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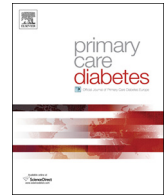
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Original research

A qualitative study exploring strategies to improve the inter-professional management of diabetes and periodontitis

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ABSTRACT

Aims: To explore inter-professional communication and collaboration in guideline-concordant diabetes and periodontitis care.

Methods: Qualitative design using iterations of workshops to identify ways to improve multidisciplinary working attended by staff from medical and dental primary care practices, and people with diabetes (n=43). Workshops were semi-structured around a topic guide. Recruitment was via the UK Clinical Research Network, and a patient and public involvement group in the North of England.

Results: Medical practice participants were unaware of the bidirectional evidence linking diabetes and periodontitis and stated that they had never received a referral from a dental professional in this context. The patient participants with diabetes reported never having been informed about the links between diabetes and periodontitis from either their family physician or dentist. Medical and dental practice participants gave negative accounts of inter-professional communication, with claims of inappropriate requests and defensive or non-responses that stymied future interaction. Indirect communication through the patient was suggested as an alternative to direct communication.

Conclusions: Indirect referral, whereby the patient is signposted to a healthcare professional, was suggested by medical and dental professionals as a useful alternative to the traditional (and time consuming) letter or telephone call, particularly in the case of suspected diabetes or periodontitis.

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1. Introduction

Diabetes has been recognised as a risk factor for periodontitis (advanced gum disease) since the early 1990s, with the risk of periodontitis being increased 2–3 times in individuals with poorly controlled diabetes compared to individuals without [1,2]. Periodontitis is a distressing chronic inflammatory disease of the gums and other supporting tissues of the teeth (including the alveolar jaw bone) which results in progressive tissue damage and ultimately tooth loss if untreated [3]. Notwithstanding the effects of periodontitis on quality of life [4,5], it also impacts on a number of systemic conditions, including diabetes and cardiovascular disease [6–8]. Severe periodontitis has been reported to be the sixth most

prevalent disease globally [9] and UK prevalence data have shown that 8% of the adult population have advanced periodontitis [10].

The pathogenic mechanisms linking periodontitis and diabetes are incompletely understood but the level of glycaemic control is key in determining risk [11]. Similar to the other complications of diabetes, the risk for periodontitis increases with poorer glycaemic control [12,13]. Evidence has emerged to support a bidirectional relationship between diabetes and periodontitis; that is, diabetes increases risk for periodontitis, and periodontitis increases risk of diabetes complications and renders glycaemic control more difficult. Furthermore, there is compelling evidence that there is potential to improve glycaemic control through the treatment of periodontitis [3,14,15]. Meta-analyses and Cochrane reviews have confirmed reductions in HbA1c of 3–4 mmol/mol (0.3–0.4%) following effective periodontal therapy up to 3–4 months after treatment [14–16].

Over the last decade, guidance documents have been published by various professional and scientific organisations to improve

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Table 1
Selected guidance and recommendations for the management of patients with periodontitis and diabetes adapted from Preshaw 2019 [25].

