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Oral Healthcare and Cardiovascular Disease

A Scoping Review of Current Strategies and Implications for Nurses

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Background: There is epidemiological evidence showing an association between periodontal disease and cardiovascular disease (CVD). Despite this evidence* no comprehensive review has been undertaken to identify strategies to improve the oral health of people with CVD. **Objectives:** The aim of this review is to identify current evidence relating to the oral healthcare and management of patients with CVD. **Methods:** A scoping review was undertaken focusing on 4 key areas, namely, the impact of periodontal treatment on CVD, current recommendations regarding oral health and CVD, the role of nurses in promoting oral health, and available resources to support them. Databases were searched using a combination of keywords and search terms and 34 articles were selected. **Results:** Systematic reviews suggest that periodontal treatment may improve CVD outcomes by reducing systemic inflammation and improving endothelial function. However, there is insufficient evidence to confirm or refute these findings. International guidelines recognize the link between periodontal disease and CVD and recommend preventative strategies in this area. Non–oral health professionals, including nurses, can promote oral health and have been undertaking this role in areas like aged care and pregnancy. However, this aspect of nursing care has not been explored in the cardiac setting and no relevant training and assessment tools are available. **Conclusions:** Maintaining oral health among cardiovascular patients is important, yet it appears to be neglected during cardiac care. Cardiac nurses are in an excellent position to promote oral health but further research is required to define their role and develop supporting resources.

KEY WORDS: cardiac rehabilitation, cardiovascular disease, nurses, oral assessment tool, oral health promotion, periodontal disease

Cardiovascular disease (CVD) is one of the leading causes of death globally, with most of these deaths due to coronary heart disease and stroke.[1] Coronary heart disease is a subclass of CVD along with cerebrovascular disease, peripheral vascular disease, and heart failure.[2]

In recent years, CVD has declined in developed countries, although it continues to cause significant burden. For instance, in the United States between the years 2003 and 2013, the number of CVD deaths per year declined by 11.7%, yet in 2013 alone, 1 in every 3 deaths was attributable to CVD.[3] In the United Kingdom, in 2014, CVD was the second most common cause of death (27%) after cancer,[4] and in Canada, in 2012,

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1 person died of heart disease or stroke every 7 minutes.[5] In Australia, CVD contributed to 30% of all deaths in 2013, with coronary heart disease accounting for almost half of these cases (45%).[6,7]

Whereas a number of well-established risk factors have been linked with CVD, including high blood pressure, smoking, high cholesterol, limited physical activity, and obesity,[2] less well known is the role that poor oral health (mainly periodontal disease) plays as a potential risk factor for CVD.[8–10] The idea of a relationship between poor oral health and systemic disease is not new, with inflammatory conditions such as joint pain treated by tooth extraction first reported in ancient Greece.[11] Over the last 20 years, there has been renewed interest in better understanding this relationship, in particular the relationship between periodontal disease and CVD.[8,11–16] Periodontal disease is a chronic inflammation of the gum (gingiva), ligaments, and bony structures that hold the tooth in place.[17]

Evidence of the specific mechanisms involved in the link between periodontal disease and CVD is well detailed.[10,18] Bacteria associated with periodontal disease can attach to atheromatous plaques, causing inflammation and damage, leading to elevated proinflammatory cytokines. This, in turn, can exacerbate systemic inflammation, leading to atheroma formation and ultimate rupture. Periodontal disease has also been linked to platelet aggregation and endothelial dysfunction, with associated elevated biomarkers such as serum C-reactive protein, interleukin-6, and tumor necrosis factor-α, all of which can contribute to increased inflammatory responses.[18] Several clinical studies suggest that the prevalence of CVD seems to be highest among those individuals in whom periodontitis coexists with elevated C-reactive protein and proinflammatory cytokine levels.[19–24]

