

BMJ Open Barriers and facilitators in the integration of oral health into primary care: a scoping review

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ABSTRACT

Objective This scoping study has been conducted to map the literature and provide a descriptive synthesis on the barriers and facilitators of the integration of oral health into primary care.

Methods Grounded in the Rainbow conceptual model and using the Levac *et al*/six-stage framework, we performed a systematic search of electronic databases, organisational websites and grey literature from 1978 to April 2016. All publications with a focus on the integration of oral health into primary care were included except commentaries and editorials. Thematic analyses were performed to synthesise the results.

Results From a total of 1619 citations, 58 publications were included in the review. Barrier-related themes included: lack of political leadership and healthcare policies; implementation challenges; discipline-oriented education; lack of continuity of care and services and patients' oral healthcare needs. The facilitators of integration were supportive policies and resources allocation, interdisciplinary education, collaborative practices between dental and other healthcare professionals, presence of local strategic leaders and geographical proximity.

Discussion and public health implications This work has advanced the knowledge on the barriers and facilitators at each integration domain and level, which may be helpful if the healthcare organisations decide to integrate oral health and dental services into primary care. The scoping review findings could be useful for both dental and medical workforce and allied primary healthcare providers. They could also guide the development of healthcare policies that support collaborative practices and patient-centred care in the field of primary care.

BACKGROUND

Over the last decades, the concept of integration has been implemented as a multidisciplinary care pathway in many health organisations to increase the effectiveness of care for patients with special clinical needs and problems, such as elders and patients with cognitive or physical disabilities.^{1–6} The integrated care approach has mainly emerged in primary healthcare settings to provide and maintain universal access to a

Strengths and limitations of this study

- This scoping review identified the barriers and facilitators of the integration of oral health through a comprehensive analysis of the literature using a theoretical framework.
- The implications of these findings will allow the development of targeted strategies that could increase the integration of oral health into primary care by eliminating common barriers and enhancing facilitators.
- The nature of the scoping review did not allow the grading of the evidence since a quality evaluation of the included studies has not been conducted. This could be an objective for a further systematic review.

broad range of healthcare services. However, this patient-centred care model faces challenges and resistance in adoption for some domains or disciplines such as oral health and dentistry.⁷ In fact, the integration of oral health into primary care is still at the stage of initiative in many countries. Recently, the American Academy of Family Physicians has supported the integration of oral health into primary care as delineated by the Oral Health Delivery Framework.⁸ This framework refers to multidisciplinary collaborative practices for risk assessment, oral health evaluation, preventive interventions as well as communication and education. It was developed by an interdisciplinary team of health and oral healthcare providers, representatives of professional associations and public health advocates as well as policy-makers and care consumers. However, this concept is still relatively new and needs to be examined in its comprehensive perspective. As defined by Gröne and Garcia-Barbero, integrated care is 'bringing together inputs, delivery, management and organisation of services related to diagnosis, treatment, care, rehabilitation and health promotion'.⁹ Furthermore, the adoption of integrated care models

in healthcare systems necessitates identifying barriers, sharing knowledge and delivering necessary information to policy-makers.

As presented in the published protocol,¹⁰ a comprehensive scoping review funded by the Canadian Institutes for Health Research has been conducted by Emami's research team to answer several research questions on the concept of the primary oral healthcare approach. The scoping review findings have been divided and prepared for presentation into two publications. This paper presents specifically the results on the barriers and facilitators. The findings in regard to policies, applied programmes and outcomes will be presented in the subsequent publication.

METHODS

The method outlined by Levac *et al.*,¹¹ an extension of the Arksey and O'Malley scoping review method,¹² has been used to conduct the review. Since the methods employed in this scoping review have been presented in detail previously,¹⁰ they are described only briefly here. The Levac *et al.* methodological framework comprises six stages: (1) identifying the research question, (2) searching for relevant studies, (3) selecting studies, (4) charting and collating the data, (5) summarising and reporting the results and 6) consultation with stakeholders to inform the review.¹¹

Research question

The following research question has been formulated for this part of the review: What are the barriers and the facilitators of the integration of oral health into primary care in various healthcare settings across the world?

Search strategy

A detailed search strategy was designed with the help of an expert librarian at Université de Montreal, using specific MeSH terms and keywords to capture the relevant literature on the topic of interest. We created groupings of keywords and medical subject headings that were combined with the Boolean terms 'OR' and 'AND' and 'NOT'. The search strategy was developed for Medline via Ovid interface (table 1) and was revised for each of the other electronic platforms such as: Ovid (Medline, Embase, Cochrane databases), National Center for Biotechnology Information (PubMed), EBSCOhost (Cumulative Index to Nursing and Allied Health Literature), ProQuest, Databases in Public Health, Databases of the National Institutes of Health (health management and health technology), Health Services and Sciences Research Resources, Health Services Research and Health Care Technology, Health Services Research Information Central, Health Services Research Information Portal, Health Services Technology Assessment Texts and Healthy People 2020. For this last platform, we used the Healthy People Structured Evidence Queries, which are preformulated PubMed searches for Healthy People 2020 (HP2020) objectives. These ongoing updated queries

have been developed by experts, librarians and stakeholders in the field of public health to achieve HP2020 objectives to easily search the evidence-based public health literature.

Identifying relevant studies and eligibility criteria

Publications in English or French from 1978 to April 2016 were reviewed. We included all research studies irrespective of study design in which the integration of oral health into primary care is the primary focus of the publication. We excluded publications such as commentaries, editorials and individual points of view, but we searched their references for the original studies. Two researchers (HH, EE) independently screened the titles and abstracts of each citation and identified eligible articles for full review. Disagreement between reviewers was discussed and resolved by consensus. All potentially relevant studies were retained for full-text assessment. Data extraction was conducted independently by the same reviewers using a data extraction form, designed according to the study's conceptual framework.

Conceptual framework

The Rainbow model was used as a conceptual model to guide the scoping study.¹³ This model is based on the integrative functions in primary care and includes level-specific domains: clinical integration (micro level), organisational and professional integration (meso level) and system integration (macro level). Furthermore, in this multilevel model, functional and normative integration assure the link between the other three domains.

Data charting and collating

To ensure the consistency of the data extraction, this stage was conducted by three reviewers (HH, EE, RS) followed by consensus. The data were classified into two tables, according to the type of the publications: (1) research reports; (2) policies, strategic plans and other relevant publications. In the first step, extracted data and related meaning units were grouped into two categories: barriers and facilitators. According to Tesch (1990), a meaning unit is 'a segment of text that is comprehensible by itself and contains one idea, episode or piece of information'.¹⁴ Then a constant comparison of the codes was conducted and the themes were identified. In the second step, these categories were divided into specific levels and domains according to the study's conceptual framework. At this stage, a triangulation was conducted by the scoping review team (HH, EE, RS, FG, YC, LL, CB) and themes were discussed and revised.

Summarising and reporting the results

A qualitative approach was used to synthesise the study's findings. This involved a descriptive and thematic analysis of the results based on the conceptual framework.