Author, year	Name of document	Target professionals	Summary of recommendations
IDF, 2009 [26].	Guideline on Oral Health for People with Diabetes	Medical	To enquire annually regarding oral self-care and symptoms of periodontitis; inform patients about the links between periodontitis and diabetes; and advise them to see a dentist regularly.
EFP, 2012 [27].	Manifesto: Periodontitis and General Health	Medical and dental	All healthcare professionals: Inform patients regarding the links; advise regular periodontal monitoring; recommends dental and medical collaboration, particularly when there is suspected diabetes.
EFP/AAP, 2013 [28].	Consensus Report and Guidelines: Diabetes and Periodontal Disease	Medical and dental	Medical professionals: inform patients with diabetes about the links; advise to go to see a dentist regularly; newly diagnosed patients should have a periodontal assessment. Dental professionals: inform patients regarding the links; advise regular periodontal monitoring; all newly diagnosed patients with diabetes should receive periodontal assessment; recommends liaising with medical doctor when there is suspected diabetes, and potentially performing a chair-side HbA1c test.
BSP, 2016 [29].	Good Practitioners Guide to Periodontology (2nd edition)	Dental	Inform patients regarding the links and enquire about HbA1c levels; consider liaising with medical doctor regarding HbA1c levels; and liaise with the doctor when there is suspected diabetes.
BSP, 2017 [30].	Diabetes and Gum Disease Campaign (part of the 2017 BSP Gum Health Awareness Day)	Medical	Inform patients with diabetes about the links; advise them to see their dental professional for assessment.
UK DoH, 2017 [31].	Delivering Better Oral Health: An Evidence-Based Toolkit for Prevention (3rd edition)	Dental	Inform patients regarding the links and enquire regarding HbA1c levels; consider liaising with the medical doctor regarding HbA1c levels using a provided template letter.
EFP/IDF, 2018 [17,18].	Consensus Report & Guidelines on Periodontal Diseases and Diabetes	Medical and dental	Medical professionals: enquire regarding symptoms of periodontitis; inform patients about the links; refer newly diagnosed patients for periodontal assessment; advise to see a dentist regularly; and collaborate with the dentist. Dental professionals: inform patients regarding links; perform regular periodontal monitoring; enquire regarding HbA1c levels; liaise with the medical doctor and consider assessing risk of diabetes in patients with suspected (but, as yet, undiagnosed) diabetes (e.g. using a validated screening questionnaire).

AAP, American Academy of Periodontology; BSP, British Society of Periodontology; DoH, Department of Health; EFP, European Federation of Periodontology; HbA1c, glycated haemoglobin; IDF, International Diabetes Federation. Reproduced with permission from Preshaw et al., British Dental Journal 2019 [25].

inter-professional working in the context of diabetes and periodontitis, examples of which are summarised in Table 1. More recently (2018), the European Federation of Periodontology (EFP) and the International Diabetes Federation (IDF) held a joint workshop on diabetes and periodontitis. They published identical papers in both a dental journal (*Journal of Clinical Periodontology*) and a medical journal (*Diabetes Research & Clinical Practice*) aiming to improve inter-professional awareness of the links between the diseases [17,18]. The publications included a suite of guidelines for dental and medical professionals, patients (whether being seen in the context of the medical practice or the dental practice), pharmacists, policymakers, and universities and research centres. The guidelines are all freely available to download from the EFP website [19]. Key recommendations in these publications and others include that:

- medical and dental healthcare professionals should inform patients of the bidirectional relationship between periodontitis and diabetes;
- medical professionals should recommend that patients with diabetes visit a dental professional for assessment, and consider collaborating with the dental team;
- dental professionals should consider liaising with the patient's physician regarding their patient's diabetes control (in the case of patients with known diabetes) or suspected diabetes (in the case of patients who do not currently have a diagnosis of diabetes).

Mixed methods research exploring current practice and views of dental clinicians relating to guidance in the context of diabetes

and periodontitis has shown that there is good uptake of informing patients about the bidirectional relationship, but contacting the patient's doctor is not reported as happening to any great extent [20]. A similar study exploring medical clinicians' current practice and motivation relating to the guidance has shown that the evidence base and published guidance is not widely known and best practice recommendations are not being followed [21]. Notwithstanding, this study found that the evidence for the bidirectional relationship between diabetes and periodontitis was valued by medical clinicians, and informing patients was considered legitimate by the medical team, particularly to the role of nurses [21]. As difficulties with collaborative working between dental and medical clinicians have been reported previously in the literature [22,23], and dissemination of guidelines alone is insufficient in promoting a change in clinical practice [24], this study aimed to explore potential ways to enable improved inter-professional working as outlined in extant diabetes and periodontitis guidance documents.

