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HOW DO DENTISTS UNDERSTAND EVIDENCE AND ADOPT IT IN PRACTICE?

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Abstract

Although there is now a large evidence-based dentistry literature, previous investigators have shown that dentists often consider research evidence irrelevant to their practice. To understand why this is the case, we conducted a qualitative study.

Objective: Our aim was to identify how dentists define evidence and how they adopt it in practice.

Methods: A qualitative study using grounded theory methodology was conducted. Ten dentists working in eight dental practices were interviewed about their experience and work processes while adopting evidence-based preventive care. Analysis involved transcript coding, detailed memo writing, and data interpretation.

Results: Findings revealed that dentists' direct observations – referred to as clinical evidence – provided the most tangible and trusted evidence in practice and during discussions with colleagues. Dentists described a detailed process used to gather, compare and implement clinical evidence. This process began when they were exposed to novelty in daily practice and proceeded through self-driven testing, producing clinical or tangible evidence that clinicians could use in practice.

Conclusion: Based on these findings, we propose an alternative to the linear form of knowledge transfer commonly represented in the literature.

Introduction

Many articles have been written about evidence-based dentistry (EBD).¹ Models for translating evidence into clinical practice have been proposed, and potential barriers to adopting EBD have been identified.²⁻¹⁵ The EBD literature contains common themes. It suggests that dentists experience: (1) difficulties in interpreting research; (2) scepticism towards the quality of research evidence; and (3) a belief that research does not address important clinical questions and so is not relevant to clinical practice.^{1,5-15} However, there has been little empirical analysis of how dentists define evidence and how it may be adopted in practice.

This article addresses two research questions: (1) what kind of evidence is relevant to dentists? And (2) how do dentists adopt that evidence in daily practice? Throughout the article we explain how a group of

dentists defined evidence and adopted it in their practices. The findings presented here form part of a larger qualitative study examining the process of adopting or not adopting evidence-based preventive protocols to manage dental caries in the private dental practice setting.

Methods

Background

This study was built on a previous Australian randomized controlled trial (RCT).¹⁶ Intervention practices in the RCT were provided with the Caries Management System (CMS) evidence-based preventive protocols to guide their treatment of dental caries.¹⁷ During the RCT, the numbers of decayed, missing and filled teeth (DMFT) were monitored. Outcomes in the intervention practices varied widely; the larger qualitative study was designed to explain that variation. Dentists, members of dental teams and patients were recruited from the RCT.

Ethics approval and ethical issues

Initial ethics approval was obtained from the Human Research Ethics Committee at the University of Sydney. As in any ethical study, we ensured that participation was voluntary, that participants could withdraw at any time, and that confidentiality was protected. All responses were anonymized before analysis, and we took particular care not to reveal potentially identifying details of places, practices or clinicians. Prior to being interviewed, all participants had the study explained to them and signed a consent form.

Research design

Qualitative research methods are routinely used to study the meanings of health and illness and processes of health care and self-care.^{18,19} Qualitative methods are increasingly common in dentistry, contributing novel insights to dental research.^{20,21} Charmaz's grounded theory methodology²² was employed to examine the process of adopting evidence-based preventive care in dental practices.²³ Grounded theory is one of the oldest and most-used methodologies in qualitative health research.^{24, p. 47} Grounded theory uses a systematically applied set of procedures to generate rather than test theory, to understand participants' points of view rather than test pre-existing hypotheses.²²⁻²⁴

Sample recruitment

In grounded theory studies, constant analysis of the data guides sampling decisions.²²⁻²⁴ Participants in the previous RCT¹⁶—22 private dental practices in New South Wales (NSW), Australia—provided our population. We invited dentists from this population, by letter, to participate in this qualitative study.

Clinical outcomes in the dental practices following the CMS protocols¹⁷ varied from substantial to little DMFT reductions during the previous RCT: dentists were recruited from these practices at all points in this range. We were interested not just in how the protocols from the RCT were adopted, but in dentists' adoption of any preventive protocols or guidelines. Thus dentists from control practices in the previous RCT were recruited to examine how their adoption of new evidence was similar or different from the intervention practices. A total of 10 dentists working in eight dental practices were recruited (Table 1).