Stakeholder consultations

We engaged the knowledge users and stakeholders in the entire process of the review through preliminary reviews

Table 1 Medline search strategy

#	Searches
1	exp Dental Health Services/
2	Oral Health/
3	Dentistry/
4	Oral Medicine/
5	exp Preventive Dentistry/
6	exp Dental Facilities/
7	exp Diagnosis, Oral/
8	Stomatognathic Diseases/
9	exp Mouth Diseases/
10	exp Tooth Diseases/
11	Pediatric Dentistry/
12	exp Dentists/
13	Community Dentistry/
14	(dentist* or stomatology or Dental Prophylaxis or Fluoridation or Oral Hygiene or Oral Health or Dental Facilities or Dental Clinic* or Dental Office* or Oral Diagnos* or Mouth Disease* or Tooth Disease* or Dental Disease* or Dental Health Service* or Dental Service* or pedodontics).mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier]
15	1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 or 11 or 12 or 13 or 14
16	exp Primary Health Care/
17	Primary Care Nursing/
18	Primary Nursing/
19	Physicians, Primary Care/
20	(Primary care or Primary health care or Primary healthcare or Primary Nursing).mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier]
21	16 or 17 or 18 or 19 or 20
22	exp 'Delivery of Health Care, Integrated'/
23	exp Community Health Services/
24	(community care or community health care or community healthcare).mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier]
25	22 or 23 or 24
26	Community Integration/
27	systems integration/
28	(Integrat* or Interprofessional or multidisciplin* or interdisciplin* or cooperat* or collaborat* or coordination*).mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier]
29	((Cross or multi or inter) adj (profession* or Disciplin*)).mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier]
30	26 or 27 or 28 or 29
31	15 and 21 and 30
32	limit 31 to (English or French)
33	(15 and 25 and 30) not 31
34	limit 33 to (English or French)

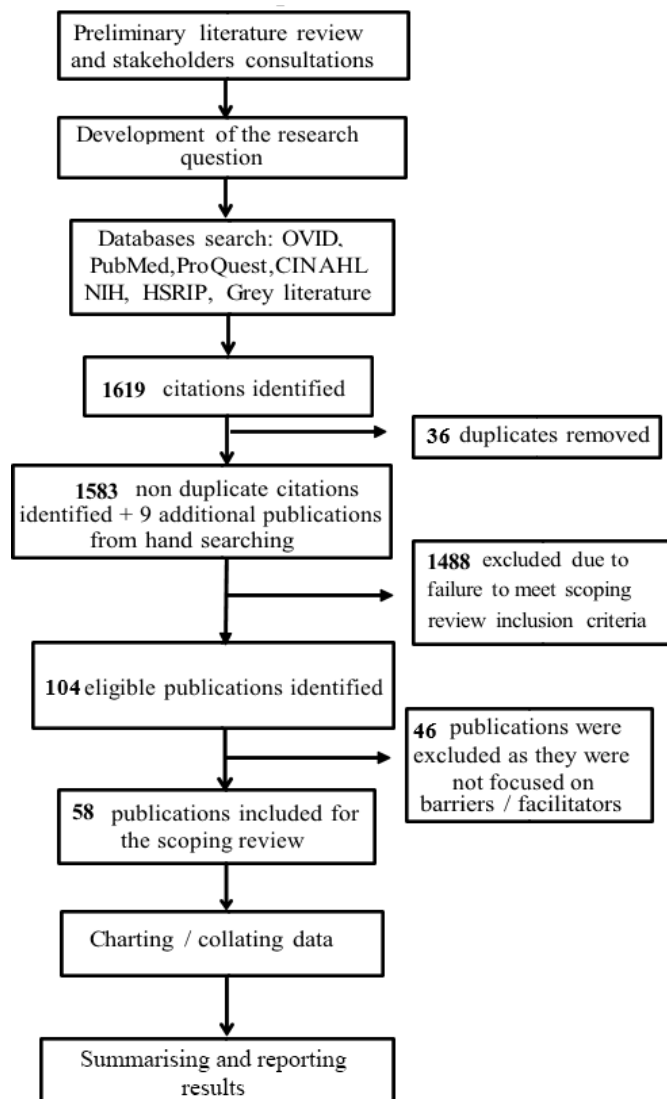


Figure 1 Flow chart of the scoping review.

of a few published articles, as well as discussions on the study research question. The stakeholders included representatives of academic healthcare organisations, policy decision-makers and primary healthcare professionals working in rural and remote communities, as well as patients' representatives.

RESULTS

Characteristics of the publications

The databases and grey literature searches yielded 1619 records (figure 1). After removal of duplicates, 1583 publications went through title and abstract screening, of which 95 were included for full review. After adding nine publications from the hand search of references, a total of 104 articles were included in the final analysis. Among the total reviewed articles, 58 publications (tables 2 and 3) reported on the barriers and/or facilitators of oral health integration into primary care. These publications were from 18 countries across the world:

the USA, Australia, Canada, France, Sweden, Norway, Switzerland, Nepal, Bangladesh, Indonesia, Tanzania, Nigeria, Thailand, Peru, Brazil, New Zealand, the UK and Iran.

The majority of research studies were published in the last decade and were conducted in the USA. Table 2 presents the characteristics of the selected original research studies (n=37).¹⁵⁻⁵¹ The research studies included pilot and demonstration projects, qualitative and quantitative studies. The latter included two randomised controlled trials (RCTs). The publications in regard to policy analyses/white papers, oral healthcare programme descriptions (n=21) are presented in table 3.⁵²⁻⁷²

The publications reported barriers and facilitators on the three levels of integration as described by Leutz *et al*⁷³: linkage (n=41); coordination (n=11) and full integration (n=6). Only seven publications from three countries reported on the long-term barriers of fully integrated models of primary oral care.^{15 17 27 46 65 70 72} Furthermore, the types of integration reported in the literature were mostly at the linkage level and included screening to identify emerging needs, understanding and responding to the special needs of identified vulnerable population groups such as children and elders, referrals and follow-up and providing information to patients.

Themes

A total of 10 themes and 9 subthemes at the macro, meso and micro level emerged from the review. These themes covered all the domains found in the theoretical model. The most frequently reported barrier was related to primary healthcare providers' competencies at the micro level and in the domain of clinical integration. The two other most reported barriers were the low political priority in the system integration domain, at the macro level, as well as the lack of funds in the organisational integration domain, at the meso level. The most frequently reported facilitators included collaborative practices in the functional domain and financial support in the system integration domain, at the macro level.

Barriers in the integration of oral health into primary care

Lack of political leadership and healthcare policies

Lack of political leadership, poor understanding of the oral health status of the population and low prioritisation of oral health on the political agenda as well as the absence of appropriate oral health policies were identified as barriers for integrated care at the macro level.^{19 21 22 25 32 40 48-51 72}

Insurance policies and separate medical and dental insurance realms were found detrimental to the coordination of services among medical and dental providers in the functional domain.^{40 53 59} Furthermore, in many countries, the professional legislation policies did not allow the delivery of preventive oral healthcare by non-dental professionals, and this operates as a barrier for integrated care.^{18 19 25 40}

Table 2 Main facilitators and barriers of the integration of oral health into primary care according to the research articles identified in the scoping review