2. Methods

2.1. Setting and study sample

Qualitative research design with six iterative workshops each lasting between 30–60 min conducted with staff in two medical and two dental primary care practices in the North of England, and two workshops were held with people with diabetes at Newcastle University (Table 2, Fig. 1). Conducting the separate workshops for people with diabetes, the medical staff and dental practice staff

Table 2
Participant characteristics.

Primary dental care		Workshop 1	Workshop 5
Practice-level details	Location	Urban	Semi-rural
	Size/number of patients	25,000	20,000
	Number of participants	8	6
	Female	6	5
Participant-level details	GDP	4	1
	DHT	4	2
	DN	–	3
Primary medical care		Workshop 2	Workshop 6
Practice-level details	Location	Rural	Semi-rural
	Size/number of patients	5,500	7,300
	Percentage of patients with diabetes	4%	16%
	Number of participants	8	9
	Female	6	7
Participant-level details	GP	6	3
	Nurse	2	3
	Practice manager	–	1
	Administrator	–	2
People with diabetes		Workshop 3	Workshop 4
Number of participants		6	6
Age range (years)		43–75	22–64
Female		4	4
Working		2	2
Retired		4	4

GDP, general dental practitioner; DHT, dental hygienist/therapist; DN, dental nurse; GP, general practitioner; %, percent.

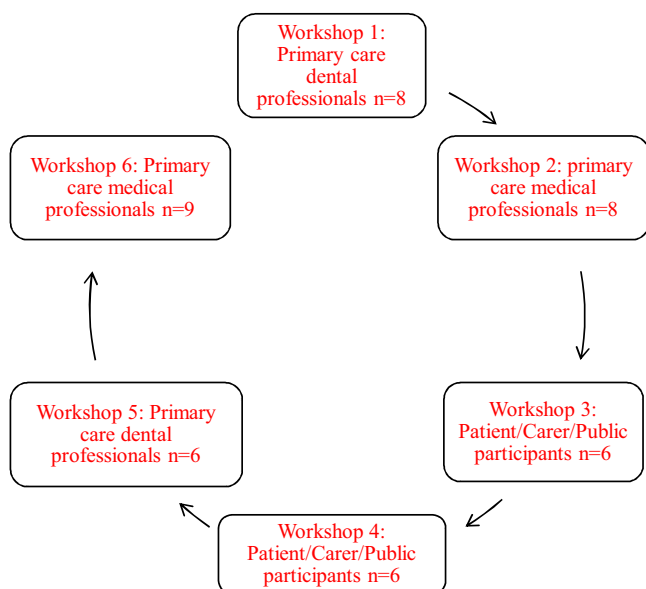


Fig. 1. Flow chart showing six workshops. Workshop 1 began with an introduction that summarised the key components of the association between diabetes and periodontitis. Workshops 2–6 began with an introduction that also included a summary of the results of the previous workshop. Workshop discussions followed a topic guide, however discussion was participant led.

was intended to create a comfortable (familiar) and uninhibited space for discussion, as suggested in multidisciplinary healthcare and social research [32]. Recruitment of the medical and dental practice staff was facilitated by the North East and North Cumbria (NENC) Clinical Research Network (CRN), who distributed a study summary (inviting potential participants to email an expression of interest to the researcher) to research-active dental and medical practices in their region. Workshops took place at lunchtime in the practices, and participants were remunerated in accordance with the Department of Health and Social Care AcoRD guidance [33]. The people with diabetes were recruited from a patient and public involvement (PPI) group at Newcastle University's School of Dental

Sciences and the workshops were held in a seminar room at the university. Travel expenses were refunded and the participants were given a gift card for their participation. All participants were provided with written and verbal information about the study prior to signing consent forms. The recruitment period ran from September 2017 until January 2018. A favourable ethical opinion was obtained from North West-Greater Manchester West National Health Service (NHS) Research Ethics Committee (16/NW/0030).