Several systematic reviews and meta-analyses of longitudinal and interventional studies have shown that periodontal disease is a risk factor for CVD or coronary heart disease when there is elevated bacterial exposure leading to inflammation, with some studies suggesting that the association is independent of other coronary risk factors.[9,17,25–28] Other studies found modest evidence of the link between periodontal disease with atherosclerosis, CVD, or coronary heart disease.[13,14,29–32] Kolltveit and Eriksen[33] state that it is difficult to establish the relationship between periodontal disease and atherosclerosis because of the multifactorial origins of the 2 conditions. The association between periodontal disease and coronary heart disease was reiterated in a recent large meta-analysis of prospective cohort studies involving 230 406 participants. The analysis concluded that periodontal disease has a significant and independent association with increased risk of coronary heart disease and that epidemiological studies are necessary to confirm this link, which could have significant implications on current clinical practice.[25] Furthermore, a recent longitudinal study in Australia involving 172 630 individuals with CVD showed that tooth loss and self-rated gums problems are markers for increased risk of ischemic heart disease.[34] Two recent large studies in the United States and Europe also showed that new cases of periodontal disease, not just those preexisting, increase the risk of future cardiovascular events.[35,36]

Despite the growing evidence on the association between periodontal disease and CVD, no comprehensive review has been undertaken to identify strategies to improve the oral health of people with CVD. This is important as it appears that very few people with established CVD seek dental care (38%), even when they have a dental problem, with one of the barriers being lack of oral health awareness.[37] It is thus essential to examine current recommendations in this area as well as emerging strategies involving nurses that could address the oral health needs of CVD patients. Gathering this information will better inform cardiac care providers as oral health may not be considered a priority in CVD. The findings will also provide direction for future oral health strategies and best practices for nurses who are at the forefront of patient care in the cardiac setting.

Aim

The aim of this scoping review is to identify current evidence relating to the oral healthcare and management of patients with CVD. Specifically, this review sought to answer the following questions:

- What is the evidence of the impact of periodontal treatment on CVD outcomes?
- What are current recommendations regarding oral healthcare for all people with CVD?
- What is the evidence regarding the role of nurses in oral health promotion?
- What training resources and tools are available to assist nurses in oral health promotion?

Methodology

Design

A scoping review methodology was selected to examine the extent of literature available, summarize the findings, and identify gaps in the literature.[38,39] The review was undertaken using the Arksey and O'Malley methodology framework.[39] The need for this scoping review arose as a result of the intricacy of the focal concept, the scope of the research questions, and the range of available literature on the topic. This method was selected because it is suited to the gathering of a diverse body of studies, in this case qualitative and quantitative studies as well as consensus statements, recommendations, guidelines, and other related literature. Another advantage

is that the scoping review process is not linear and restrictive but iterative, allowing researchers to go back and forth and redefine search terms and research questions based on initial findings.[39]

Data Extraction

With the assistance of a health librarian, an initial literature review of available relevant articles was undertaken using the following databases: CINAHL, MEDLINE, Embase, Cochrane Central, Joanna Briggs Institute, Health Collection for Australian publications, PubMed Central, and Conference Papers Index–ProQuest. To identify unpublished literature, reports, discussion papers, and conference proceedings, databases and registers including the National Technical Information Service and the Health Management Information Consortium were searched. Clinical trial databases and government sites were also explored. Finally, the reference lists and bibliographies of all relevant studies were hand searched for further references.

As each database had its own unique indexing terms, individual search strategies were developed for each database. A combination of keywords and search terms using Boolean operators, truncation, phrase searching, and Medical Subject Headings were used in the search strategies. Keywords included *oral health, periodontitis*, *periodontal disease*, *periodontal treatment*, *cardiovascular disease*, *heart disease*, *oral health education and/or promotion*, *oral health assessment/tool,* and *nurses/cardiac care clinicians*. The search included all relevant published and unpublished literature available in the English language, including abstracts/full text and qualitative/quantitative studies.