Authors, year/ country (reference number)	Type of publication	Setting/ target healthcare users	Main barriers to integration	Main facilitators of integration
Anumanrajadhon <i>et al</i> , 1996/Thailand ¹⁶	Demonstration project	Community healthcare centre/Rural communities	<ul style="list-style-type: none"> ▶ Deficient infrastructure and logistics ▶ Financial cost 	<ul style="list-style-type: none"> ▶ Interprofessional education ▶ Resource allocation ▶ Local leaders and community involvement
Haughney <i>et al</i> , 1998/UK ¹⁷	Original research report	General medical and dental practices/ General population	<ul style="list-style-type: none"> ▶ Discrepancies in health record systems ▶ Poor care coordination 	<ul style="list-style-type: none"> ▶ Colocation and proximity ▶ Collaborative practices ▶ Effective communication
Helderman <i>et al</i> , 1999/ Bangladesh, Indonesia, Nepal, Tanzania ¹⁸	Demonstration projects	Community healthcare centres/Rural communities	<ul style="list-style-type: none"> ▶ Conventional dentistry and lack of dentists' social and behavioural knowledge ▶ Deficient infrastructure and logistics 	<ul style="list-style-type: none"> ▶ Interprofessional education ▶ Supportive policies
Johnson and Lange, 1999/ USA ¹⁹	Original research report	Long-term care facilities/Geriatric population	<ul style="list-style-type: none"> ▶ Limited knowledge/training of primary care providers ▶ Implementation constraints ▶ Institutional policies 	<ul style="list-style-type: none"> ▶ Nursing staff interest and positive attitude toward oral health ▶ Patients' perception and oral health needs
MacEntee <i>et al</i> , 1999/Canada ²⁰	Original research report	Long-term care facilities/Geriatric population	<ul style="list-style-type: none"> ▶ Financial cost of on-site dental clinic ▶ Lack of infrastructure and implementation issues ▶ Lack of professional interest ▶ Limited knowledge/education 	<ul style="list-style-type: none"> ▶ Collaborative practices ▶ Local champion
Fellona and DeVore, 1999/USA ²¹	Original research report	Primary care nursing centres/Vulnerable population	<ul style="list-style-type: none"> ▶ Lack of referral sources ▶ Unavailability of dental providers ▶ Lack of professional interest ▶ Financial cost 	<ul style="list-style-type: none"> ▶ Collaborative practices ▶ Human resources including oral health professionals ▶ Interprofessional education/training
Chung <i>et al</i> , 2000/ Switzerland ²²	Original research report	Nursing homes/ Geriatric population	<ul style="list-style-type: none"> ▶ Limited knowledge/training of primary care providers ▶ Lack of professional interest and perception of responsibility ▶ Low institutional priority for oral health 	<ul style="list-style-type: none"> ▶ Interprofessional education/training ▶ Collaborative practices
Diamond <i>et al</i> , 2003/USA ²³	Original research report	Community health/oral health network/ School-aged children in underserved communities	<ul style="list-style-type: none"> ▶ Poor support from academic institutions ▶ Lack of goal-oriented human resources ▶ Long-term financial issues 	<ul style="list-style-type: none"> ▶ Community support ▶ Collaborative practices ▶ Stakeholders' common vision and support ▶ Financial support
De La Cruz <i>et al</i> , 2004/ USA ²⁴	Original research report	Paediatric practices and family medicine practices/ Medicaid eligible children	<ul style="list-style-type: none"> ▶ Practice setting of primary healthcare providers (solo, workload and high-patient volume) ▶ Primary healthcare providers' self-perceived difficulty for referral 	<ul style="list-style-type: none"> ▶ Primary clinicians' confidence in dental screening ▶ The dental care needs of children at-risk for developing disease
Cane and Butler, 2004/ Australia ²⁵	Demonstration project/ Pilot study	Community public health services/Rural and remote communities	<ul style="list-style-type: none"> ▶ Professional legislation policies ▶ Lack of agreement on interprofessional education ▶ Unstructured care coordination 	<ul style="list-style-type: none"> ▶ Financial support and adequate resources ▶ Interprofessional education/training

Continued

Table 2 Continued

Authors, year/ country (reference number)	Type of publication	Setting/ target healthcare users	Main barriers to integration	Main facilitators of integration
Hallberg <i>et al.</i> , 2005/ Sweden ²⁶	Original research report	Medical practices/ Children with disabilities	<ul style="list-style-type: none"> ▶ Limited knowledge and education of healthcare professionals in regard to oral health ▶ Attitudes and concerns in regard to shared responsibility ▶ Deficient organisational support and limited resources 	<ul style="list-style-type: none"> ▶ Working in multidisciplinary teams ▶ Financial support and adequate resources
Maunder and Landers, 2005/UK ²⁷	Original research report	Community pharmacies/General population	<ul style="list-style-type: none"> ▶ Lack of referral mechanism and unstructured care coordination ▶ Lack of support for pharmacists on integration into primary healthcare teams 	<ul style="list-style-type: none"> ▶ Interprofessional education/training ▶ Interdisciplinary meeting ▶ Pathway file: coordination mechanism
Lewis <i>et al.</i> , 2005/USA ²⁸	Original research report	Community based-medical practices/ Children	<ul style="list-style-type: none"> ▶ Financial issues and logistics ▶ Lack of financial incentives for primary care providers ▶ Limited knowledge and education of healthcare professionals in regard to dental preventive acts ▶ Attitudes and concerns in regard to shared responsibility ▶ Lack of time and workload of healthcare professionals 	<ul style="list-style-type: none"> ▶ Coordination mechanism ▶ Interprofessional education/training and supportive materials ▶ Dental resources in community ▶ Interprofessional communication ▶ Implementations strategies
Lowe, 2007/UK ²⁹	Original research report	General medical practices/Geriatric population	<ul style="list-style-type: none"> ▶ Lack of referral mechanism and unstructured care coordination 	<ul style="list-style-type: none"> ▶ Patients' oral health needs ▶ Coordination mechanism ▶ Proximity
Andersson <i>et al.</i> , 2007/ Sweden ³⁰	Original research report	Primary healthcare centre/Geriatric population	<ul style="list-style-type: none"> ▶ Limited knowledge and education of healthcare professionals in regard to oral health ▶ Cultural gap between dental and medical disciplines, and discipline-oriented education ▶ Unstructured care coordination ▶ Lack of reimbursement policies in regard to preventive dental care acts for non-dental healthcare professionals ▶ Assignment of responsibility and lack of time 	<ul style="list-style-type: none"> ▶ Holistic health perspective of primary care providers ▶ Interprofessional collaboration
Slade <i>et al.</i> , 2007/USA ³¹	Original research report	Private paediatric and family physician practices/Medicaid-eligible children	<ul style="list-style-type: none"> ▶ NA 	<ul style="list-style-type: none"> ▶ Type of medical practices: paediatric practices ▶ Large volume practices

