



**University of Dundee**

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# BMJ Open 'Well, in dentistry the dentist is always the boss': a multi-method exploration of which organisational characteristics of dental practices most influence the implementation of evidence-based guidance

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## ABSTRACT

**Objective** To investigate which organisational characteristics of primary care dental practices influence the implementation of evidence-based guidance.

**Design** A multimethod study set within primary care dentistry in Scotland comprising: (1) Semistructured interviews with dental teams to inform development of a self-report questionnaire exploring the translation of guidance in primary care dentistry and (2) A questionnaire-based survey and case studies exploring which organisational characteristics influence knowledge translation.

**Results** Interview data identified three themes: leadership, communication and context. Survey data revealed compliance with recommendations from three topics of dental guidance to be variable, with only 41% (emergency dental care), 19% (oral health assessment and review) and 4% (drug prescribing) of respondents reporting full compliance. Analysis revealed no significant relationship between practice characteristics and compliance with emergency dental care or drug prescribing recommendations. Positive associations were observed between compliance with oral health assessment and review recommendations and having a practice manager, as well as with the type of treatment offered, with fully private practices more likely, and fully National Health Service practices less likely to comply, when compared with those offering a mixture of treatment. Synthesis of the data identified leadership and context as key drivers of guidance uptake.

**Conclusions** Evidence-based dental recommendations are not routinely translated into practice, with variable leadership and differing practice contexts being central to poor uptake. Guidelines should aim to tailor recommendations and implementation strategies to reflect the complexities and varying contexts that exist in primary care dentistry, thus facilitating the implementation of evidence-based guidance.

## STRENGTHS AND LIMITATIONS OF THIS STUDY

- ⇒ A key strength of this study was the multimethod approach adopted, which provides a more holistic contextual portrayal of the phenomenon being studied.
- ⇒ The use of the receptive healthcare contexts for change framework throughout the study provided consistency in theoretical approach.
- ⇒ Although practices were self-selecting, our use of practice visits and observations served to check the accuracy of self-reported data.
- ⇒ Gathering practice-level questionnaire data were challenging. Data analysis was conducted at the individual rather than the practice level, with clustering by practice ID to reduce potential bias.

## BACKGROUND

Evidence-based guidance aims to reduce inappropriate variations in practice and promote evidence-based healthcare.<sup>1</sup> It is well documented, however, that the translation of research evidence into routine practice is unpredictable,<sup>2</sup> and patients do not necessarily receive the care they need or that is in accordance with current evidence.<sup>3–5</sup> Knowledge translation (KT) requires more than the development and dissemination of guidance,<sup>6–11</sup> and the availability of evidence alone is not usually sufficient to change behaviour.<sup>12</sup> A systematic review across 11 studies found that only a third of research evidence informing guidelines is routinely implemented.<sup>13</sup> This delay in implementation of evidence into clinical practice is known as the 'evidence to practice gap'.<sup>10 11</sup>

In the UK, around 90% of healthcare encounters occur in primary care.<sup>14</sup> Primary

care organisations vary in structure, composition, packages of care offered, remuneration and practice systems. Dental practices are mainly small, privately owned organisations, although in recent years there has been a growth in dental corporate bodies, which currently make up around 10% of the Scottish market. General dental practitioners (GDPs) work under a National Health Service (NHS) contract, treating children and adults under an item of service fee structure. While some GDPs only undertake NHS work, many undertake a mixture of NHS and private treatments.

In 2004, the Scottish government established the Scottish Dental Clinical Effectiveness Programme (SDCEP), to develop user-friendly guidance to promote best practice and improve the quality of dental care in Scotland.<sup>15</sup> This initiative embedded a KT research programme within the guidance development process, known as Translation Research in a Dental Setting (TRiADS).<sup>16</sup> A number of studies undertaken within the TRiADS programme have found that guideline recommendations were not being fully translated into routine dental practice.<sup>17–19</sup>

The diverse characteristics of dental practices make them particularly challenging for KT initiatives. The objective of this study was to investigate which organisational characteristics of primary dental care practices are most influential on the translation of guidance and explore whether these characteristics are predictors of guideline compliance.