2.2. Workshop delivery

At the beginning of the workshops, a summary of key components of the association between diabetes and periodontitis was given, together with results of the previous workshop to provide context for discussion. The workshops followed a topic guide, however the participants were encouraged to talk freely and the discussion was participant-led. The discussion concluded with a recap of the main discussion findings (delivered by the workshop facilitator, SMB), ensuring an accurate account of the discussion, which also allowed the participants an opportunity to reflect on their contributions and refine their comments should they wish to do so.

2.3. Analysis

Consent was obtained from the participants to audio-record the workshops and reflective notes were made by the researcher (SMB). The audio recordings were transcribed, anonymised and subsequently checked for accuracy against the recording. Thematic analysis [34] was used to identify common attributes within the data [35]. Notable discussion points and specific comments of interest were identified from the transcripts and supporting reflective notes, and codes or key words were applied by the researcher (SMB), and subsequently discussed with the research team. Following completion of the sixth workshop, the transcripts were revisited and a process of re-reading (whilst listening to the audio recordings) enabled application of the constant comparison method to revise the codes [36]. Emergent patterns and resultant themes were formulated via an inductive approach to the data analysis

[37]. Quotes which illustrated concepts relating to a particular theme were considered in detail and unpacked to explore meaning and develop better understanding. Analytical discussion during meetings of the research team provided the opportunity to further explore and clarify the emergent themes.

3. Results

3.1. Participant characteristics

Participant characteristics ($n = 43$ in total) are shown in Table 2. Two medical practices were recruited, one with a below-average percentage of patients with diabetes (4%) and one with an above-average percentage (16%). Participants were medical practice staff members with a range of job roles including general practitioner (GP), nurse, practice manager and administrator. Two dental practices were recruited, one located in an urban area whilst the other was in a semi-rural area. Participants were dental practice staff members from a range of job roles including dentist (GDP), dental hygienist/therapist (DHT) and dental nurse. Two-thirds of the participants in the workshops that recruited people with diabetes were female, two-thirds were retired and participant ages ranged from 22 to 75 years.

3.2. Themes

Major themes and illustrative quotes are cross-referenced in the text to Table 3. The discussions were prompted by the topic guide and focused on two broad areas: accommodation of evidence and guidelines; and interaction, both experienced and planned.

3.3. Accommodation of evidence and guidelines

During the workshops, participants engaged with the evidence and recommendations, and discussion focused on accommodating new knowledge into the context of their existing views and experience. Medical and dental professionals reported a lack of awareness of various aspects of the published guidance for management of patients with periodontitis and diabetes (Quote 1 (Q1), Table 3). The medical teams had no knowledge of the guidelines or published evidence in the scientific literature but they were surprised to learn, and enthused by, the evidence regarding the effect of periodontitis treatment in improving glycaemic control. Whilst dental professionals were aware of the evidence, some of them were unfamiliar regarding the units used to measure glycaemic control (e.g. mmol/mol or % HbA1c values) and others were unsure of the reliability of patient self-report regarding diabetes control, both of which could reduce effective communication (Q2 and Q3, Table 3). Both the medical and dental staff members expressed doubt in relation to each other's knowledge on the topic, stating that they felt the lack of knowledge was mutual across both professions (medical and dental) (Q4 and Q5, Table 3). Patient participants (diagnosed with diabetes) reported that they had never been informed about the links between diabetes and periodontitis by either their GP or GDP; and they felt the probability of receiving that information in the future was low due to the rushed nature of appointments. Furthermore, there was a suggestion that an oral health educational intervention delivered around the time of diabetes diagnosis, alongside information regarding the complications of diabetes, would ensure that all newly diagnosed patients were informed (Q6, Table 3).