Continued

Table 2 Continued

Authors, year/ country (reference number)	Type of publication	Setting/ target healthcare users	Main barriers to integration	Main facilitators of integration
Ritter <i>et al.</i> , 2008/USA ³²	Original research report	Primary healthcare centres/ Young children	<ul style="list-style-type: none"> ▲ Limited knowledge and education of healthcare professionals in regard to oral health ▲ Lack of financial incentives (reimbursement policies) for primary healthcare providers ▲ Unstructured care coordination 	<ul style="list-style-type: none"> ▲ Local champions ▲ Interprofessional education/training ▲ Legislation ▲ Building political will and public awareness ▲ Support of medical community
Tenenbaum <i>et al.</i> , 2008/ France ³³	Original research report	Private practitioner-hospital health network/Population with limited access to care	<ul style="list-style-type: none"> ▲ Lack of structured care coordination and referral systems ▲ Limited interprofessional collaboration ▲ Assignment of responsibility ▲ Lack of financial incentives 	<ul style="list-style-type: none"> ▲ Interprofessional education/training
Pronych <i>et al.</i> , 2010/USA ³⁴	Original research report/ Pilot	Long-term care facilities/Geriatric population	<ul style="list-style-type: none"> ▲ Professionals' lack of interest, time constraints ▲ Attitudes and concerns in regard to shared responsibility 	<ul style="list-style-type: none"> ▲ Oral healthcare coordinator ▲ Interprofessional education/training
Close <i>et al.</i> , 2010/USA ⁴¹	Original research report	Primary healthcare practices/Children ≤3years old	<ul style="list-style-type: none"> ▲ Limited training of healthcare professionals in regard to technical dental acts ▲ Lack of structured care coordination and referral systems ▲ Attitude and resistance of office personnel ▲ Implementation issues (eg, time, staff turnover) 	<ul style="list-style-type: none"> ▲ Technical training of primary healthcare providers for preventive acts ▲ Implementation of coordination strategies
Wooten <i>et al.</i> , 2011/USA ³⁵	Original research report	Prenatal care centres/Pregnant women	<ul style="list-style-type: none"> ▲ Limited knowledge and education 	<ul style="list-style-type: none"> ▲ Interprofessional education/training ▲ Proximity and referral resources
Skeie <i>et al.</i> , 2011/Norway ³⁶	Original research report	Child health clinics/Infants and toddlers	<ul style="list-style-type: none"> ▲ Limited knowledge and education ▲ Time constraints of primary healthcare providers 	<ul style="list-style-type: none"> ▲ Population oral health needs ▲ Interprofessional communication ▲ Interprofessional education/training
Hajizamani <i>et al.</i> , 2012/ Iran ³⁷	Original research report	Public healthcare centres/General population	<ul style="list-style-type: none"> ▲ Lack of primary healthcare providers' knowledge on oral health and their duties towards oral healthcare 	<ul style="list-style-type: none"> ▲ Interprofessional education/training ▲ Collaborative practices
Rabiei <i>et al.</i> , 2012/Iran ³⁸	Original research report	Public healthcare centres/General population	<ul style="list-style-type: none"> ▲ Limited knowledge and education of primary healthcare providers 	<ul style="list-style-type: none"> ▲ Interprofessional education/training
Brownlee B., 2012/USA ³⁹	Original research report	Community health centres /General population	<ul style="list-style-type: none"> ▲ Limited education and training of primary healthcare providers ▲ Cost of sustainable programmes ▲ Time constraints of primary healthcare providers ▲ Change in leadership ▲ Shortage of healthcare workforce 	<ul style="list-style-type: none"> ▲ Medical/dental champion/leaders ▲ Colocation ▲ Implementation of structured care coordination and supportive electronic record system ▲ Financial support and strategies for revenue ▲ In-reach programme targeting population at risk

Continued

Table 2 Continued

Authors, year/ country (reference number)	Type of publication	Setting/ target healthcare users	Main barriers to integration	Main facilitators of integration
Sams <i>et al</i> , 2013/USA ⁴⁰	Original research report	Centres of Medicare and Medicaid services/Children	<ul style="list-style-type: none"> ▲ Opposition from dental profession ▲ Healthcare professionals' lack of interest ▲ Administrative issues ▲ Lack of personnel ▲ Limited budget for reimbursement of non-dentist providers 	<ul style="list-style-type: none"> ▲ Compatibility with other Medicaid programmes ▲ Reimbursement for multiple services of non-dental care professionals ▲ Interprofessional education/training
Olayiwola <i>et al</i> , 2014/USA ⁴²	Original research report	Medical and dental practices/General population	<ul style="list-style-type: none"> ▲ Financial cost ▲ Delivery barriers ▲ Inadequate services linkage 	<ul style="list-style-type: none"> ▲ Colocation and proximity ▲ Community partnerships with academic institutions and key stakeholders ▲ Interprofessional education/training ▲ Supportive policies and collaboration ▲ Implementation of coordination strategies and patients' engagement
Braimoh <i>et al</i> , 2014/ Nigeria ⁴³	Original research report	Local governments' primary healthcare centres /General population	<ul style="list-style-type: none"> ▲ Lack of primary healthcare workers' education and training in regard to oral health ▲ Shortage of healthcare workforce ▲ Lack of equipment and inadequate infrastructure ▲ Limited funds 	<ul style="list-style-type: none"> ▲ Colocation ▲ Local leader ▲ Interprofessional education/training ▲ Provision of resources and adequate infrastructure
Pesaresi <i>et al</i> , 2014/Peru ⁴⁴	Original research report	Health centres of Ministry of Health/ Infants and their caregivers	<ul style="list-style-type: none"> ▲ Limited knowledge of primary healthcare professionals on the importance of oral health ▲ Primary healthcare professionals' perceived responsibility in regard to oral health 	<ul style="list-style-type: none"> ▲ Interprofessional training and education ▲ Primary healthcare professionals' willingness to advise on oral health
Mitchell-Royston <i>et al</i> , 2014/USA ⁴⁵	Original research report	Healthcare centres/ Children ≤12 years old	<ul style="list-style-type: none"> ▲ Limited training of healthcare professionals in regard to oral healthcare 	<ul style="list-style-type: none"> ▲ Oral health champion ▲ Collaborative practices and team approach ▲ Interprofessional training and education ▲ Adequate care coordination and referral system ▲ Use of tools such as standardised electronic health records to incorporate oral prevention into primary care workflow ▲ Reimbursement policies for non-dental providers for oral health services ▲ Supportive policies and collaboration of key stakeholders

Continued

Table 2 Continued

Authors, year/ country (reference number)	Type of publication	Setting/ target healthcare users	Main barriers to integration	Main facilitators of integration
De Aguiar <i>et al.</i> , 2014/ Brazil ⁴⁶	Original research report	Municipalities' primary healthcare centres/General population	<ul style="list-style-type: none"> ▲ Limited skills and training of healthcare professionals in regard to dental acts ▲ Lack of human resources ▲ Attitude and concerns in regard to the responsibility for oral healthcare ▲ Workload and time constraints of primary healthcare providers 	<ul style="list-style-type: none"> ▲ Supportive policies and resources ▲ Interprofessional collaboration ▲ Regulations in regard to primary healthcare providers' scope of practice and tasks ▲ Acknowledgement of the care effectiveness
Hummel <i>et al.</i> , 2015/USA ⁴⁵	White paper /Case studies	Primary healthcare centres/ Vulnerable and at risk population	<ul style="list-style-type: none"> ▲ Historical fragmentation of oral and general healthcare ▲ Barriers to sharing clinical information ▲ Lack of training of primary care providers in regard to oral health ▲ Time constraints and workflow of primary care providers ▲ Lack of evidence-based guidelines ▲ Lack of financial incentives and payment policies for primary care practices ▲ Discipline-oriented perspective in regard to the scope of practice 	<ul style="list-style-type: none"> ▲ Consumer advocacy and collaboration of key stakeholders including patients and caregivers ▲ Dissemination of validated screening and assessment tools ▲ Care coordination and structured referral process ▲ Team and incremental approach ▲ Use of health information technology ▲ Interprofessional education/training ▲ Quality and performance measurements ▲ Local champion
Langelier <i>et al.</i> , USA/2015 ⁵⁰	Original research report	Federally qualified healthcare centres/ Vulnerable population groups	<ul style="list-style-type: none"> ▲ Limited funds ▲ Low priority for oral health ▲ Limited resources and shortages of workforce ▲ Incompatibility of previously built electronic medical and dental record systems ▲ High cost of an adequate infrastructure 	<ul style="list-style-type: none"> ▲ Adequate care coordination and referral system ▲ Use of standardised electronic health records ▲ Engagement of both public and private dental and non-dental providers in primary care ▲ Collaborative practices ▲ Communities tailored programs ▲ Patients' needs ▲ Colocation and proximity ▲ Financial support and supportive environments
Barnett <i>et al.</i> , 2016/ Australia ⁴⁷	Original research report	Community primary care centres/Rural communities	<ul style="list-style-type: none"> ▲ Primary care professionals discipline-oriented perspective in regard to the scope of practice ▲ Lack of structured referral process and 'one-way communication' ▲ Limited knowledge and education 	<ul style="list-style-type: none"> ▲ Primary care professionals' confidence and competencies in providing emergency dental care ▲ Primary care professionals' perceptions of patient needs ▲ Interprofessional education and training ▲ Collaboration

