the usual routines of that dentist and the dental assistant. However, there were practical differences from the scenario in Quadrant 1, as preventive activities were part of the usual recall appointment fee, so 'prevention' was not financially valued and the rest of the practice was still oriented towards restorative care.

'*I suppose if I did not have support from my practice management I could not work*

the way I do. Not having this support is a big issue these days because lots of people are just working for big practices that are running as businesses. I think charging for prevention is the hardest thing. Getting it accepted by other dentists is difficult too because they might be filling in everything.' – Dentist employed at Dental Practice 6.

Implications for patients

Patients had different experiences in different practices. During the study patients were recruited from two dental practices. These practices were allocated in Quadrants 1 and 3 (Fig. 1). Patients who visited the practice in Quadrant 1 reported that their visit was friendly and mutually respectful. They were offered preventive options and were educated about self-care at home. As a result, patients talked about having 'strong teeth' and 'being in control' of their oral health. Conversely, those patients who visited the practice located in Quadrant 3 described their relationship with dentists as dictatorial because dentists had a 'mandate for doing fillings.' The patients felt they were not made aware of preventive options and their teeth were 'degenerating.' This group of patients characterised dentists as either 'old-school dentists' (Quadrant 3) or 'new-school dentists' (Quadrant 1) based on the treatment options provided and the clinical relationship offered.[16]

'*I wonder whether old-school dentists have got a mandate on what they do or whether that is easier or they make more money from continually filling teeth...*' – Patient, Quadrant 3.

'*The dentists never mentioned to me any possibility of fluoride treatments. So I just think that there must be an old-school where this is the way it is done.*' – Patient, Quadrant 3

'I have been fairly better educated in this practice. I used to just go to a dentist and get my teeth fixed and no one really ever said what to do in between.' – Patient, Quadrant 1

DISCUSSION

What is the relevance of these findings to the future of preventive care in general dental practices?

In this study, restorative care was the 'default mode' observed in the majority of the practices. Figure 1 shows that this was particularly the case in Quadrants 2 and 3, where strong commitments to restorative care meant preventive treatments were actively resisted or a lack of leadership made restoration the 'default' option. The dental leader in Quadrant 1 had adapted completely to prevention, while the employee dentists in Quadrant 4 engaged in prevention but had little support.

The difference between Quadrants 1 and 4 was the degree of leadership offered in the whole practice and thus the proportion of practice resources prioritised towards prevention. In Quadrant 4, the single dentist and a dental assistant created a 'preventive oasis' inside a dental practice still oriented towards restorative care. In contrast, in Quadrant 1 the whole dental team, guided by the lead dentist, were engaged and established preventive care as central to their daily practice routines.

This study suggests that leadership is imperative if there is to be a movement away from a 'default' restorative focus towards preventive care. Such leadership is potentially a challenging task, requiring an individual dentist to persuade all members of a dental team to make preventive care a central part of daily life of a general dental practice. Willcocks in his *BDJ* opinion article described this form of leadership as 'transformational leadership', when the lead dentist inspires and motivates all members of the dental team, engaging them to support change or transformation.[22] Our findings provide empirical support for this view that an individual dentist's leadership role is vital for effecting change in a dental practice. Other researchers have shown that other factors also influence change in dental practices: adopting a team approach, allowing autonomy within the dental team and being part of professional networks.[23] These were all present in Quadrant 1, while having autonomy to practice prevention was essential in Quadrant 4.

In this study, dentists' cultural identity, that is, their long-standing beliefs and dispositions, defined their daily practices of restorative care. For example, dentists described their daily activities as 'performing surgery' and this was part of what it meant to be a dentist. While on the surface this may seem trivial, it potentially has a profound impact on the likelihood that dentists will practice preventive care. If dentists are asked to provide preventive care, meaning that there is no need for the customary focus on restorative care, the move away from an interventionist approach of care could profoundly challenge their professional identity.[8,9,24–26] In addition, dentists' deeply-held beliefs about the motivation, values or cooperativeness of patients also determined whether or not prevention was offered. This is consistent with previous research that shows that dentists may find it difficult to treat patients who do not value oral health or are disinterested, providing them with a different quality of dental care.[27,28]

How can dentists be encouraged to develop a preventive outlook?

This study suggests that it is critical to convince practice leaders that it is possible to sustain their income while moving towards a preventive care focus. External networks of trusted peers and key opinion leaders (practicing dentists) could potentially be mobilised to promote preventive care. For example, a strong opinion leader (who is a practicing dentist within a local network) could be identified to work with dental practices as an agent of change. Opinion leaders could also set up study groups to discuss clinical cases and highlight practical strategies for practice leaders to have the confidence to prioritise resources towards prevention. Based on our findings, such opinion leaders could have a strong effect within their network of dentists. Other authors have also suggested that knowledge transfer relies on small networks of dentists who trust each other.[29–31]

This may be a disheartening conclusion for dental academics who hope that dental professionals will embrace the paradigm of evidence-based dentistry simply because the RCT evidence is compelling. However this study has shown that dental practice is not purely scientific, it is also cultural, social and economic. While we can publish papers about the need for evidence-based preventive care and discuss it in dental meetings, this study suggests that until we get access to the influential local networks in which decisions about the practice of dentistry are made on a daily basis, we will not change knowledge transfer inside practices. Future intervention research should not only be consistent with the best

RCT evidence, but should address practice leadership, the prioritisation of cultural, social and economic resources towards practicing prevention and the need to communicate research evidence through trusted networks of dental professionals.

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