## METHODS

### Study design

A multimethod study underpinned by the Receptive Healthcare Contexts for Change (RHCC) framework.<sup>20</sup> This framework explores factors including the content, context and process of change. The RHCC was selected a priori as an exploratory lens through which to explore the organisational level barriers and facilitators to the translation of guidance.

The study comprised two stages:

1. Semistructured interviews with dental teams to inform the development of a self-report questionnaire exploring the translation of guidance in primary care dentistry.
2. Questionnaire-based survey and dental practice case studies to explore which organisational characteristics are most influential on the translation of guidance in primary care dentistry.

### Setting and participants

Dental team members in general dental practices in Scotland.

### Data collection

#### Interviews and questionnaire development

Semistructured telephone interviews were conducted with dental team members to inform the development of a self-report questionnaire to explore the translation

of guidance in primary care dentistry. Practices (n=26) were sampled from an ongoing trial evaluating the translation of SDCEP's 'Decontamination' guidance.<sup>21</sup> Self-reported compliance data relating to decontamination recommendations, from 131 dental practices in Scotland allowed practices to be ranked by compliance. The top 10% (N=13) and the bottom 10% (N=13) were selected, in order to recruit four practices in total: two of higher and two of lower compliance. All practices in the sample were sent a study information pack and invited to participate.

A topic guide was informed by the RHCC framework, discussions with key stakeholders and literature review findings.<sup>22</sup> Demographical questions were included to develop a full picture of the practice, its structure and systems. The topic guide was piloted with three dental team members. Interviews were conducted by an experienced qualitative researcher (HC) and digitally recorded with consent. Data collection ceased when data saturation was achieved.<sup>23</sup>

Interview data were reviewed to inform the development of the questionnaire. This questionnaire also included questions to determine compliance with three topics of dental guidance: SDCEP's emergency dental care guidance,<sup>24</sup> oral health assessment and review<sup>25</sup> and drug prescribing.<sup>26</sup> These topics were selected based on the differing dental contexts and team members they target.

#### Questionnaire-based survey and dental practice case studies

A random sample of 400 practices was identified using the Practitioner Services Division's Management Information Dental Accounting System database.<sup>27</sup> Practices were randomised at practice level and then by individual dentist. One dentist per practice was randomly allocated as the practice contact and asked to distribute questionnaires to all team members. All practices where at least one dentist and one non-dentist completed the questionnaire were eligible for case study participation. Case studies involved face-to-face or telephone interviews, informal discussions and practice observations.

An initial review of the literature did not identify an obvious instrument to explore all of the salient themes identified from the interview data. However, a mapping exercise identified the Organisational Climate Measure (OCM) instrument<sup>28</sup> that covered most themes and could be adapted. Furthermore, the OCM had previously been used within a UK healthcare setting and was considered appropriate for completion by a range of team members. The modified OCM was incorporated into a questionnaire which also included questions to determine compliance with the three topics of dental guidance. Participants were considered compliant if they reported 'always' following best practice for the recommendations for each topic. Compliance with recommendations was variable. The questionnaire was piloted in four dental practices to test content validity.

## Data handling and analysis

### Interviews and questionnaire development

Audiorecordings were anonymised and securely transferred to a professional transcription service and transcribed verbatim. Data were managed using NVivo V.10 software. Thematic analysis was undertaken to organise and classify data according to key issues, concepts and emerging themes.<sup>29</sup> The RHCC framework was used as an initial coding framework. As these interviews were exploratory and aimed to identify organisational barriers and facilitators to the translation of guidance, it was important that analysis allowed for the identification of key issues using the RHCC as well as recognising other emergent themes. The Consolidated Criteria for Reporting Qualitative Research guided reporting of the data<sup>30</sup> (Checklist 1).