Continued

Table 2 Continued

Authors, year/ country (reference number)	Type of publication	Setting/ target healthcare users	Main barriers to integration	Main facilitators of integration
Smith M and Murray- Thomson W, 2016/New Zealand ⁴⁸	Original research report	Government-assisted care/Geriatric frail population	<ul style="list-style-type: none"> ▲ Lack of policies on including oral healthcare in residential care facilities ▲ Traditional perspectives of dental profession in regard to dental care and limited social commitment 	<ul style="list-style-type: none"> ▲ Intersectoral collaboration and care planning at system level ▲ Upskilling of dental workforce for primary care services ▲ Patient empowerment in regard to oral health needs ▲ Financial support and supportive environments
Arthur and Rozier, 2016/ USA ⁴⁹	Original research report	Medical practices/Medicaid-eligible children ≤5years old	<ul style="list-style-type: none"> ▲ Limited research on the effectiveness of oral health services provided by non- dental providers ▲ Partial reimbursement and requirement for training 	<ul style="list-style-type: none"> ▲ Implementation of policies by Medicaid programmes
Bernstein <i>et al</i> , 2016/USA ⁵¹	Original research report	Federally qualified healthcare centres/ Vulnerable population groups	<ul style="list-style-type: none"> ▲ Limited time ▲ Lack of training and expertise of primary care providers ▲ Lack of shared medical and dental records ▲ Low priority for oral health 	<ul style="list-style-type: none"> ▲ Shared vision between caregivers and administrators ▲ Local champion

Implementation challenges

The cost of integrated services, human resources issues and deficient administrative infrastructure were reported as major barriers in implementation of oral health integrated care at the meso and macro levels.^{16 20 21 26 28 33 42 43 48} The challenges to ensure the economic stability of programmes targeting oral health in primary care and the high cost of equipment maintenance were frequently reported as barriers.^{66 69} Many studies were in accordance with the fact that workload of personnel, staff turnover, time constraints and scarcity of various trained human resources such as care coordinators, public health workforce and allied dentists were important barriers to oral health integrated care.^{15 24 28 30 34 36 39 41 46 51 54 57 66} Moreover, recruitment and retention of dental and non-dental staff were considered challenging, mostly due to the limited number of professionals interested in working in primary integrated clinics and shortage of dentists in rural and remote regions.^{48 63 71}

Deficient administrative infrastructure such as the absence of dental health records in medical records, cross-domain interoperability and domain-specific act codes were considered as a contributor to the general perception of dental care as an 'optional' service, hindering medical professionals from performing basic dental services.^{59 67 69}

Discipline-oriented education and lack of competencies

At the meso level, lack of interprofessional education and focusing on discipline-oriented training in health were identified as obstacles to integrated care in many studies.^{18-20 22 26-28 30 32 35-39 41 43-48 50 51 54 66} This barrier was translated at the micro level as lack of competencies. Knowledge, attitudes and skills were the most reported meaning units of competencies of primary healthcare providers, as defined by Bloom and Krathwohl.⁷⁴ The lack of knowledge in regard to integrated care practices was identified for both dental and non-dental care providers. For instance, a study conducted in the USA showed that paediatricians with a low level of competencies had adopted oral healthcare into their routine practice five times less than those with a higher level.²⁴ Besides, qualitative studies conducted in Sweden, France and Brazil found various attitudes towards integrated care in both dental and medical healthcare teams, in terms of professional interests, shared tasks and responsibility.^{26 33 46} Chung *et al* found that 33% of the physicians in a long-term care facility declared carrying out a systematic examination of the oral cavity, while the others expressed feelings of illegitimacy and considered oral health as an exclusive dentist domain.²² Moreover, and contrary to nursing personnel in a long-term care facility, only a minority of the physicians stressed that oral healthcare of the residents should be carried out on site by a dentist.²⁰

Lack of continuity of care and services

The theme continuity of services included three subthemes: unstructured mechanism for care

Table 3 Main facilitators and barriers of the integration of oral health into primary care according to the non-research publications identified in the scoping review

Authors, year/Country	Type of publication	Setting/ Target healthcare users	Main barriers to integration	Main facilitators of integration
Tesini, 1987/USA ⁵²	Programme description	Community healthcare centre/ Populations with special care needs	<ul style="list-style-type: none"> ▶ Poor connection between academic institutions and primary care sector 	<ul style="list-style-type: none"> ▶ Interprofessional education/training ▶ Strategic leader
Nolan <i>et al.</i> , 2003/USA ⁵³	Policy analysis and case studies	Healthcare centres' low-income population with a focus on children	<ul style="list-style-type: none"> ▶ Professional legislation policies, dental licensing laws and practice acts ▶ Lack of referral mechanism 	<ul style="list-style-type: none"> ▶ Strategic leadership and supportive healthcare policies, regulations and reimbursement policies for primary care providers ▶ Education/training ▶ Incremental approach
Rozier <i>et al.</i> , 2003/USA ⁵⁴	Programme description	Medical offices/Low-income population with a focus on high-risk children	<ul style="list-style-type: none"> ▶ Lack of knowledge, skills and confidence among primary care providers ▶ Time and work load of primary healthcare providers ▶ Lack of referral mechanism 	<ul style="list-style-type: none"> ▶ Interprofessional education/training ▶ Strategic leadership ▶ Supportive healthcare policies and reimbursement policies for primary care providers ▶ Collaboration among various organisations ▶ Financial support and adequate resources
Wysen <i>et al.</i> , 2004/ USA ⁵⁵	Programme description	Community health centres/ Low-income children	<ul style="list-style-type: none"> ▶ Discipline-oriented perspectives ▶ Professional interest 	<ul style="list-style-type: none"> ▶ Local champion and case manager ▶ Colocation ▶ Interprofessional education/training ▶ Financial support ▶ Adequate resources and outreach services by public health sectors
Pan American Health Organization/WHO, 2006/ USA ⁵⁶	Strategic plan	National and regional programmes and community health centres/12 year-old children worldwide	<ul style="list-style-type: none"> ▶ Lack of coordinated and sustainable strategy ▶ Resistance to change within dental profession 	<ul style="list-style-type: none"> ▶ Public health policies, support of key stakeholders and interprogrammatic approach ▶ Providing evidence based on needs assessment ▶ Interprofessional education/training ▶ Multidisciplinary approach ▶ Legislation
Heuer, 2007/USA ⁵⁷	Programme description	School-based primary medical care/ Children	<ul style="list-style-type: none"> ▶ Time constraints of primary healthcare providers 	<ul style="list-style-type: none"> ▶ Colocation ▶ Interdisciplinary care coordination ▶ Legislation in regard to the scope of dental hygienists' practice
Stevens <i>et al.</i> , 2007/ USA ⁵⁸	Programme description	University-affiliated primary care centres/ Pregnant adolescents	N/A	<ul style="list-style-type: none"> ▶ Type of primary care: prenatal services ▶ Collaborative practices ▶ Interprofessional education/training and orientation sessions ▶ Systematic care coordination ▶ Local leader ▶ Primary healthcare providers' rewards and recognition