3.4. Experienced and planned interaction

A key factor that led the medical practice participants to doubt the knowledge of dental professionals on the subject area was the

absence of referrals from dental professionals in this context, as reported by the medical practice staff (Q7, Table 3). Whilst it was clear that inter-professional communication did exist in other contexts between medicine and dentistry, albeit rarely, there were numerous accounts of negative experiences from both the medical and dental professionals. For example, some medical professionals reported that they were only contacted by dental professionals in relation to queries regarding a dose adjustment of anti-coagulant medication prior to certain dental procedures (such as tooth extractions); which they (the medical professionals) considered was inappropriate. They felt that dental professionals should seek relevant advice from a dental regulatory or advisory source (Q8, Table 3). In addition, another concern among medical professionals arose when patients with toothache attended the medical practice on the advice of the dental practice (who may not have been able to schedule a timely appointment for the patient), suggesting that the GP would be able to prescribe antibiotics (Q9, Table 3). Issuing antibiotics to patients with toothache was looked upon poorly by these medical practice staff as it was effectively asking the GP to work outside of their scope of practice. Dental professionals also noted poor inter-professional communication and stated that whilst they considered their enquiries to be legitimate, they felt they were often ignored or dismissed by their medical practice colleagues (Q10 and Q11, Table 3). Patients with diabetes wanted their healthcare professionals to take time and explain the relationship between their diabetes and periodontitis, however they reported being rushed 'in and out' of consultations, particularly dental appointments. One patient had encountered an aggressive response from their GP in relation to a dental matter and therefore expressed doubt that communication could ever be improved (Q12, Table 3).

Medical professionals outlined that although they would not recommend direct communication via letters or phone calls due to operational time constraints, they would welcome an indirect referral via the patient (Q13, Table 3). Furthermore, they reported that signposting a patient to the GP was common practice and used by a whole range of people, including hairdressers (Q14, Table 3). Whilst it was noted that not all patients would act on signposting, dental professionals concurred that in the context of diabetes and periodontitis, signposting an individual with suspected diabetes to their GP for investigation was perceived and experienced to be acceptable (Q15 and Q16, Table 3).

4. Discussion

Inter-professional communication and collaborative working in the context of diabetes and periodontitis have been recommended in various best practice guidance publications over the last decade to improve patient care and diabetes outcomes. This study suggests that there may be currently little-to-no interaction between dental and medical clinicians in the context of diabetes and periodontitis, and there appears to be little appetite for improved (direct) communication by clinicians.

Successful introduction and implementation of clinical guidelines have been shown to vary [38,39] and whilst knowledge is important, previous studies looking at the uptake of diabetes recommendations have identified that contextual and motivational barriers can affect implementation [40–42]. Behavioural change is complex and multifactorial. Whilst the workshops revealed a lack of knowledge regarding various elements of the guidelines, previous negative interactions such as inappropriate enquiries and stymied inter-professional communication were the focus of much discussion. Furthermore, a lack of referrals from dental professionals in the context of diabetes and periodontitis, caused medical teams to challenge dental professional's ownership of the guidance. For

Table 3
Themes regarding collaboration in the context of diabetes and periodontitis and illustrative quotes.