### Questionnaire-based survey and practice case studies

Questionnaire data were managed using SPSS V.22. Descriptive statistics were used to explore the data. Internal consistency of instrument measures was tested using Cronbach's alpha. Independent t-tests assessed differences in responses from participants reporting compliance with recommendations when compared with those reporting non-compliance.  $\chi^2$  tests (or Fisher's exact test for low frequency observations) assessed any relationships between practice characteristics and compliance. Where appropriate, logistic regression models were used to assess the relationship between instrument items and compliance with the three dental topics. Data were clustered by the practice ID variable, to control for any practice level characteristics that might influence the result. Statistical significance was defined as  $p < 0.05$  and based on two-sided tests. Case study data were analysed using thematic analysis. The questionnaire can be found in online supplemental file 1.

## Patient involvement

Patients were not involved in this study.

## RESULTS

### Interviews

Twenty-six practices were sent information packs, including participant information sheets. Six practices were contacted by telephone before the target four were recruited. Non-participating practices cited time constraints. Fourteen interviews across the four practices were conducted, ranging from 15 min to 1 hour. Practices have been given pseudonyms for the purpose of presenting this data.

All four practices were independently owned, two practices (Archibald's and Black's) offered a mixture of NHS and private treatment, one (Campbell's) was fully private and the other (Davidson's) was fully NHS. Team members interviewed comprised: six dentists, three dental nurses, one practice manager (PM), two receptionists, one dental surgery assistant and one office administrator. **Table 1** presents the structure and character of participating practices.

Online supplemental file 2 presents the key findings by practice. Analysis of the interview data identified three themes: leadership, communication and context.

### Leadership

Leadership 'hierarchies' were evident in all practices, although manifested differently. All practices had an identifiable leader and in all cases, this was the practice owner and dentist; however, leadership was also provided by other team members, such as dental nurses and PMs. Leadership strategies acted as both barriers and enablers to the translation of guidance. Some participants, both dentists and non-dentists, claimed that they were happy to

**Table 1** Practice structures and characteristics

Archibald dental practice	Campbell dental
Demographics/characteristics: <ul style="list-style-type: none"> <li>▶ Mixture of NHS and private treatment.</li> <li>▶ 3 dentists, 5 dental nurses, 2 hygienists, 1 receptionist.</li> <li>▶ Computerised patient record system.</li> <li>▶ Urban area.</li> <li>▶ Traditional practice, owned by principal dentist and his wife.</li> </ul>	Demographics/characteristics: <ul style="list-style-type: none"> <li>▶ Fully private.</li> <li>▶ 2 dentists, 4 dental nurses, 2 hygienists, 2 receptionists, 1 practice manager.</li> <li>▶ Computerised system, website, Facebook and Twitter.</li> <li>▶ Rural area.</li> <li>▶ Independently owned, progressive practice.</li> </ul>
Black's dental practice	Davidson's dental care
Demographics/characteristics: <ul style="list-style-type: none"> <li>▶ Mixture of NHS and private</li> <li>▶ 4 dentists, 5 dental nurses, 1 administrator, 1 practice manager.</li> <li>▶ Computerised system, website and Facebook Page.</li> <li>▶ Urban area.</li> <li>▶ Traditional independently owned practice in the middle of a takeover by an associate collaboration.</li> </ul>	Demographics/characteristics: <ul style="list-style-type: none"> <li>▶ Fully NHS.</li> <li>▶ 6 dentists, 6 dental nurses, 1 hygienist, 1 receptionist.</li> <li>▶ Paper patient record system.</li> <li>▶ Rural area.</li> <li>▶ Traditional practice owned by principal dentist, not advanced.</li> </ul>
NHS, National Health Service.	

be told what to do, almost relying on it, with participants referring to 'doing as they were told' and 'following the rules'. It was, however, clear that some team members found their lack of involvement in decision-making frustrating.

*Well in dentistry the dentist is always the boss, they have a very strong opinion, and nobody can overrule them if they're wrong...Participant 10 (Dentist).*

In all practices, dentists appeared to have more knowledge and awareness of guidance, when compared with other team members. As a result, practice dissemination systems, influenced how information was received, if at all, by other team members.