Table 1: Characteristics of participants (N= 10)

Site	Professionals	Previous RCT group	Clinical experience (years)
Dental practice 1	1 dentist	intervention	25
Dental practice 2	3 dentists	intervention	10 to 30
Dental practice 3	1 dentist	control	20
Dental practice 4	1 dentist	control	25
Dental practice 5	1 dentist	control	23
Dental practice 6	1 dentist	control	20
Dental practice 7	1 dentist	intervention	25
Dental practice 8	1 dentist	intervention	28

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.²²⁻²⁴ Saturation is determined by the data analyst. When analysts find that new interviews do not add new information to the analysis – that is, become repetitive with prior interviews – and that central concepts are fully understood, they determine that they have reached saturation.²⁵ In this study, the last three dentists interviewed confirmed our analysis rather than adding new concepts. We then ceased data collection because our understanding was well supported by the existing data. It is considered unethical to continue recruiting after saturation, as the additional participants will not contribute significantly to the knowledge produced.²⁵

As in all qualitative research, this study was not designed to estimate proportions in a wider population, quantify relationships between pre-determined variables, or provide a representative or average view. Instead, this study intended to explain the variation in participants' practices and understandings. For this reason we recruited a smaller sample compared to those in quantitative studies, and we recruited informative participants rather than statistically-representative participants.

Interviews

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 Hanrahan²⁶ have reported that telephone interviews give the same in-depth data as face-to-face interviews. Semi-structured interviews were based on the research questions, were digitally recorded, professionally transcribed in detail, and the transcripts checked against the recordings.

During interviews, participants were encouraged to talk at length, to tell their story of adopting evidence, using new technologies or of learning to work preventively, and to explain what these processes 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 adopting evidence in practice. We found that we did not need to prompt dentists to talk about evidence as they talked about evidence constantly. The interview questions that particularly generated talk about evidence were:

- Have you ever made a big change in the way you practice dentistry or to the services you provide? Could you tell me about that change?
- Can you think back to a new treatment or technology that you have adopted in your surgery recently. What did you take into account when you decided to adopt it in your regular practice? What did influence your decision to adopt it?
- What kind of preventive services do you usually have in the practice to offer? How did you implement these preventive services? Why did you do so?
- When you are making a decision about how to treat that patient, what are the things that you normally consider?

Participants from the control practices were asked similar questions about evidence and technologies they had applied. Dentists interpreted and answered these questions in relation to the meaning of evidence and how they used evidence in practice. As the study progressed, our understanding about what dentists considered 'evidence' and how they adopted it in practice began to consolidate and we developed a theoretical framework to explain this process. All dentists were interviewed more than once which contributed to the refinement of theoretical concepts.

Data analysis

Charmaz's²² iteration 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. All researchers saw detailed excerpts from the data and two worked together in the development of the early coding frameworks. Coding was conducted primarily by AS, supported by team meetings and discussions when researchers compared their interpretations. The primary analyst also wrote extensive memos which documented the development of the codes, what they meant, how they varied, and how they related to the raw data.

A recent review highlighted the need to achieve 'depth of insight and methodological rigour in qualitative dental research';²⁷ we believe that both were achieved during this study. Table 2 illustrates the points that were critical for this study to achieve rigour and quality.

Table 2: Rigour and quality during study

Throughout the study

1. It was important to acknowledge that, as researchers, we had some pre-existing concepts in mind due to our academic backgrounds in dentistry and public health, although we deliberately remained open to what participants would tell us about their experiences.

During data collection

1. Interviews were digitally recorded, professionally transcribed in detail and the transcripts checked against the recordings.

2. Interview transcripts were analysed as soon as possible after each round of interviews in each dental practice sampled.

3. By carefully selecting participants and by modifying the questions asked during data collection, we filled gaps, clarified uncertainties, and tested our interpretations.

4. Writing case-based memos right after each interview while being in the field allowed the researcher/interviewer to capture initial ideas and make comparisons between participants' accounts. These memos assisted the researcher to make comparisons among her reflections, which enriched data analysis and guided further data collection.

5. Having the opportunity to contact participants after interviews to clarify concepts and to interview dentists more than once contributed to the refinement of concepts.