Study Selection

All literature relating to the study aim and research questions were selected. Literature including adult inpatients and outpatients and where abstracts were available in English was included in the search. No filter for the date was placed to ensure that all relevant articles were identified. Literature relating to children, dentistry, dental professionals (dentists/hygienists), and oral/dental hygiene was excluded from the search. Key information, including authors, year of publication, study setting and population, outcome measures, and recommendations/results, was extracted from each article and summarized using tables. Only Level 1 evidence studies (meta-analysis and systematic reviews) were chosen to answer the first research question (impact of periodontal treatment on cardiovascular outcomes). The second area focused on international recommendations and/or consensus statements as well as government policies and guidelines regarding oral healthcare for patients with CVD. The third focus area (the role of nurses promoting oral health) included Level 1 evidence (systematic reviews), literature reviews, trials, and best practice guidelines. In the last focus area (oral health training resources and tools to assist nurses in oral health promotion), trials, pilot studies, cross-sectional studies, and best practice recommendations were searched. The last 2 focus areas initially targeted studies in the cardiac setting; however, as the preliminary search revealed no results, the research questions were revised and the focus was expanded to other healthcare settings.

Results

In the initial search, a total of 3846 potentially relevant articles were found. After screening for relevance and removal of duplicates and nonrelevant articles based on the inclusion/exclusion criteria and review of title and abstract, 3787 articles were excluded. Full-text versions of the remaining 59 articles were obtained and reviewed by 2 of the authors (PS, AG). After further exclusion of 25 articles, a final selection of 34 papers was then sorted into the 4 focus areas (Figure).

Impact of Periodontal Treatment on Cardiovascular Outcomes

Evidence of the impact of periodontal disease treatment on CVD outcomes has been reviewed in several systematic reviews and meta-analyses. This review identified 10 relevant studies.[19,20,22,40–46] To evaluate the methodological quality of the systematic reviews and meta-analyses, the tool Assessment of Multiple Systematic Reviews was used.[47] Of the studies selected, 6 were rated as high quality, 3 as medium quality, and 1 study as low quality by 2 reviewers (PS, AG) (Table 1).

Cardiovascular outcomes explored in the studies included biomarkers related to systemic inflammation, which affects endothelial function contributing to atherosclerosis.[48] Although 1 older study did not find evidence that periodontal treatment can reduce C-reactive protein levels,[42] 7 more recent systematic reviews and meta-analyses studies showed improvement in endothelial function associated with reduction of inflammatory markers, especially C-reactive protein.[19,20,22,41,44–46] One study found short-term reduction in C-reactive protein levels with a stronger periodontal treatment effect on people with existing comorbidities, especially CVD and diabetes.[40] Three studies showed improvement of other biomarkers associated with atherosclerotic disease: interleukin-6, tumor necrosis factor-α, fibrinogen, cholesterol levels, and triglycerides.[20,22,46]

Overall, the evidence found, including a recent Cochrane review, does not support or refute whether periodontal treatment can prevent recurrent cardiovascular events or CVD in the long-term, and there is no evidence available on primary CVD prevention.[20,22,43]