*if it was felt it was relevant to anyone other than the dentist...then individuals would be...shown what was relevant and what was changed...Participant 3 (Dentist).*

Leadership hierarchies also influenced professional development, with clinicians reporting having time to undertake training but administrative staff highlighting barriers. In some cases, this presented as a lack of interest or motivation. One participant when asked about training said they were 'quite happy just to jog along'. During the interviews, much reference was made to 'the dentists' or 'the girls', to refer to the dental nurses, reinforcing a sense of two distinct, and perhaps, unequal groups within the team.

### Communication

Communication was intrinsically linked to leadership. Only one practice reported having regular meetings, and methods for dissemination of guidance varied. Another practice reported only having meetings when there was a problem. The effects of not having any 'whole team' communication were clear and reinforced by participants reporting 'mixed messages'.

*...sadly, the only time there is a meeting of the whole team would be when there is a major issue, and then it could be quite confrontational. That would trigger a full meeting based on whatever the issue was and it would be brought up fait accompli, 'look, this is what's happening, we don't want this, we want this, no questions asked, this is what's happening, we start tomorrow', boom! Participant 5 (Dentist).*

*...one person says something, the next person says another and we get Chinese whispers before it reaches the last person. Participant 14 (Dentist).*

In terms of the dissemination of guidance and recommendations, it was reported that the dentists generally received guidance individually, with limited discussion or dissemination to the rest of the team. On the whole guidance was 'passively received' rather than actively sought. Non-dentists reported feeling frustrated about not being aware of new guidance and felt uninformed about planned changes. This was particularly evident in relation to decision-making processes around which recommendations were to be implemented.

*We don't really get access to them, we're only told what they contain, what to carry out, but we don't actually have it in front of us to get, you know have the opportunity to look through it. Participant 6 (Dental Surgery Assistant).*

*...there's no real discussion between everyone as a team, about what sorts of things would be useful, you know nobody really has any input at all. Participant 7 (Office Administrator).*

### Context

Context related to the patient profile, the practice setting and the guidance topic. It was clear that patient expectations differed depending on the patient profile and setting of the practice. One practice, set within a more affluent area, reported that patient expectations were high and this led to greater pressure to allocate emergency appointments and a higher standard of care expected.

*...they can be very demanding, but I mean we meet most of the demand, I wouldn't say that we don't, no, but they do expect quite a high level of care. Participant 9 (Dental Nurse).*

Practice context related to the premises and practice resources. Barriers included patient access to the premises, working across multiple floors and how this impacted on communication and storage space. Resources, especially time and money, emerged as barriers in all practices.

The guidance topic also appeared to influence the translation of guidance. All practices referred to SDCEP's Decontamination guidance, as a 'hot topic'. It was evident that this was something they felt they should be following, suggesting that when more focus is placed on a topic there may be more motivation to comply. This links with the concept of prioritising which recommendations to follow. Participants referenced 'dipping in and taking bits out', and it not being possible to implement it all with 'common sense having to prevail'. The notion of prioritising guidance recommendations and 'cherry picking' which to follow was evident across all practices.

### Questionnaire-based survey

Four hundred practices were sent questionnaires (four questionnaires per practice). Six opted out and three packs were returned unopened. In total 349 completed questionnaires were returned from across 96 practices: a practice response of 25%. Most participants reported that their practice was independently owned (88%), the remaining were corporately owned (6%) or part of the salaried service (7%). Most offered a mixture of NHS and private treatment (77%), 22% were fully NHS and <1% were fully private. Over half (56%) reported having a PM. Table 2 presents compliance with each of the three SDCEP guidance documents.

Table 3 shows the practice characteristics of individuals who reported being fully compliant.  $\chi^2$  tests revealed no significant relationship between practice characteristics and compliance with the emergency dental care guidance or drug prescribing recommendations. A positive

**Table 2** Compliance with SDCEP guidance

Guidance topic	Compliant (%)	Non-compliant (%)
Emergency dental care	141 (41)	200 (59)
Oral health assessment and review	63 (19)	273 (81)
Drug prescribing	12 (4)	317 (96)

SDCEP, Scottish Dental Clinical Effectiveness Programme.

association was observed between oral health assessment and review compliance and having a PM ( $p < 0.01$ ) and whether a practice was fully NHS, fully private or a mix ( $p < 0.01$ ).