6. The decision to include phone interviews due to participants' preference worked very well. Phone interviews had similar length and depth compared to the face-to-face interviews, but allowed for a greater range of participation.

During data analysis

1. Detailed analysis records were kept which made it possible to write an explanatory paper.²³

2. The use of the constant comparative method enabled: (1) the concept of evidence to be explained; and (2) the analysis to produce not just a description but a model, in which depth of insight about the process of making sense of evidence was gained.

3. All researchers supported analysis activities; a regular meeting of the research team was convened to discuss and contextualize emerging interpretations, introducing a wide range of disciplinary perspectives.

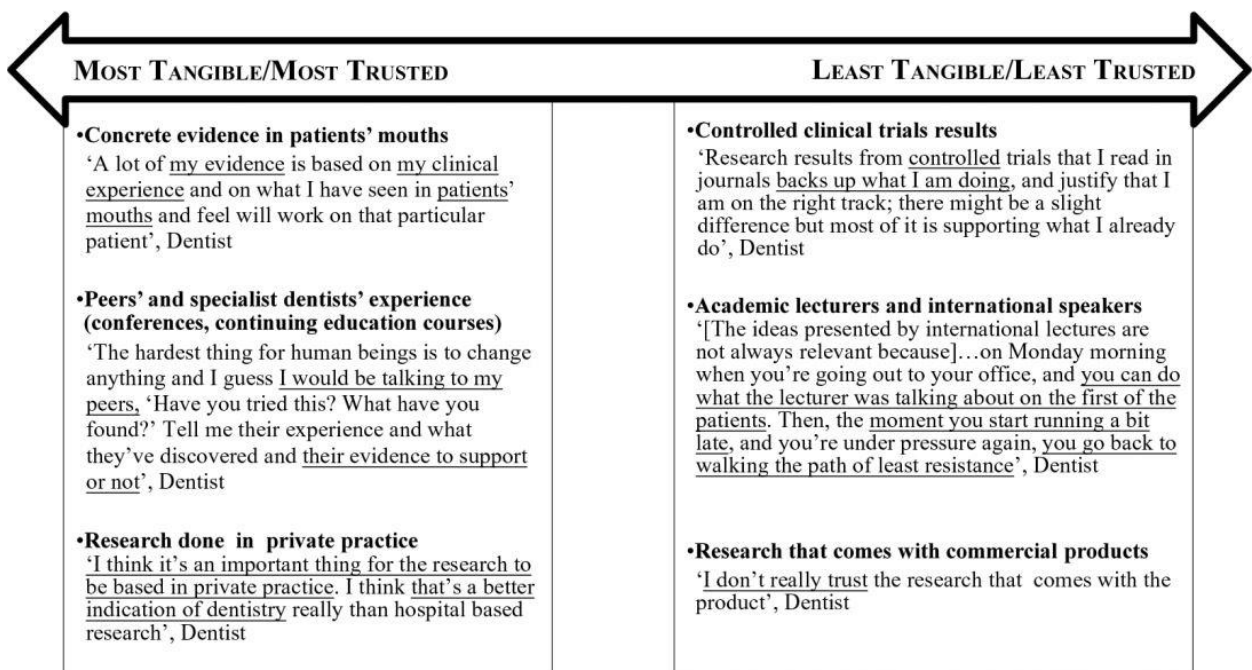
Findings

Dentists were able to define what evidence meant to them and how they made sense of it, and were able to explain how they had been adopting evidence in practice over the years.

Defining evidence

The meaning of ‘evidence’ varied. One of the most important variations was the degree of tangibility of the evidence. When we analyzed participants’ accounts, we found that they talked about evidence as varying along a scale from most tangible to least tangible (Figure 1). In their accounts, clinical evidence – that is, concrete evidence seen in their patients’ mouths – was talked about as the most tangible. Tangible evidence was the most valued and the most trusted, both in the practice setting and during discussions with colleagues. Dentists said that seeing the rate of dental caries incidence ‘plummeting in patients’ mouths’ or caries lesions ‘vanishing on x-rays’ – visual concrete evidence – led them to believe in specific preventive materials or treatment approaches. Treatment decisions were guided by this concrete clinical evidence, accrued over years of clinical experience.