Theme	Quotes
Accommodation of evidence and guidelines	<p>Q1: I think it makes sense. . . I suppose they have increased risk of, almost everything. . . but do we know why? Do we know why they have poorer glycaemic control? Is it because of, inflammation and infection that causes worsening of it? (Medical professional, W2001: 51–56).</p> <p>Q2: I wouldn't know to that, sort of, depth. . . like things like your HbA1c, it's not, I know the term, but I don't know it in and out, 'cos [because] it's just not something that. . . I would have to probably look it up, just to inform myself a little bit. (Dental professional, W1008: 150–153)</p> <p>Q3: . . . in my experience. . . you're not really sure how well it's [diabetes] being managed. . . and neither are they (the patient) probably for that matter. . . (Dental professional, W1003: 85–88).</p> <p>Q4: What is their [dentist's] awareness of the links between periodontitis and diabetes? Or what's their ownership of it? 'Cos you know. . . work[ing] in silos. . . where, 'it's a dental problem, not mine', but obviously, it's very joined together. (Medical professional, W2003: 671–676).</p> <p>Q5: I think they (general practitioners) don't probably appreciate, they don't appreciate this link, but I think they also don't appreciate, the level of understanding that as a professional group, we have, of how, if you like, our world [the oral cavity] impacts on the greater systemic world [systemic health]. (Dental Professional, W1003: 363–365).</p> <p>Q6: . . . you know, so it's part of the, the education rather than, you know, if you're lucky enough to have a doctor that's going to, a dentist that's going to take this on board, you could miss out couldn't you? But, if it was part of the education, in general for newly diagnosed, well everybody would be aware of it. (Patient participant, W3005: 1255–1257)</p>
Experienced interaction	<p>Q7: What about the other way around? What about dentists referring to us? I've never had anyone who's been sent to me by a dentist saying, "I've been told I need to tighten up my diabetic control". (Medical professional, W2003: 668–671).</p> <p>Q8: If they're on warfarin [anti-coagulant therapy], "what is the advice about warfarin for doing surgery", that's what they ask. (Medical Professionals, W6007: 740–741).</p> <p>Q9: We've had them in the last few weeks again where they've [the patient] had a [dental] problem, they've contacted the dentist and they've been told . . . "Oh, go to your doctor. . . he'll give you antibiotics". We don't prescribe [in] that [scenario], no we won't [give antibiotics]. We have written to all the dentists before and said, to remind them that they shouldn't be sending dental patients to us. (Medical professional, W6009: 630–665).</p> <p>Q10: Based upon the times I've contacted GPs to ask for blood tests, you know, when it might be you have a suspicion of anaemia or other things. . . they're not really ve[ry], in my opinion, not particularly receptive to that. (Dental Professional, W1003: 277–288).</p> <p>Q11: If we make the referral, it's not usually very well received at all. . . I think there's a perception they think we're interfering or we're, we're stepping beyond our remit. . . (Dental Professional, W1003: 357–358)</p> <p>Q12: Well, I get a [diabetes] review twice a year. . . they're very good. . . but, my doctor is. . . violently against, anything to do with dentistry. . . they [say they] haven't got time. . . they don't see the holistic, sort of, situation. (Person with diabetes, W3002: 1115–1138).</p>
Planned interaction	<p>Q13: The best thing for [the dentist] to do would be. . . to encourage them just to come along, like, we don't want loads of letters, but if they can just encourage, we'd always be happy to see them and check [HbA1c] and do their [bloods], you know. (Medical Professional, W2006: 749–754)</p> <p>Q14: I think that's the easiest way, we've got hairdressers sending us patients, chiropractors do. . . if the dentist said, "Go and see your doctor, 'cos I think these two are linked", they would come, some of them would come. . . we probably wouldn't be that responsive to a letter, but if they use the patients as the vehicle, it's their body, and then the ones that are interested would come." (Medical Professional, W2003: 787–802).</p> <p>Q15: I didn't contact their GP, but we advised them to go and get tested and they did. I didn't actually write a letter or anything, they, they went, I explained the risk of diabetes, had my suspicions, I've done it on about 3 patients that we've, we've advised to go for testing. (Dental Professional, W1007: 269–270).</p> <p>Q16: Well yeah, and probably, a bit of thinking, is it easier for the patient just to make that call themselves, and go and do it themselves. (Dental Professional, W1003: 265–266).</p>

Q1, Q2: quote 1, quote 2 etc. W#, workshop number and participant identifier, followed by the corresponding line numbers that relate to the location of the quote within the transcription.

their part, dental participants knew of the evidence, but described a history of non-replies or dismissive responses from GPs.