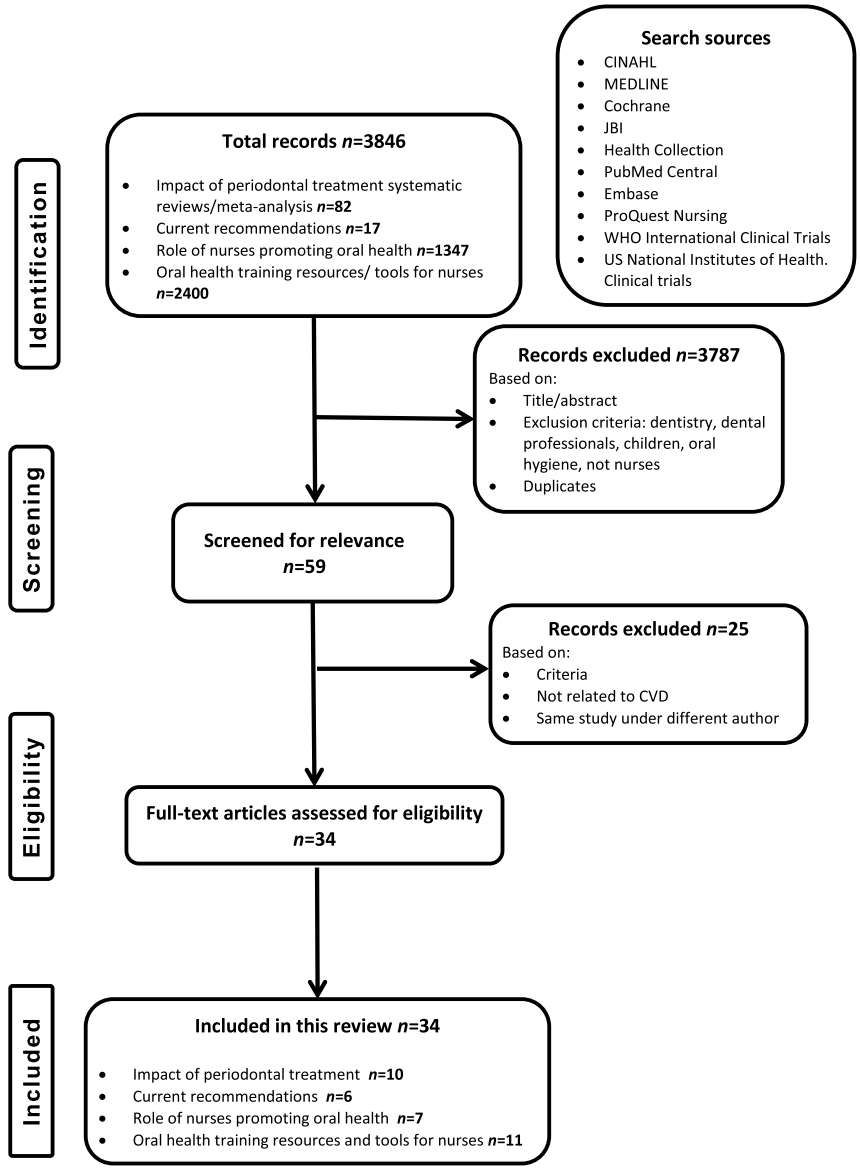

FIGURE. *Search flowchart.*

Current Recommendations Regarding Oral Healthcare for Patients With Cardiovascular Disease

Most of the recommendations in this area originate from the United States and Europe. The *American Journal of Cardiology* and *Journal of Periodontology* consensus report[49] recognizes the link between periodontal disease and CVD and recommends treatment and preventative approaches to reduce the risk of primary and secondary cardiovascular events. The report also states that prospective studies are needed to determine the effectiveness of periodontal treatment on CVD outcomes, but on the basis of current data, it is important to reduce inflammatory markers associated with periodontal disease to decrease the risk of CVD. It is now recommended that patients at risk should be informed about the association between atherosclerotic CVD and periodontal disease, have early assessment to identify risk factors, and receive early dental and medical evaluations.[49] The American Heart Foundation has also released a scientific statement on this topic, acknowledging the strong evidence supporting an association between periodontal disease and CVD (Level of Evidence A) and its public health importance.[50] The statement, which is endorsed by the World Heart Foundation and The American Dental Association Council, does also confirm the limited evidence supporting any causative relationship.[50]

A European consensus report, supported by the European Society of Cardiology, recognizes that inflammatory responses in certain susceptible persons may contribute to cardiovascular events and that periodontal treatment may reduce CVD risk.[51] The