Continued

Table 3 Continued

Authors, year/Country	Type of publication	Setting/ Target healthcare users	Main barriers to integration	Main facilitators of integration
Powell and Din, 2008/ USA ⁵⁹	White paper	Medical and dental practices/ general population	<ul style="list-style-type: none"> ▶ Poor communication between medical and dental providers ▶ Incompatibility of the electronic medical and dental records ▶ Ignorance of oral health in best practice guidelines ▶ Separation of medical and dental treatment in insurance systems ▶ Unstructured care coordination 	<ul style="list-style-type: none"> ▶ Standardised electronic health records integrating oral health ▶ Interprofessional and cross-discipline education/training ▶ Legislation and policies to include preventive dental care in the health system
Weber-Gasparoni <i>et al</i> , 2010/USA ⁶⁰	Programme description	University-affiliated community clinic/Infants and toddlers	<ul style="list-style-type: none"> ▶ Financial cost 	<ul style="list-style-type: none"> ▶ Support, partnership and collaboration of key stakeholders ▶ Interprofessional education/training
Kruger <i>et al</i> , 2010/ Western Australia ⁶¹	Report/Case study	Rural and remote Aboriginal medical centres/Rural and remote Indigenous communities	<ul style="list-style-type: none"> ▶ NA 	<ul style="list-style-type: none"> ▶ Colocation ▶ Collaboration and partnership of key stakeholders from service, education and research ▶ Symbiotic relationship with general health practitioners and supportive environment ▶ Interprofessional communication and collaborative practices ▶ Interprofessional education/training ▶ Resources and facilities
Pucca <i>et al</i> , 2010/Brazil ⁷²	Policy analysis	Healthcare network system/ General population	<ul style="list-style-type: none"> ▶ Low political priority for oral health 	<ul style="list-style-type: none"> ▶ Institutionalisation of policies and financial investments ▶ Collaboration and partnership of key stakeholders
Planning Unit, South Western Sydney Local Health, 2012/ Australia ⁶²	Strategic plan	Private general practice/Rural and remote communities	<ul style="list-style-type: none"> ▶ Workforce shortages ▶ Fragmented service system ▶ Discipline-oriented perspectives 	<ul style="list-style-type: none"> ▶ Information management and technology ▶ Administrative procedures ▶ Training and support ▶ Reimbursement and incentive policies
Grantmakers in Health, 2012/USA ⁶³	Report/Case studies	Healthcare centres/ Vulnerable population groups	<ul style="list-style-type: none"> ▶ Workforce issues ▶ Dentists' negative attitude toward vulnerable population 	<ul style="list-style-type: none"> ▶ Alternative dental service providers ▶ Communication and partnerships ▶ Education and training ▶ Insurance and financing ▶ Leadership
U.S. Department of Health and Human Services, Health Resources and Service Administrations, 2012/USA ⁶⁴	Case presentation	Primary healthcare centres / Early childhood	<ul style="list-style-type: none"> ▶ Lack of community dental providers ▶ Limited public health coverage for dental care ▶ Family hesitance/resistance in regard to some preventive dental care ▶ Lack of training and unfamiliarity of non-dental providers with new procedures 	<ul style="list-style-type: none"> ▶ Structured care coordination and effective referral system ▶ Interprofessional education/training (including cultural competency) ▶ Local champion ▶ Quality improvement assessment ▶ Resource identification

Continued

Table 3 Continued

Authors, year/Country	Type of publication	Setting/ Target healthcare users	Main barriers to integration	Main facilitators of integration
NHS Commissioning Board, 2013/UK ⁶⁵	Strategic plan/Case studies	NHS primary care dental services /General population	<ul style="list-style-type: none"> ▶ Limited budget 	<ul style="list-style-type: none"> ▶ Local dental networks ▶ Supportive policies and collaboration of key stakeholders including policy-makers, commissioners, clinicians, dental public health and academia ▶ Care pathway commissioning framework ▶ Implementation of coordination strategies such as tool kit for practices ▶ Financial support
US Department of Health and Human Services, 2014/USA ⁶⁶	Strategic document	Healthcare centres/ Vulnerable groups	<ul style="list-style-type: none"> ▶ Financial sustainability ▶ Time constraints of primary healthcare providers 	<ul style="list-style-type: none"> ▶ Implementation of oral health core competencies within primary care practices ▶ Organisational leadership ▶ Organised and multifaceted infrastructure ▶ Financial support and strategies for revenue ▶ Financial incentives and reimbursement policies for primary healthcare providers ▶ Interprofessional education/training
Ramos-Gomez, 2014/ USA ⁶⁸	Programme description	Community health and wellness centres/ Vulnerable, high-risk children ≤5years old and their caregivers	NA	<ul style="list-style-type: none"> ▶ Supportive policies and collaboration of key stakeholders including policy-makers, dental and non-dental care providers and academia ▶ Implementation of community outreach coordination ▶ Interprofessional education/training ▶ Unified family-centred care ▶ Electronic medical records
Abrams <i>et al</i> , 2014/USA ⁶⁹	Strategic plan	Community clinics and private medical offices/ Children in underserved neighbourhoods	<ul style="list-style-type: none"> ▶ Limited infrastructure ▶ Financial sustainability 	<ul style="list-style-type: none"> ▶ Supportive policies and collaboration of key stakeholders including community members ▶ Coordinated healthcare system ▶ Interprofessional training ▶ Standardised electronic medical records ▶ Incorporation of oral health in insurance health plan and reimbursement policies
Pucca <i>et al</i> , 2015/Brazil ⁷⁰	Policy analysis	Healthcare network system/ General population	<ul style="list-style-type: none"> ▶ Private providers' interests ▶ Fragmented care and education 	<ul style="list-style-type: none"> ▶ Institutionalisation of policies and financial investments ▶ Coordinated sustainable oral health network ▶ Educational investment and job marketing ▶ Adequate infrastructure and human resources ▶ Collaboration of key stakeholders
Pourat <i>et al</i> , 2015/ USA ⁷¹	Programme description/ Policy brief	Community health centres/ Low-income and uninsured population	<ul style="list-style-type: none"> ▶ Infrastructure funding 	<ul style="list-style-type: none"> ▶ Colocation ▶ Administrative support and financial incentives to recruit dental providers
US Oral Health Strategic Framework 2014–2017, 2016/USA ⁶⁷	Strategic plan	Primary healthcare centres/ Vulnerable and underserved population	<ul style="list-style-type: none"> ▶ Historical fragmentation of oral and general healthcare ▶ Ununified medical and dental records. 	<ul style="list-style-type: none"> ▶ Supportive policies and collaboration of key stakeholders ▶ Collaborative practices ▶ Cross-discipline education and training ▶ Unified patient-centred health centres

coordination at the micro level and lack of practice guidelines and types of practice at the meso level. Discontinuity in the integrated care process was associated with poor referral systems, deficient interface and poor connection between public health section, primary care and academic institutions.^{21 27 29 32 33 41 47 53 54} Furthermore, practice types such as in silo practices and contract-based services were reported as barriers for linkage, coordination and integration of services.^{15 32} Some studies showed that solo practices and practices with specific clientele such as infants and toddlers had lower referral rates to dentists than polyclinics with various clienteles.^{24 54}

