



Qualitative analysis of cardiovascular disease prevention in dental practice

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ABSTRACT

Background: The primary prevention of periodontal disease is a global health concern due to its increasing incidence and evolving evidence of its role in cardiovascular disease (CVD). This study aimed to describe dentists' perceptions and practices regarding CVD prevention in practice.

Study design and methods: A qualitative study design, using semi-structured interviews, was used to determine the perceptions, practices, barriers, and enablers of dentists towards the implementation of CVD prevention in practice. Interviews were analysed using a thematic analysis framework. NVivo 12 Pro software was utilised to support the data analysis.

Results: Eleven participants (eight female) with a mean employment history of 17.45 years, were interviewed, at which point data saturation was reached. The semi-structured interviews ranged in duration from 45 to 86 min, with a mean duration of 62.5 min. All dentists interviewed were in private practice. Inductive thematic analysis revealed four major themes - dentists' current practices in relation to preventive cardiology in practice; professional identity and role expectations; barriers to preventive cardiology in practice; and facilitators of preventive cardiology in dental practice.

Conclusions: This study highlights the current practices, perceptions and identified barriers and enablers to preventive cardiology in Irish dental practice. Future research should focus on educational interventions to improve the implementation of CVD prevention guidelines in dental practice.

1. What this study adds

- Dentists recognise the link between oral and cardiovascular health.
- Barriers exist to implementing CVD prevention advice in dental practice.
- Dentists identify multiple enablers of CVD prevention in a dental office setting.

2. Implications for policy and practice

- There should be a greater focus on the importance of oral health in CVD prevention.
- Dentists are well positioned to provide a holistic life course approach to prevention.
- Government policy should promote interprofessional collaboration between dentists and other healthcare professionals.

3. Introduction

Greater focus is being placed on the relationship between periodontal and atherosclerotic cardiovascular disease (CVD). While CVD and periodontitis share common risk factors including smoking, systematic review of research has determined an association between periodontitis and myocardial infarction [1], stroke [2], peripheral arterial disease [3], and hypertension [4], mediated largely through inflammation. Preventive dental care is accepted as a critical component of positive general health. A randomised controlled trial examined the effectiveness of periodontal treatment on reducing primary and secondary cardiovascular events [5].

The primary prevention of periodontal disease is a key global health concern due to its increasing incidence, and the evolving evidence of its role in CVD. Dentists are aware of the periodontal-CVD relationship, yet a lack of knowledge and education has deterred them from providing CVD preventive advice to patients in dental practice. This study aimed to describe dentists' perceptions, current practices, barriers, and enablers

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in relation to CVD prevention in dental practice.

4. Methods

A qualitative study design, using semi-structured interviews, focused on descriptive phenomenology to gain an insight into Irish dentists' practices, to determine their perceptions, practices and the barriers and enablers they face in the implementation of preventive cardiology in practice. A structured interview template was employed to guide the interviews (Supplementary file). Interview prompts were utilised to gain greater insights into dentists' lived experiences.

Participants were recruited using purposive sampling. The study population comprised English-speaking dentists in active clinical practice. Data were collected via the videoconferencing telecommunication application ZOOM. Field notes were taken during each interview to aid later transcription. Interviews were transcribed verbatim thereafter. The interviews concluded when no new themes were obtained from the transcripts. Interviews were analysed using a thematic analysis framework. NVivo 12 Pro software was utilised to support the data analysis. Quotations were extracted from the transcripts to illustrate the themes that emerged from the study.

Participants provided informed consent after reading a participant information sheet. To maintain confidentiality and anonymity interview transcripts were identified by participant number only (e.g. P1,P2 etc.). Verbal consent to proceed with interviews was given by each participant on the video conferencing platform. Ethical approval was granted by the Galway University Hospitals Clinical Research Ethics Committee (C. A. 2328).

5. Results

Eleven participants (eight female) with a mean employment history of 17.45 years, were interviewed, at which point data saturation was reached. The semi-structured interviews ranged in duration from 45 to 86 min, with a mean duration of 62.5 min. All dentists interviewed were in private practice. The participating dentists were derived from urban practices in towns and cities throughout the Republic of Ireland (counties Cork, Dublin, Longford, Galway, and Sligo). Inductive thematic analysis revealed four major themes with multiple subthemes and representative quotations (Table 1).