TABLE 1 Impact of Periodontal Treatment on Cardiovascular Outcomes

Author(s)	Study Type	CVD Outcomes	Conclusion	Quality Score[a]
Demmer et al, 2013[40]	MA/SR of RCT	Systemic inflammation: CRP	Anti-infective periodontal treatment has a short-term modest reduction in systemic CRP. Treatment effects are stronger for studies including patients with comorbidities (CVD, diabetes) compared with ''healthy'' people.	11 (high quality)
Freitas et al, 2010[41]	MA/SR of RCT	Systemic inflammation: CRP	Nonsurgical periodontal treatment significantly reduces serum levels of CRP, which is related to coronary events.	7 (medium quality)
Ioannidou et al, 2006[42]	MA/SR of RCT and single cohort studies	Systemic inflammation: CRP	Systemic inflammation is present in people with PD. Evidence does not support that periodontal treatment can reduce systemic CRP levels, elevated in PD.	8 (high quality)
Lam et al, 2011[20]	SR of oral health promotion interventions	Systemic inflammation: CRP and IL-6 levels; endothelial function	Periodontal treatment and oral health promotion activities improve periodontal health, reduces inflammatory markers, and improves endothelial function in the short-term. The impact of these on secondary CV events was not determined.	5 (medium quality)
Li et al, 2014[43]	SR of RCT/quasi-RCT	Occurrence and recurrence of CVD	Evidence does not support or refute whether periodontal therapy prevents CVD recurrence. There is no evidence available on primary prevention.	11 (high quality)
Moura et al, 2010[19]	MA/SR	Systemic inflammation: CRP	Periodontal therapy is associated with a reduction in CRP level. Further research is needed on the possible impact of periodontitis on CVD events.	7 (medium quality)
Orlandi et al, 2014[44]	MA/SR of intervention trials	Endothelial function	There is association between increased intima media thickness, flow mediated dilatation and PD. There is beneficial effect of periodontal treatment on flow-mediated dilatation, therefore, endothelial function, supporting studies of periodontal treatment on CV outcomes.	10 (high quality)
Paraskevas et al, 2008[45]	MA of pilot trials	Systemic inflammation: CRP	Periodontal therapy resulted in a weighted mean reduction in serum CRP of 0.5 (95% CI, 0.08–0.93) mg.	10 (high quality)
Teeuw et al, 2014[22]	MA/SR of intervention and non-intervention trials	Atherosclerotic profile; Endothelial function	Consistent reports indicate that periodontal treatment improves endothelial function and reduces biomarkers of atherosclerotic disease (CRP, IL-6, TNF-α), fibrinogen, total cholesterol, HDL-C, triglycerides, and HbA_{1c}, particularly those with established CVD and/or diabetes.	9 (high quality)
Tonetti, 2009[46]	SR of intervention trials	Systemic inflammation: CRP, IL-6, fibrinogen; endothelial function	Intensive periodontal treatment decreases systemic inflammation and improves endothelial function, which may contribute to the prevention of atherosclerosis.	2 (low quality)

Abbreviations: CRP, C-reactive protein; CV, cardiovascular; CVD, cardiovascular disease; HbA_{1c}, glycosylated hemoglobin test or hemoglobin A_{1c}; HDL-C, high-density lipoprotein cholesterol; IL-6, interleukin-6; MA, meta-analysis; PD, periodontal disease; RCT, randomized control trial; SR, systematic review; TNF-α, tumor necrosis factor-α.
[a]Scored using the ''A Measurement Tool to Assess Systematic Reviews'' (8–11, high quality; 4–7, medium quality; 0–3, low quality).

consensus states that clinicians should be aware of the potential association and its clinical implications.[51] A more recent consensus report by the European Federation of Periodontology and the American Academy of Periodontology[52] confirms strong epidemiological evidence between periodontal disease and increased risk of CVD. The report emphasizes that primary prevention of periodontal disease is desirable and a highly important strategy. Furthermore, identification of people at risk and periodontal disease diagnosis may contribute to cardiovascular risk stratification.[52]

In Australia, no specific recommendations regarding oral health for people with CVD exist, and current practice guidelines for cardiac care clinicians in both the acute and rehabilitation settings do not address oral health.[53,54] The new Australian National Oral Health plan recognizes the association between oral health and chronic diseases and incorporates goals to improve oral health, especially periodontal disease among the population (Table 2).[55]

Role of Nurses in Promoting Oral Health

Cardiovascular patients with poor oral health are likely to benefit from clinicians' involvement, by raising their awareness of the risks associated with periodontal disease, performing oral assessments, and providing dental referrals if necessary. Nurses, in particular, are in an ideal position to take up this role as they interact with patients more regularly than any other health provider and have a closer ongoing relationship.[56] Non–oral health professionals such as nurses have played an important role in promoting oral health in other systemic conditions across various developed countries.[56–59] For example, studies show that nurses are capable of providing oral health education, assessment, and referrals in the areas of aged care, dementia,[60,61] and maternal oral health.[56] Furthermore, midwives and nurse practitioners in the United States have been promoting oral health as part of antenatal care for young pregnant women involved in the Rochester Adolescent Maternity Program.[62] In Australia, child and family health nurses are playing an active role in promoting oral health as part of the Early Childhood Oral health program.[63,64] Oral health guidelines have also been successfully implemented into midwifery practice as part of the Midwifery Initiated Oral Health program and have been shown to significantly improve the uptake of dental services, knowledge, and quality of life of pregnant women in Australia.[65–67]