Patient's oral healthcare needs

The review of publications revealed that patients' decision to accept or refuse integrative care was mainly based on their need perception rather than the assessment of healthcare providers.^{19 24 29 36} In an RCT conducted by Lowe *et al*, current dental problem and not having a regular dentist were the significant predictors for consultation with a non-dental primary care provider.²⁹ Patients' problems seem to motivate confident practitioners to provide oral healthcare.^{26 47}

Facilitators of the integration of oral health into primary care

Supportive policies and resources allocation

Publications on policies and successful integrated programmes highlighted the importance of financial support from governments, stakeholders and non-profit organisations at the macro level.^{15 16 18 32 39 42 45 46 53 54} Furthermore, several governmental strategic plans highlighted that partnerships and common vision among governments, communities, academia, various stakeholders and non-profit organisations can act as a facilitator to integration of oral health into primary care in the normative domain.^{56 65 67 69} Healthcare policies such as Arizona Hygiene Affiliated Practice Act and Medicaid, reimbursements to trained primary care providers for oral screening, patient education and fluoride varnish applications acted as facilitators to the integration of oral health into primary care in the USA.^{40 57} In Brazil, prioritisation of deployment of the National Oral Health Policy by the federal government demonstrated greater integration of oral healthcare in the unified health system, with coverage for access to oral health for the Brazilian population having grown significantly since 2004.^{70 72}

Interprofessional education

Several studies revealed that non-dental professionals agreed on interprofessional education, showing higher willingness to include oral health education in their job schedule and to undertake further training on oral health.^{25 27 28 30–32 35–38 40 42–44 46 47 52 54–56 58 60–63 66–68} Training of paediatricians, family and primary care physicians and community health providers in a preventive dentistry programme in North Carolina (Into the Mouths of Babes), in Seattle (Kids Get Care) and in Washington led

to the integration of preventive dental services into their practices.^{28 54 55}

Collaborative practices

This theme included three subthemes: perceived responsibility and role identification, case management and incremental approach. Although many studies reported a lack of oral health knowledge among various healthcare providers, it was also reported that understanding their role in providing oral healthcare could act as a facilitator to engage them in integrated oral healthcare services.^{19–23 26 27 30 42 44 46–48 51 58 60 65–69} According to some studies conducted in North Carolina and Peru, primary care physicians and nurses were able to identify their role and assumed their responsibility in taking care of the oral health of their patients.^{44 54} Besides, integrated primary care in Glasgow reported positive response on the part of professionals towards joint-work practices.¹⁷

Two pilot studies reported that appropriate case management, including choice and flexibility in service delivery at multiple levels (administrative and/or clinical) could lead to effective coordination and consistency between oral health and other healthcare services.^{16 25} Some programmes such as the Neighborhood Outreach Action for Health (NOAH) oral health programme in Arizona showed success in primary care teamwork when sharing oral healthcare responsibilities with nurses, medical assistants and other members of the team.⁵⁷ This success relies on an effective coordinated care and strengthening of referral systems, communication among healthcare workers, as well as task-shifting strategies.^{15 27–29 39 41 42 45 50 57 58 64–66} The incremental approach was suggested as a successful strategy for integration of oral health into primary care.^{15 53} This approach allowed gradual modification in the workflow based on staff experience and preference.

Local strategic leaders

Results of studies conducted in the USA and some developing countries highlighted the strategic role of the local leader in building teamwork and communities' capacities in the integration of oral health into primary care.^{15 16 19 32 38 39 45 51 55 63 64} In the Rochester Adolescent Maternity Programme, for instance, registered nurses were found as 'drivers' in promoting oral health by assessing patients' dental needs and managing their consultations and referral.⁵⁸ Similarly, an oral health coordinator in a pilot project in New Hampshire was identified as a linkage facilitator between nursing and dental human resources.³⁴

Proximity

Geographical proximity or colocation of dental and medical practices were reported as the main facilitators for interdisciplinary collaboration in various communities.^{17 42 43 50} Healthcare professionals have shown interest in the colocation model since it is the first step to merge primary care and dental care and allows establishing a

relationship among the healthcare workforce, showing promising results in the delivery of efficient care addressing both the medical and oral health needs of patients.^{55 57 61 71}

According to Wooten *et al*,³⁵ nurses and certified midwives were more likely to adopt preventive measures and refer patients for specialised care if they had a dental clinic in the primary practice setting.

DISCUSSION

Fragmentation in primary healthcare may put at risk vulnerable patients with chronic or acute health problems such as oral health diseases.^{1 75 76} However, the integration of oral health into primary care is still at an emerging stage in many countries around the world. Healthcare policy-makers and organisations need high-quality evidence and information to assess their own process gaps and make decisions on its implementation.⁷⁷ Despite the large number of publications on primary healthcare integration, a number of knowledge gaps exist in the domain of oral healthcare integration. To our knowledge, this is the first scoping review aimed at synthesising influential factors in the integration of oral health into primary care using a theoretical model of integration. In fact, the concept of integration is complex and needs to be analysed in a multi-level perspective. In this study, we used the Rainbow model of integrated care to conduct the thematic analysis.¹³ This framework provided a valuable lens to identify level-specific and domain-specific barriers and facilitators across publications. It allows for a better understanding of the inter-relationships among the dimensions of integrated care from a primary care perspective.

The results of the present scoping review are in line with publications on the challenges faced in the implementation of integrated care.^{78–81} Common barriers such as the absence of healthcare policies and supporting strategies, inadequate interdisciplinary training and workload increase seem to depend on both contextual and individual factors rather than the discipline itself.^{78–81} However, in this study we identified a discipline-specific barrier: perception of oral healthcare needs. Some publications reported that patients and most of the primary healthcare providers did not attribute value to continuity of care in the field of oral health because oral health conditions are rarely life threatening.^{26 33 47} This aspect, which could be critical from the lens of dental professionals, may be explained by lack of knowledge and awareness of the impact of oral health on general health and well-being and could help explain the fact that oral health is seldom on the political agenda. Interprofessional education and collaboration could be effective in raising awareness on the importance of oral health and its integration into primary care. However, recent studies show that implementation of interprofessional health science curricula is also encountering barriers and requires long-term financial and political supports.⁸² E-health technologies such as online education, electronic health records

and web-patient portals could be used to facilitate the implementation of integrated care.⁸³

Although some common facilitators such as supportive policies and resource allocation are crucial to mitigate the challenges of integrated care, it seems that the presence of a local leader and proximity have significant impact on making sense of the complex concept of integration, putting collaborative practices in place and involving the stakeholders to make effective and positive change in their organisation.

This scoping review has some strengths and limitations when compared with systematic reviews. Although the scoping review methodology allows the analysis of a broad range of publications, it does not necessitate the quality assessment of publications and grading of evidence. However, scoping reviews provide an avenue for future research and have clinical and public health impact.