While all dentists were interested in preventing disease within the oral cavity, a minority were actively addressing cardiovascular health risk in patients with known CVD and periodontitis. Dentists perceived themselves as having an important indirect role in CVD prevention through addressing the prevention of oral disease and promoting good oral hygiene.

Many barriers were identified to providing preventive cardiology advice in dental practice. There was a strong perception among interviewees that healthcare is delivered in isolated systems. This was a deterrent to providing wider health advice in practice with a risk of causing interprofessional tension and due to patients' preconceived perceptions of the dentist as focused on aesthetics and something other than a healthcare provider. Practice isolation and absence of access to referral systems such as smoking cessation programmes to reduce oral and CVD risk were cited as problematic for the provision of holistic preventive patient care. Some reported feeling uncomfortable discussing CVD risk with patients without set guidelines or solid evidence for oral-cardiovascular health links. Dentists mentioned acute presentations, cost, and time limits on consultations as deterrents to providing preventive cardiology advice in practice.

Many actions to allow preventive cardiology to be facilitated in dental practice were suggested. Continuing professional development (CPD) was cited as a method that would allow dentists give patients holistic advice and information. Interprofessional collaboration and shared practice were frequently discussed. A collaboration between the dental and cardiac representative bodies was suggested to facilitate

Table 1
Summary of themes, sub-themes and representative quotations emerging from the semi-structured interviews.

Theme	Sub-themes	Representative Quotations
Dentists' current practices in relation to preventive cardiology in practice	Common risk factor approach	"I'll usually say there's a lot of complex factors that affect your gum disease, diet and stress and within that I'll talk about systemic disease, if they have risk factors for diabetes or heart disease I might hone in on that." (P7)
	Oral health advice for primary CVD prevention	"I do touch on we now know from decades of research that, the mouth is a big avenue to the bloodstream, if you have inflamed gums you tend to have inflamed linings to your arteries and your body." (P4)
	Secondary CVD Prevention	"I talk about and explain gum health and the possible link and particularly in your case you've already had stents and high blood pressure and you don't want other risk factors that could elevate your risk of a bad outcome." (P4)
	Dentists' perceptions of their role in practice	"Dentists certainly think they have an indirect role in CVD and general health am maintenance and prevention." (P5)
Professional identity and role expectations	Dentists' views of public's expectations	"It's clearly not viewed as important as the GP or hospital services, I think it's seen as cosmetic you know, a lot of people will not go let's say unless a filling is needed towards the front." (P1)
	Systems approach to health-working in silos	"You don't want people to be kind of feeling like dentists are going over other people's heads or the GPs feeling the dentists are doing what they shouldn't be doing." (P1)
	Barriers to preventive cardiology in practice	"I haven't referred anyone to smoking cessation since I was in England, I don't even know if there's somewhere I can refer to here." (P8)
	Absence of evidence and clinical guidelines	"If there's solid evidence that can be presented to the patient then yes I mean, a lot of the time it could be mentioned in passing, it might just change things a little bit I suppose if it were a requirement you know." (P7)
	Acute care and dental specific focus	"If someone has gum disease it's hard enough to discuss the dental aspects of it, I think if you started talking about heart disease you would lose them altogether, so no I don't mention CVD or systemic health apart from smoking." (P9)
	Poor public awareness of oral-systemic link	"It's not commonly mentioned by their GP, it's not commonly mentioned on television, its only down to the dental hygienist and dentist telling you." (P4)
	Education and training for dentists	"A lecture, what to do, when to refer, how to motivate, there would be a role out of awareness and

(continued on next page)

Table 1 (continued)