Despite evidence showing the capacity of non–oral health professionals to promote oral health, no studies

TABLE 2 Current Recommendations Regarding Oral Health Care for Patients with CVD

Author	Publication Location	Details of Publication	Outcomes and Recommendations
Australian Government, 2015[55]	Australia	Australia's National Oral Health Plan 2015–2024	Recognizes the association between oral health with CVD and other chronic diseases. It incorporates goals to improve oral health, especially PD among the population.
Bouchard et al, 2010[51]	Europe	Consensus. European Society of Cardiology	There is evidence of association between PD and CVD. There is no convincing evidence that periodontal treatment can influence cardiac health. However, oral health should be promoted to prevent CVD.
Friedewald et al, 2009[49]	United States	Consensus report. Editors of *The American Journal of cardiology & Journal of Periodontology*	There may be an independent link between periodontitis and increased risk of CVD. Patients with periodontitis should be informed of risk and be referred for medical evaluation.
Kinane and Bouchard, 2008[86]	France	Consensus report. Sixth European Workshop on Periodontology	There is a link between PD and CVD. Clinicians should be aware of the potential relationship and its clinical ramifications.
Lockhart et al, 2012[50]	United States	Scientific statement. American Heart Foundation, endorsed by the American Dental Association and the Word Heart Foundation	There is Level A evidence supporting an association between PD and ASVD independent of known confounders. There is no evidence that periodontal treatment can prevent ASDV. The relationship between PD and ASDV is of public health importance.
Tonetti and Dyke, 2013[52]	Italy	Consensus report. EFP/AAP Workshop on Periodontitis and Systemic Diseases	There is consistent and strong evidence that PD increases the risk for CVD. Primary prevention is desirable. Diagnosis of periodontitis may contribute to cardiovascular risk stratification.

Abbreviations: ASVD, atherosclerotic vascular disease; CVD, cardiovascular disease; EFP/AAP=European Federation of Periodontology and American Academy of Periodontology; PD, periodontal disease.

were identified that focused on cardiac care nurses undertaking this role. Reports from Australia also suggest that oral health is not routinely addressed by cardiac care clinicians during clinical practice.[68] There are many possible reasons why cardiac nurses may not be actively promoting oral health. One reason could be that nurses view oral healthcare as unpleasant and time-consuming.[69,70] Nurses may also have limited knowledge and training in oral health[65] and therefore may not be confident to discuss oral health during clinical practice.[66,71,72] Another possibility could be that nurses, particularly those in acute cardiac settings, may not view oral health as a priority because of time constraints and the lack of conclusive evidence indicating the benefits of periodontal treatment on cardiovascular outcomes (Table 3).[50]

Oral Health Training Resources and Tools to Assist Nurses in Oral Health Promotion

A review of the literature shows that there are very few oral health education programs that help build the capacity of nurses to promote oral health among their patients. Those that do exist have originated from Australia, United States, Turkey, and Sweden and have focused primarily on training nurses and health providers in the aged care setting,[72–75] pregnancy,[65,67,76,77] and early childhood period.[64] Most of these programs have been professional development activities offering continuing professional development points for health professionals.[64,67,75,77] One of these programs involved an evidence-based education program to equip midwives in Australia to provide oral health education, assessment, and referrals to pregnant women.[78] The program was evaluated and shown to significantly improve the knowledge and confidence of midwives to promote oral health.[67] Oral health education and training resources have resulted in significant improvement in nurses' knowledge, confidence, attitudes, and motivation,[67,72–74,76] demonstrating that nurses are receptive to education and training in this area. Despite the above programs, no oral health training programs have been identified that are specifically developed for cardiac care clinicians.