Logistic regression models assessed the relationship between the OCM instrument measures and compliance with the emergency dental care guidance and oral health assessment and review recommendations. Full results can be found in online supplemental file 3. Only one of the instrument measures, 'integration' was predictive of compliance with the Emergency Dental Care recommendations, suggesting that greater levels of the trust and co-operation between team members, increased the likelihood of compliance. Three of the instrument measures, 'welfare', 'pressure to produce' and 'guidance prioritisation' were predictive of compliance with the oral health assessment and review recommendations, with lower scores suggesting a greater probability of full compliance. Results also suggested that fully private practices were more likely, and fully NHS practices were less likely, to comply with the oral health assessment and review recommendations when compared with those offering a mixture of treatment ( $p < 0.01$ ).

Only 12 of 349 respondents were fully compliant with the Drug Prescribing recommendations. All 12 worked in independently owned practices offering a mixture of NHS and private treatments. Due to this lack of variation across variables, logistic regression was not appropriate. A comparison of responses across the instrument items revealed a significant difference for 'pressure to

produce'. Compliant respondents reported lower pressure to produce scores than those who were not compliant ( $p = 0.04$ ). No other statistically significant differences in responses were observed.

### Case studies

Seventy-seven of the 96 practices who completed the questionnaire were eligible for participation in the case studies. Two practices agreed to participate. Eight interviews were conducted in total.

Practice A was an urban, independently owned practice with one part-time dentist and one nurse. Practice B was a rural, corporately owned practice with two dentists, three nurses, a receptionist and a part-time hygienist and PM. Neither practice was fully compliant with any of the three dental topic areas. Despite differences in practice characteristics, some similar themes emerged from the case study data.

Leadership was a strong theme, although affecting the practices in different ways. In practice A, strong leadership was apparent from the principal dentist and owner, and while this appeared to work well most of the time, there were instances where it appeared as a barrier, particularly when a more formalised approach was needed.

*We sit down all the time and we call it practice meetings for the protocol. But you know, it's just as easy to stray on to what we did at the weekend.* **Participant 15 (Dentist).**

Practice B had a very different structure and management system in place, mainly due to being corporately owned. All team members referred to 'following the party line', having no leader within the practice and everyone being equal. It was evident however, that the PM did exert some leadership and tried to facilitate adoption in terms of disseminating guidance to the team and developing processes to ensure it was read. Her role, however, was remote from the day-to-day working of the team, and this perhaps added to the power struggle observed between the dental nurses, trying to assume aspects of a leadership role in her absence. One team member commented:

*Who is the leader, or who tries to be the leader...?* **Participant 19 (Dental Nurse).**

**Table 3** Characteristics of compliant practices

Practice characteristics	Emergency dental care (n=141)	Oral health assessment & review (n=63)	Drug prescribing (n=12)
Has a practice manager	80 (57%)	45 (73%)	6 (50%)
Independently owned	119 (84%)	56 (89%)	12 (100%)
Corporate practice	8 (6%)	5 (8%)	0 (0%)
Salaried service	14 (10%)	2 (3%)	0 (0%)
Fully NHS	32 (23%)	5 (8%)	0 (0%)
Fully private	1 (<1%)	1 (2%)	0 (0%)
A mixture of NHS/private	108 (77%)	57 (90%)	12 (100%)

NHS, National Health Service.



Context incorporated the patient context, including attitude and lifestyle, as well as practice context, including geographical location, premises, team size and ownership. The context of the case study practices was very different, but in both cases appeared to influence how they prioritised guidance. In Practice A, while good intentions to follow recommendations were clear, processes of implementation were haphazard, combined with a tendency to prioritise and tailor recommendations to fit their practice and patient context.