Figure 1: Scale of evidence



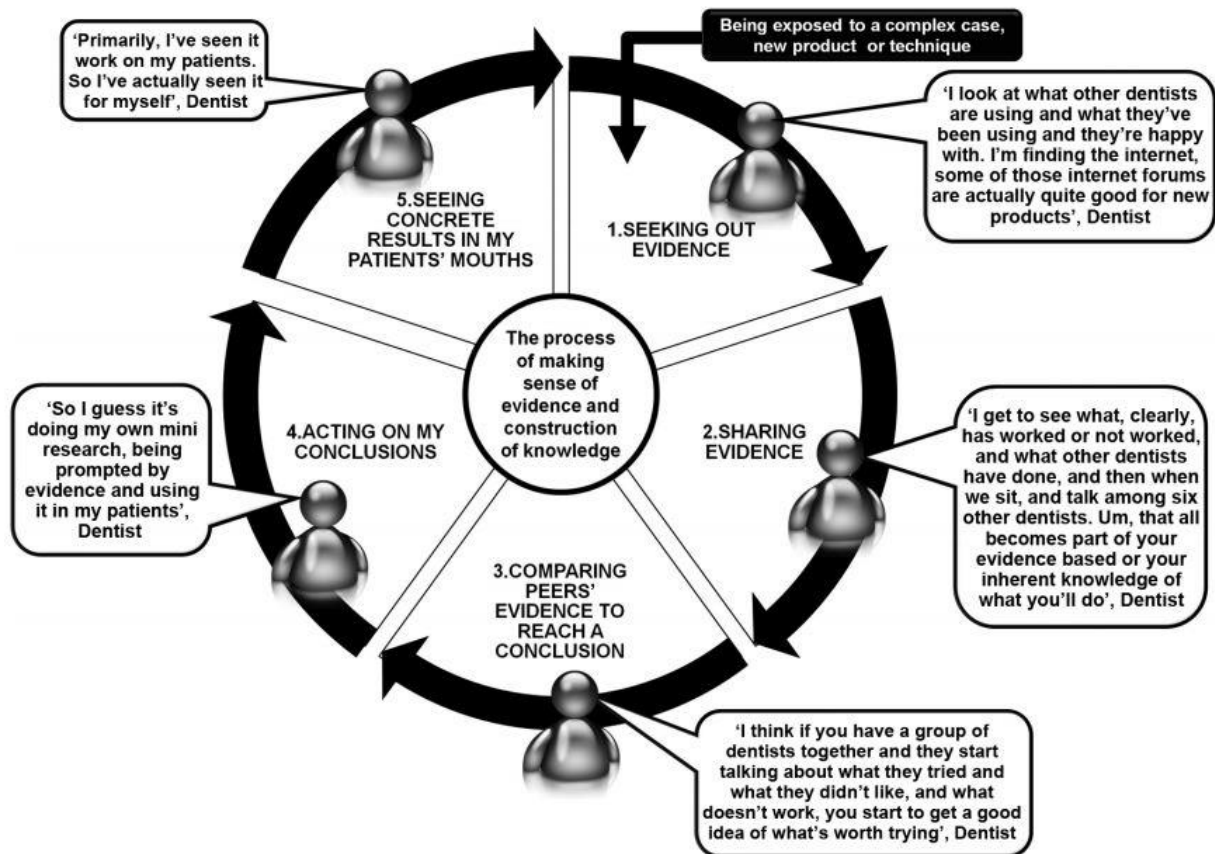
If dentists had not yet experimented with a certain material or technique in their patients’ mouths, they would ask their peers about it or get information about it while attending continuing education courses. Thus their peers’ clinical evidence could be considered the next most tangible evidence, and would inform their decision to try a new material. However, dentists trusted some colleagues more than others. The most trusted colleagues were friends and specialist dentists who participated in the same study group. Key opinion leaders who presented continuing education courses were also trusted, provided they were also practicing dentists.