Another potential barrier for cardiac care nurses to promote oral health is the lack of access to reliable, valid, and easily implemented oral health assessment tools. Currently, some tools do exist for non–dental health professionals. This includes the Oral Health Assessment Tool, a modified version of the Kayser-Jones Brief Oral Health Status Examination tool,[79,80] which was developed and validated by Chalmers in Australia and found to be reliable for nurses to assess and refer aged and cognitively impaired residents in long-term facilities.[81] The tool consists of 8 categories with a scoring from 0 = healthy, 1 = oral changes, or 2 = unhealthy in each assessment category.[81] Another tool is The Holistic and Reliable Oral Assessment Tool for assessing older hospitalized patients, which was developed in England. This tool, which includes 9 items each rated on a 4-point Likert scale, was also found to be reliable and valid for nurses.[82] An oral assessment tool has also been developed for dietitians and other healthcare workers in Australia to facilitate dental referral of people with human immunodeficiency virus.[83] This tool, which consists of 3 items, was shown to have a sensitivity of 84% and a specificity of 55%. Finally, an oral assessment tool also exists for midwives to identify dental problems and provide referrals to pregnant women. This 2-item tool assesses common dental problems during pregnancy and frequency of dental visits and has shown good sensitivity (98%) and positive predictive value (88%).[84] However, no assessment tools

TABLE 3 Role of Nurses in Promoting Oral Health

Author	Study Location	Study Type	Conclusion
Chalmers et al, 2005[81]	United States	Systematic review	There is evidence to support nurses promoting oral health for adults with dementia. An oral health assessment tool was recommended.
Clemmens and Kerr, 2008[56]	United States	Literature review	Nurses have an essential role in women's oral health promotion, education and screening.
George et al, 2010[65]	Australia	Systematic review	There is a potential role for midwives to provide oral health assessments, education, and referrals for pregnant women.
Heilbrunn-Lang et al, 2015[66]	Australia	Pre-post mixed design	The evaluation of an oral health education program for midwives showed that with relevant training, it is feasible and acceptable for midwives to incorporate oral health into their practice in Australia.
Nyongesa, 2013[61]	United States	Pilot of an oral health program	Trained nurses in aged care can effectively assess, document, and refer residents using an appropriate oral health assessment tool.
Stevens et al, 2007[62]	United States	Oral health guidelines for prenatal care	Guidelines based on The Rochester Adolescent Maternity Program recommend that oral health promotion should be included as standard care for registered nurses in prenatal programs.
The Joanna Briggs Institute, 2015[80]	Australia	Best practice recommendations	Trained nurses can undertake oral health assessment and refer older adults in long-term care facilities to the dentist. The Brief Oral Health Status Examination tool was found to be the most reliable assessment tool for older adults with cognitive impairment.

were identified in this review that have been developed and tested for use by cardiac care clinicians (Table 4).

Discussion

The aim of this scoping review is to identify current evidence relating to the oral healthcare and management of patients with CVD. The findings from this scoping review reaffirm what is well documented in the literature,[9,17,25,26,85] that periodontal disease is a potential risk factor for CVD. Although there is still debate on the effectiveness of periodontal treatment in improving cardiovascular outcomes,[20,22,43] the general consensus, internationally,[49,51,52,86] is that all cardiovascular patients should receive oral health education about the importance of oral health along with risk assessment and dental referrals if required. This is especially important as existing evidence indicates a lack of awareness among cardiovascular patients regarding the importance of oral health and are seldom seeking dental care.[37] There are also suggestions that cardiac care clinicians are not addressing oral healthcare in clinical practice.[68] Nonetheless, these views are based on a few studies; clearly, further research is warranted to explore current perceptions, practices, and knowledge of cardiac care clinicians regarding oral health.

Nevertheless, current findings do suggest that cardiac care clinicians need to play a more active role in oral healthcare to reduce the inflammation that can result from periodontitis. This review has, for the first time, put forward the case for cardiac nurses to take up this role owing to their unique position and close interaction with patients.