*The guidelines are that you take your dirty instruments in a plastic container with a lid on it. These three steps between the surgery and the set-down area, you know. And really why would you get gunk on your wee plastic container? ...And the thing is that of course in most practices they are bigger, and you can see why these guidelines are in place... So, these are the kind of things that we have to say we do them in protocols but in reality we don't really do them.* **Participant 15 (Dentist).**

Practice A also tailored their working systems, such as appointment management, to accommodate the chaotic lifestyles of their patients and a relaxed atmosphere was evident, with considerable time spent over appointments and large gaps between patients. This observation was in keeping with the low 'pressure to produce' score from their questionnaire data. In contrast, practice B's patient profile represented a close-knit community, which appeared to be a barrier when introducing new policies or methods of working. Finance and other external resources only emerged as a barrier to Practice B which was surprising given it is part of a group of corporate practices, where one might expect greater access to resources than an independently owned single-handed practice. In practice B, both dentists highlighted challenges relating to antibiotic prescribing, which they attributed to the previous practice owner. They reported that some patients presented with the expectation of being prescribed an antibiotic. These patient expectations were specifically identified as a barrier to following Drug Prescribing recommendations.

*Old patients go back to history of this practice, they were used for a scale and polish to have antibiotics prescribed... and then...I said 'no, you don't need them', ...eh they are so persistent that I have to go, 'this is the paper, read it, you want to fight?'* **Participant 22 (Dentist).**

## DISCUSSION

Numerous studies have attempted to identify the best means of translating health-related research findings into practice yet evidence shows that most KT initiatives only work some of the time and in some circumstances.<sup>31</sup> Our dental team interviews identified organisational level barriers and facilitators appearing to influence KT. These were categorised within the three broad themes of leadership, communication and context. Within these,

sub-themes around team working, decision making, collaboration, dissemination and practice systems and learning were evident.

Questionnaire findings identified relatively low levels of compliance with dental guidance – only 41%, 19% and 4% were fully compliant with the emergency dental care, oral health assessment and review and drug prescribing recommendations, respectively, highlighting that evidence-based recommendations are not being routinely translated into practice. Furthermore, compliance levels may have been enhanced due to social desirability bias. Exploratory analysis revealed no significant relationship between practice characteristics and compliance with either the drug prescribing or emergency dental care recommendations, however, positive associations were observed between oral health assessment and review compliance and whether the practice is fully NHS, fully private or a mix; and whether the practice has a PM. Low levels of compliance with Drug Prescribing recommendations is supported by the literature<sup>32</sup> and, in Scotland, there is a wide variation in dental prescribing.<sup>33</sup>

Case study data identified that leadership and context appear most influential on the translation of guidance with practices themselves tailoring recommendations to their own ownership structure, geographical context and patient profile.

Synthesis of the data identified two overarching areas salient to the translation of dental guidance: leadership and context. Leadership emerged in differing forms and appeared to affect mechanisms and styles of communication. The impact of having a PM, leadership exerted by a principal dentist or leadership offered by dental nurses all appeared influential. A systematic review conducted by Lau *et al* exploring the evidence to practice gap in primary care, echoed these findings, with both internal and external leadership, including the role of champions, identified as having a positive impact on adoption.<sup>11</sup> This review also suggested that hierarchical structures, which often exist in dental practices, can act as barriers to KT.<sup>11</sup>

Context related to patient profile, including attitude and lifestyle; and practice characteristics, including geographical location, premises, team size and ownership. The role of context on KT is increasingly recognised, with what works in one setting not necessarily being transferrable to another.<sup>34 35</sup> Context has been described as the underlying systems, culture and circumstances of the environment in which an intervention is being implemented<sup>36</sup> and was the subject of a recent realist review, to better understand its influence on healthcare quality improvement initiatives.<sup>37</sup> Findings identified that contextual factors are frequently cited as both barriers and facilitators, echoing the findings of this study. Furthermore, recent developments reinforce the significant impact that context may play in KT. These include the updated SQUIRE 2.0 guidelines for quality improvement studies in healthcare, to recognise context as a fundamental reporting item<sup>38</sup> and the Medical Research Council guidance for process evaluation of complex interventions, highlighting the importance of the contextual factors associated

with variations in implementation, intervention mechanisms and outcomes.<sup>39</sup>

This study benefits from a number of strengths. First, the multimethod approach adopted. The use of multiple methods, can enhance research findings, allowing the strengths of each approach to reinforce the overall study design,<sup>40</sup> producing a more holistic contextual portrayal of the phenomenon being studied.<sup>41</sup> It is argued that, as was the case with this study, when exploring organisational level factors, multiple viewpoints achieved through the use of both qualitative and quantitative methods, can improve the accuracy of any judgements concerning the data.