Miscommunication between dental and medical clinicians has previously been reported elsewhere in the literature. A study of German GPs and GDPs showed problematic collaborative working with allegations of poor knowledge, uncertainty of role and previous difficult interactions [23]. Holzinger et al. also reported GPs' frustration relating to requests from GDPs for advice on anticoagulant therapy and dose adjustment for dental procedures, suggesting that this practice is widespread [23]. Cope et al. found UK GPs to be equally frustrated when faced with prescribing antibiotics to treat dental pain (particularly given concerns regarding antimicrobial resistance) [43].

Miscommunication between physicians and other allied health professionals in the context of diabetes has also been reported, with barriers relating to uncertainty of role and distrust of inter-professional working [44–46]. Schweizer studied inter-professional collaboration and diabetes care in Switzerland and suggested that perception about collaboration is important and the negative experiences of communication are likely to influence team-working [46]. The findings of the current study are consistent with the literature and suggest that despite the continued publica-

tion of international guidance documents advocating the benefits of inter-professional communication, the implementation of these recommendations offer a significant challenge for dental and medical clinicians and additional strategies are needed to change clinical practice.

With time constraints being common in healthcare, minimal disruption has been reported to be important in the implementation of clinical behaviours [47]. Active signposting has been shown to be effective in the context of reducing the amount of inappropriate GP consultations by triaging patients to a more appropriate healthcare professional [48]; and it is recommended in the UK NHS Year of Care initiative for managing long term conditions [49]. During the workshops, previous occurrences of indirect referral were described as acceptable by dental professionals in the case of suspected diabetes; and medical professionals suggested that indirect referral from a variety of sources was not only commonplace, but actually preferred over a letter or a telephone call. Furthermore, NHS England have (August 2019) published a commissioning standard for the dental care of people with diabetes that recommends signposting. The document states that considerable NHS savings can be made by informing patients with diabetes (in the medical practice) about the links between periodontitis and dia-

betes and signposting them to a dentist for periodontal screening [50].

In the event of patients with diabetes and periodontitis, particularly those with poorly controlled diabetes who do not have a dentist, engaging with and acting on information and signposting by their family physician (or nurse), they stand to benefit from periodontal treatment that has the potential to improve their glycaemic control. HbA1c reductions of up to 3–4 mmol/mol seen up to 3–4 months after periodontitis treatment [15] could be a significant incentive for improved inter-professional communication. Whilst it is uncertain whether the implementation of the NHS commissioning standard will be more successful than that of previous diabetes and periodontitis guidance, further research is needed to explore whether signposting in the context of diabetes and periodontitis offers an effective substitute to direct referral and an important solution to the problems associated with inter-professional communication.

4.1. Strengths and weaknesses

Six workshops enabled exploration of the perspectives of patients, medical and dental professionals to interprofessional communication in the context of diabetes and periodontitis. Workshops were considered appropriate methodology as they would enable learning, broad discussion and problem solving. However, the availability of interested healthcare professionals and patients made recruitment problematic. This led to the decision to recruit at a practice level and through a PPI group. To facilitate recruitment further, the workshops were held either at lunchtime or as part of an established meeting, and refreshments and remuneration provided. Future research should aim to conduct an integrated workshop with people with diabetes and healthcare professionals together as it may stimulate alternative discussion on this topic.

5. Conclusion

Whilst inter-professional collaboration in the context of diabetes and periodontitis is a key recommendation that features in numerous published best practice guidance documents, it is clearly complex and challenging to implement. We consider that it is important for academics and specialists involved in guideline publication to consider the implementation of their recommendations as part of the process of developing guidance. Indirect referral, whereby the patient is signposted to a healthcare professional, was suggested by medical and dental professionals as a useful alternative to the traditional (and time consuming) letter or telephone call and has recently been recommended in an NHS commissioning standard outlining dental care for people with diabetes. Further research is necessary to evaluate signposting in this context to establish whether it is an effective, albeit indirect, communication tool.

Conflict of interest

No potential conflict of interest was reported by the authors.

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