This review has shown that nurses and other non–oral health professionals can be trained in providing oral healthcare, evidenced by their roles in addressing the oral health needs of aged patients, pregnant women and children across various countries. Therefore, cardiac nurses with targeted cardiac-specific oral health training can play a vital role addressing the oral health needs of their patients. Before such a strategy can be initiated by cardiac care nurses, key barriers may need to be addressed. The study findings have revealed that no specific education and training is currently available to

TABLE 4 Oral Health Training Resources and Tools to Assist Nurses in Oral Health Promotion

Author	Study Location	Study Type	Conclusion
Oral health training resources			
Frenkel et al, 2002[72]	United Kingdom	Randomized control trial	The oral health program significantly improved nurses' knowledge ($P < .003$) and attitude ($P < .001$).
George et al, 2016[67]	Australia	Pre-post test design	After the oral health education program, midwives' knowledge and confidence improved in promoting prenatal oral health.
King, 1992[73]	Australia	Pilot of an education program	Aged care nurses' behavior and knowledge improved after attending the program.
Öcek et al, 2003[76]	Turkey	Pre-post mixed design	After the oral health education program, midwives' knowledge and motivation improved in providing education to mothers and pregnant women.
Wårdh et al, 2002[74]	Sweden	Pilot of an oral health education model	Aged care nurses who attended additional dental clinical placement experience and served as dental care aids gave higher priority to oral health than did nurses who received only traditional oral health education.
Oral health assessment tools			
Chalmers et al, 2005[81]	Australia	Cross-sectional study	The oral health assessment tool was reliable and valid for use by nurses among aged care residents, including the cognitively impaired.
Dickinson et al, 2001[82]	England	Cross-sectional study	The Holistic and Reliable Oral Assessment Tool was a reliable assessment tool for nurses which can also be used as an oral hygiene indicator for older medically ill hospitalized patients.
George et al, 2014[84]	Australia	Pilot of a screening tool	A two-item oral health screening tool was found to be reliable and valid to be used by midwives in the antenatal setting.
Jeganathan et al, 2010[83]	Australia	Pilot of a screening tool	The three-item tool (questionnaire) to screen people living with HIV is valid and sensitive to be used by non–dental health professionals.
Kayser-Jones et al, 1995[79]	United States	Pilot of a screening tool	Nurses in aged care can effectively learn to evaluate the oral health of residents using the Brief Oral Health Status Examination (BOHSE) tool.
The Joanna Briggs Institute, 2015[80]	Australia	Best practice recommendations	Trained nurses can undertake oral health assessment and refer older adults in long-term care facilities to the dentist. The BOHSE tool was found to be the most reliable assessment tool for older adults with cognitive impairment.

What's New and Important

- Periodontal disease can contribute to adverse outcomes in patients with CVD.
- Although the effectiveness of periodontal treatment is still being debated, it is now recommended that all cardiac care providers need to promote oral health.
- Cardiac nurses are in a unique position to promote oral health. Further research is needed to equip nurses in this area and to develop relevant training resources for this group of clinicians.

build capability in cardiac care nurses to address oral health. Developing such a resource is an important first step in developing a preventative oral health program for cardiovascular patients as many cardiac care clinicians, especially nurses, lack adequate oral health knowledge.[70,71]

It is also equally important to develop and validate an appropriate oral health assessment tool for cardiac care nurses, as this review has identified a gap in this area. Although few tools are available for non–oral health professionals, none have been validated for the cardiac setting. The tool needs to be brief, practical, and easy to administer, considering the busy nature of the cardiac setting, and this new tool could include the 2- or 3-item tools piloted in the antenatal and HIV setting.[83,84]

The timing of the oral health assessment needs to be considered, taking into account the acute and rehabilitation phases of cardiac care. Incorporating oral healthcare in the acute phase may not be effective, as patients may not see this as a priority and hence not be receptive to receiving oral health advice. Therefore, oral health promotion may need to be addressed outside the acute phase of the patient's care such as in the prehospitalization or posthospitalization period.

Finally, it is essential to ensure that an affordable and appropriate dental referral pathway is in place before cardiac care nurses incorporate oral health guidelines into their practice. Although cost has not been highlighted in this review as a barrier for people with CVD, it is an issue that needs to be considered especially in countries where universal access to public dental services is not available.

Conclusion

Promoting and maintaining oral health among cardiovascular patients are important because of the strong association between periodontal disease and CVD. Although a causal link has not been confirmed between periodontal disease and CVD, the general consensus is that cardiovascular patients need to be made aware of this association and its potential implications. Cardiac nurses are in an ideal position to promote oral healthcare among their patients, but further research is required to define their role and develop training resources and assessment tools to support them.

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