Theme	Sub-themes	Representative Quotations
Facilitators to preventive cardiology in practice	Interprofessional collaborative approach	implementation and hopefully yielding results in 5, 10, 15 years in reduction of cardiovascular illnesses." (P3) "If it's coming from lots of different people and lots of different directions then I think people will accept the information and little seeds that we plant will grow into useful habits." (P6)
	Access to referral pathways	"Having access things like smoking cessation, so the whole system works together to plug in holes, so nobody is falling through the cracks." (P1)
	Government health policy	"I think the government needs to educate the population with a hard-hitting ad campaign, there's none of that, people don't die of gum disease in general it's hard for them to justify spending the money." (P11)
	Holistic focus on health	"Unless you treat people in a holistic manner, one failing is going to leak into another and pretty soon everything is going to fall apart, incorporating that oral care and you know dentistry is a vital part in keeping the rest of the body healthy". (P1)
	Redirection of healthcare budget	"If the government took the acute budget down 1 % per year and put it into prevention it would be beneficial." (P3)
	Life course approach to prevention	"Teaching kids in schools about the importance of oral health and hygiene and regular visits to the dentist." (P10)

dissemination of relevant evidence-based information regarding the oral-cardiovascular health link.

6. Discussion

This study is the first of its kind to explore dentists' experiences of CVD prevention in practice. Consensus guidelines recommend that patients with periodontitis without known CVD should be educated on their increased risk of acquiring CVD, to empower them to manage other multifactorial risk factors and minimise overall cardiovascular risk [6]. Glick and Greenberg asserted that dentists play a crucial role in CVD prevention [7]. They estimated that over 300,000 high-risk asymptomatic adult males could have been identified in dental practice by calculating Framingham risk scores. Use of SCORE charts in practice can help identify high-risk asymptomatic individuals and has been advocated for use in the dental setting [6]. Although cardiovascular risk screening is not current practice among this cohort of Irish dentists, there is potential with adequate training and further integration of dental practice in primary care. This could allow dentists access to shared electronic systems to manage patients more holistically and improve communication and collaboration with other professionals, as well as being cost effective for healthcare.

One of the strongest themes to emerge in this study was the multiple barriers dentists faced in addressing CVD prevention in practice. Poor public awareness of the periodontitis-CVD link was frequently

mentioned, as well as limited public knowledge of the dentist's role in maintenance of systemic health. Reduced public health literacy and lack of awareness were deterrents to providing preventive cardiology advice in practice. Collaboration between dental and cardiac representative bodies was called for to support professionals to discuss the link in practice more readily. Smoking cessation advice was a component of preventive care for some dentists, yet absence of referral pathways due to practice isolation impeded them from referring those seeking to quit smoking.

Dentists in this study had never received referrals from GPs or cardiologists for periodontal screening, despite guidance advocating this interdisciplinary collaboration for primary and secondary CVD prevention [6]. Compartmentalisation of professional roles because of siloed care affected dentists' ability to deliver extra-oral health promoting and preventive advice. A cross-sectional study examining cardiologists' practice behaviours relating to oral health and CVD demonstrated that 46 % of cardiologists believed it was the responsibility of the dentist to carry out an oral examination, reiterating the segregation of roles in practice [8]. Nevertheless, a cross-sectional study of patients with cardiovascular disease has shown that non-dental professionals could play a more active role in disseminating periodontal preventive advice [9].

We have previously observed that dentistry tends to be segregated from mainstream medical practice, despite the obvious synergy between the two disciplines [10]. Enhanced integration of oral health into undergraduate medical education curricula and primary care practice would facilitate the common risk factor approach and promote preventative measures and screening for better patient outcomes and a reduction in healthcare costs. Likewise, dentists should be encouraged and incentivised to adopt a more proactive role in preventive medicine, for example by counselling patients with periodontitis around the importance of screening for other cardiovascular disease risk factors [10]. Many universities with medical schools lack dental schools and it is therefore highly desirable to develop closer interprofessional links between these two pillars of healthcare. A joint interprofessional curriculum in preventive oral health care would foster greater integration between dentistry and medicine.

While this is the first study of its kind, this research was limited to dentists in private practice in a single country with a structure of dental care similar to that of other countries in the western world. Dentists in this cohort may not be representative of all dentists, including those engaged in both public and private practice. The open-ended nature of semi-structured interviews may lead the interview to ask leading questions, which can introduce bias. Conversely, the study participants may be subject to social desirability bias.