Dentists associated research done in private practice with ‘real world’ dentistry. They reported that research conducted in the private practice setting answered the clinical problems important to their daily practice better than results from hospital-based trials. Clinical trial results were defined as the least tangible and least trusted evidence. Clinical trial results were only interesting when they confirmed familiar procedures that dentists had already tested and accepted in their own practices: that is, they were convenient when they supported what dentists already knew, but were otherwise considered irrelevant. The advice of international speakers and non-clinical dental academics was not considered tangible and trustworthy. Dentists felt that non-clinical dental academics did not share their clinical experiences and did not understand the hurdles they faced in practice.

The process of making sense of evidence and construction of knowledge

Dentists also described a process of making sense of evidence during interactions with colleagues and through testing evidence in their own practices (Figure 2).

Figure 2: The process of making sense of evidence



This process began when dentists were exposed to a complex case, a new product or technique, or a new treatment approach. For example, a common problematic situation described by these participants was when a patient at high risk of developing dental caries presented with failing restorations. After many unsuccessful attempts to solve that situation, dentists would initiate the process, described next. Alternatively, the process could be triggered when dentists read or heard about a new treatment approach or material that related to a common problem experienced on a daily basis. There were five stages within this process.

Each time dentists were exposed to a new product or treatment approach or to a complex case which they did not yet have concrete evidence about, they would re-enter this process of making sense of evidence, constructing knowledge via interaction with peers, and testing evidence in their own practices. Only at the end of this process would they routinely adopt the approach or technology in their practice.

Discussion

Our initial research questions were focused on the process of adopting evidence-based preventive protocols more or less successfully. However, our findings revealed that research evidence – the evidence from RCTs – was not the main focus for this group of dentists. The professionals valued and sought out evidence of a different kind; that is, tangible clinical evidence. Dentists described a detailed process used to gather, share, compare, implement and develop tangible clinical evidence in their

practices. Dentists were sometimes challenged by complex cases, and this was one stimulus for seeking out and testing evidence. However, dentistry is also driven by new technologies: materials, products and techniques. While participants said they did not trust the research claims by manufacturers of commercial products, new technologies created challenges for dentists and forced them to spend time talking to trusted colleagues and seeking evidence they could trust. Previous studies support our findings about dentists asking for advice from trusted colleagues when faced with clinical uncertainties.^{14, p.589, 15,p.1338}

So, how should we use these findings to facilitate the uptake of evidence-based treatment in dental practice? Seeing clinical evidence – present, concrete and visible in patients' mouths – was fundamental to these dentists' way of working. RCTs will remain the key source of evidence about dental treatments, but this study suggests that their results may be better trusted and adapted into practice if the statistical results are presented alongside concrete clinical illustrations (e.g. case reports showing before and after scenarios; before and after patients' x-rays, intra-oral photographs and study models). Seeing relevant tangible concrete evidence should encourage dentists to experiment with a technique or new material in their practices.

However, by itself this may not be sufficient to encourage uptake as participants only trusted peers and key opinion leaders. They were sceptical of non-clinical dental academics. Perhaps key opinion leaders – who are practising dentists – could be prevailed upon to address some of the important clinical questions that dentists want answered. For example, in the United States and Scandinavia, an important initiative has been the creation of the Dental Practice-Based Research Network (DPBRN) where clinical trials conducted in network practices are focused on answering issues that dentists themselves define as relevant.²⁸ In this context, registered DPBRN dentists become clinical investigators and, therefore, have a direct role in the production of research evidence in their practices.^{29–31} Our study suggests that such clinical investigators will take on the role of trusted key opinion leaders who are uniquely placed to translate evidence for their peers.

Conclusion

This research shows that the promotion of evidence-based dental care is not a simple task. Dentists emphasized the importance of talking about real patients' cases with colleagues. Dentists also valued having the opportunity to experiment with new products and techniques in order to see the evidence directly in patients' mouths. They valued tangibility, and trusted evidence that they had generated and tested the most. Translating evidence to practising dentists in a way that reflects these values and practices may therefore be as important as the evidence itself.

This qualitative study suggests future directions for intervention research, which could test whether the implementation of EBD improves when evidence is: (1) made tangible; (2) communicated through trusted networks; and (3) experienced personally by seeing changes in the oral health of patients.

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