The use of the RHCC framework to underpin the study design, data collection and analysis was novel and provided consistency. The RHCC was originally developed from case studies carried out in large-scale organisations.<sup>20</sup> It provided an exploratory lens through which to explore the translation of guidance, however given this work was undertaken within small primary care organisations, the focus of some aspects of the framework differed to that developed in the original model. Future work could test modifications to the framework in dental and other primary care research settings.

Caution should however be taken when interpreting these findings. First, it could be argued that participating practices may represent the more motivated dental teams, although this is the case for all research studies where participation is voluntary. The questionnaire response rate was also lower than anticipated and gathering practice level data was challenging. Low levels of compliance and lack of variability may explain why not all themes that emerged from the interviews were identified by the survey findings. Due to the low practice level response, analysis was conducted at the individual rather than the practice level. For the regression analysis, however, data were clustered by the practice ID variable, to control for any practice level characteristics that might influence the result. Furthermore, only two case studies were undertaken. In these practices, the dental teams were working within very specific patient and organisational contexts. Therefore, consideration should be taken in relation to the transferability of these findings to other dental and primary care settings. That said, the case study approach is not intended to be generalisable and case studies, because they detail specific experiences in specific contexts, provide an insight into the relationships between organisational processes and the context.<sup>42</sup>

One approach for the future may be to explore ways of tailoring guidance implementation strategies. This would allow differences in relationships and structural and procedural processes to be accounted for and may facilitate KT. Tailoring healthcare and implementation strategies is an emerging field especially within behavioural science.<sup>43</sup> The importance role of context and understanding the when, where, why and how implementation strategies can improve implementation effectiveness and subsequent health outcomes warrants further attention.<sup>44</sup>

The results of this study confirm that there is no ‘right’ quality improvement or KT approach that will be effective in all organisations or contexts,<sup>45 46</sup> and supports previous work highlighting that sustainable organisational change initiatives need to be designed in context to fit the particular set of local circumstances.<sup>47</sup> This approach would complement the Scottish Government’s Oral Health Improvement Plan (OHIP),<sup>48</sup> which sets out the future of oral health improvement and NHS dental services in Scotland. The OHIP will introduce a dental preventive care pathway and an Oral Health Risk Assessment promoting personalised patient care, designed to individual needs. Furthermore, a better understanding of what effective leadership looks like is needed. Relatively little is known about attributes of individuals who successfully lead primary care implementation activities,<sup>49</sup> and even less so in primary care dentistry.

## CONCLUSIONS

This study identified low compliance with dental guidance. Two overarching organisational-level characteristics appeared most influential on the translation of evidence-based guidance in Scottish primary care dental practices: leadership and context. Data synthesis identified that these characteristics act as both barriers and facilitators to KT. The results highlight the complexities around guidance implementation given the varying contexts that exists in primary healthcare. It may be that guidance implementation strategies should be tailored to incorporate these factors to facilitate KT and improve compliance with best practice recommendations.

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**Contributors** HC: manuscript production and revisions, led the scientific development, conduct, datacollection, analysis and interpretation of the study. Responsible for overall content and study guarantor. ST: contributed to the scientific development of the study, commented on drafts. LM: contributed to the scientific development of the study, commented on drafts. CR: contributed to the scientific development of the study, commented on drafts. LY: contributed to the scientific development of the study, commented on drafts. JC: contributed to the scientific development of the study, commented on drafts.

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**Data availability statement** Data are available on reasonable request. All anonymised interview and questionnaire data are available on request from the corresponding author HC (h.c.cassie@dundee.ac.uk).



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