7. Conclusions

This study highlights the current practices, perceptions and identified barriers and enablers of preventive cardiology in Irish dental practice. For perceived barriers to be overcome there should be reform of school and professional curricula, interdisciplinary education and training, and prioritisation and ease of access to preventive care. Future research should focus on educational interventions to improve the implementation of CVD prevention guidelines in dental practice.

Ethical research

Ethical approval of the research protocol was granted by the Galway University Hospitals Clinical Research Ethics Committee (C.A. 2328).

Authors' contributions

G.T.F., A.O'F. and R.G. contributed to the conception, design, and acquisition of the work. All authors contributed to the analysis and interpretation of data for the work. G.T.F. and C.H.L. drafted the manuscript. All authors critically revised the manuscript, gave final

approval, and agree to be accountable for all aspects of work ensuring integrity and accuracy.

Data availability

Interview transcript material may be shared upon reasonable request to the corresponding author.

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Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.puhp.2025.100586>.

References

- [1] L. Rydén, K. Buhlin, E. Ekstrand, et al., Periodontitis increases the risk of a first myocardial infarction: a report from the PAROKRANK study, *Circulation* 133 (6) (2016) 576–583, <https://doi.org/10.1161/CIRCULATIONAHA.115.020324>.
- [2] N.C.F. Fagundes, A.P.C. Almeida, K.F.B. Vilhena, M.B. Magno, L.C. Maia, R. R. Lima, Periodontitis as a risk factor for stroke: a systematic review and meta-analysis, *Vasc. Health Risk Manag.* 15 (2019) 519–532, <https://doi.org/10.2147/VHRM.S204097>.
- [3] S. Yang, L.S. Zhao, C. Cai, Q. Shi, N. Wen, J. Xu, Association between periodontitis and peripheral artery disease: a systematic review and meta-analysis, *BMC Cardiovasc. Disord.* 18 (1) (2018) 141–148, <https://doi.org/10.1186/s12872-018-0879-0>.
- [4] E. Muñoz Aguilera, J. Suvar, J. Buti, et al., Periodontitis is associated with hypertension: a systematic review and meta-analysis, *Cardiovasc. Res.* 116 (1) (2020) 28–39, <https://doi.org/10.1093/cvr/cvz201>.
- [5] W. Liu, Y. Cao, L. Dong, et al., Periodontal therapy for primary or secondary prevention of cardiovascular disease in people with periodontitis, *Cochrane Database Syst. Rev.* 12 (12) (2019) CD009197, <https://doi.org/10.1002/14651858.CD009197.pub4>. Update in: *Cochrane Database Syst. Rev.* 2022;10: CD009197.
- [6] M. Sanz, A. Marco Del Castillo, S. Jepsen, et al., Periodontitis and cardiovascular diseases: consensus report, *J. Clin. Periodontol.* 47 (3) (2020) 268–288, <https://doi.org/10.1111/jcpe.13189>.
- [7] M. Glick, B.L. Greenberg, The potential role of dentists in identifying patients' risk of experiencing coronary heart disease events, *J. Am. Dent. Assoc.* 136 (11) (2005) 1541–1546, <https://doi.org/10.14219/jada.archive.2005.0084>.
- [8] M. Mosley, S. Offenbacher, C. Phillips, C. Granger, R.S. Wilder, North Carolina cardiologists' knowledge, opinions and practice behaviors regarding the relationship between periodontal disease and cardiovascular disease, *J. Dent. Hyg.* 88 (5) (2014) 275–284.
- [9] P. Sanchez, B. Everett, Y. Salamonson, et al., The oral health status, behaviours and knowledge of patients with cardiovascular disease in Sydney Australia: a cross-sectional survey, *BMC Oral Health* 19 (1) (2019) 12–20, <https://doi.org/10.1186/s12903-018-0697-x>.
- [10] K.J. O'Brien, V.M. Forde, M.A. Mulrooney, E.C. Purcell, G.T. Flaherty, Global status of oral health provision: identifying the root of the problem, *Public Health Challenges* 1e6 (2022) 1–5, <https://doi.org/10.1002/puh2.6>.