CONCLUSION

The scoping review findings allow better understanding of conceptually grounded barriers and facilitators at each integration domain and level. The most reported barrier themes included primary healthcare providers' competencies at the micro level and in the domain of clinical integration. The most frequently reported facilitators included collaborative practices in the functional domain and financial support in the system integration domain at the macro level. The themes identified here permit the conduct of potential future research and policies to better guide integration of oral healthcare practices between dental and medical workforce and allied primary healthcare providers.

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REFERENCES

- Starfield B, Shi L, Macinko J. Contribution of primary care to health systems and health. *Milbank Q* 2005;83:457–502.
- Hutchison B, Abelson J, Lavis J. Primary care in Canada: so much innovation, so little change. *Health Aff* 2001;20:116–31.
- Béland F, Hollander MJ. Integrated models of care delivery for the frail elderly: international perspectives. *Gac Sanit* 2011;25 Suppl 2:138–46.
- Deber RB. Health care reform: lessons from Canada. *Am J Public Health* 2003;93:20–4.
- Kodner DL, Spreeuwenberg C. Integrated care: meaning, logic, applications, and implications—a discussion paper. *Int J Integr Care* 2002;2:e12.
- Kodner DL, Kyriacou CK. Fully integrated care for frail elderly: two American models. *Int J Integr Care* 2000;1:e08.
- Emami E. The integration of oral health in primary care: interdisciplinary research initiative. Mosaic, Canadian Association of Public Health Dentistry. Spring 2015 (7). 2015 http://www.caphd.ca/sites/default/files/Mosaic_Spring_2015.pdf.
- Phillips K, Hummel J. Oral Health in primary care: a framework for Action. *JDR clinical and translational research* 2016;1.
- Gröne O, Garcia-Barbero M; WHO European Office for Integrated Health Care Services. Integrated care: a position paper of the WHO European Office for Integrated Health Care Services. *Int J Integr Care* 2001;1:e21.
- Emami E, Harnagea H, Girard F, et al. Integration of oral health into primary care: a scoping review protocol. *BMJ Open* 2016;6:e013807.
- Levac D, Colquhoun H, O'Brien KK. Scoping studies: advancing the methodology. *Implement Sci* 2010;5:69.
- Arksey H, O'Malley L. Scoping studies: towards a methodological framework. *Int J Soc Res Methodol* 2005;8:19–32.
- Valentijn PP, Schepman SM, Opheij W, et al. Understanding integrated care: a comprehensive conceptual framework based on the integrative functions of primary care. *Int J Integr Care* 2013;13:e010.
- Tesch R. *Qualitative research: analysis, Types and Software tools*. Basingstoke, UK: Falmer, 1990.
- Hummel J, Phillips KE, Holt B, et al. Oral health—an essential component of primary care—white paper. *Safety net medical home initiative*. Seattle, WA: Qualis Health, 2015. <http://www.safetynetmedicalhome.org/sites/default/files/White-Paper-Oral-Health-Primary-Care.pdf>. (accessed 23 Oct 2016).
- Anumanrajadhon T, Rajchagool S, Nitisiri P, et al. The community care model of the Intercountry Centre for Oral Health at Chiangmai, Thailand. *Int Dent J* 1996;46:325–33.
- Haughney MG, Devennie JC, Macpherson LM, et al. Integration of primary care dental and medical services: a three-year study. *Br Dent J* 1998;184:343–7.
- van Palenstein Helder W, Mikx F, Begum A, et al. Integrating oral health into primary health care—experiences in Bangladesh, Indonesia, Nepal and Tanzania. *Int Dent J* 1999;49:240–8.
- Johnson TE, Lange BM. Preferences for an influences on oral health prevention: perceptions of directors of nursing. *Spec Care Dentist* 1999;19:173–80.
- MacEntee MI, Thorne S, Kazanjian A. Conflicting priorities: oral health in long-term care. *Spec Care Dentist* 1999;19:164–72.
- Fellona MO, DeVore LR. Oral health services in primary care nursing centers: opportunities for dental hygiene and nursing collaboration. *J Dent Hyg* 1999;73:69–77.
- Chung JP, Mojon P, Budtz-Jørgensen E. Dental care of elderly in nursing homes: perceptions of managers, nurses, and physicians. *Spec Care Dentist* 2000;20:12–17.
- Diamond R, Litwak E, Marshall S, et al. Implementing a community-based oral health care program: lessons learned. *J Public Health Dent* 2003;63:240–3.
- dela Cruz GG, Rozier RG, Slade G. Dental screening and referral of young children by pediatric primary care providers. *Pediatrics* 2004;114:e642–52.
- Cane RJ, Butler DR. Developing primary health clinical teams for public oral health services in Tasmania. *Aust Dent J* 2004;49:162–70.
- Hallberg U, Klingberg G. Medical health care professionals' assessments of oral health needs in children with disabilities: a qualitative study. *Eur J Oral Sci* 2005;113:363–8.
- Maunder PE, Landes DP. An evaluation of the role played by community pharmacies in oral healthcare situated in a primary care trust in the north of England. *Br Dent J* 2005;199:219–23.
- Lewis C, Lynch H, Richardson L. Fluoride varnish use in primary care: what do providers think? *Pediatrics* 2005;115:e69–76.
- Lowe C, Blinkhorn AS, Worthington HV, et al. Testing the effect of including oral health in general health checks for elderly patients in medical practice—a randomized controlled trial. *Community Dent Oral Epidemiol* 2007;35:12–17.
- Andersson K, Furhoff AK, Nordenram G, et al. 'Oral health is not my department': perceptions of elderly patients' oral health by general medical practitioners in primary health care centres: a qualitative interview study. *Scand J Caring Sci* 2007;21:126–33.
- Slade GD, Rozier RG, Zeldin LP, et al. Training pediatric health care providers in prevention of dental decay: results from a randomized controlled trial. *BMC Health Serv Res* 2007;7:176.
- Riter D, Maier R, Grossman DC. Delivering preventive oral health services in pediatric primary care: a case study. *Health Aff* 2008;27:1728–32.
- Tenenbaum A, Folliguet M, Berdougo B, et al. [Improving the physician-dental surgeon relationship to improve patient care]. *Presse Med* 2008;37:564–70.
- Pronych GJ, Brown EJ, Horsch K, et al. Oral health coordinators in long-term care—a pilot study. *Spec Care Dentist* 2010;30:59–65.
- Wooten KT, Lee J, Jared H, et al. Nurse practitioner's and certified nurse midwives' knowledge, opinions and practice behaviors regarding periodontal disease and adverse pregnancy outcomes. *J Dent Hyg* 2011;85:122–31.
- Skeie MS, Skaret E, Espelid I, et al. Do public health nurses in Norway promote information on oral health? *BMC Oral Health* 2011;11:1–9.
- Hajizamani A, Malek Mohammadi T, Hajmohammadi E, et al. Integrating oral health care into primary health care system. *ISRN Dent* 2012;2012:1–7.
- Rabiei S, Mohebbi SZ, Patja K, et al. Physicians' knowledge of and adherence to improving oral health. *BMC Public Health* 2012;12:855–68.
- Brownlee B. Oral health integration in the patient-centered medical home environment: case studies from community health centers. *Qualis Health/DentaQuest Foundation* 2012 <http://docplayer.net/4669109-White-paper-oral-health-integration-in-the-patient-centered-medical-home-pcmh-environment-case-studies-from-community-health-centers.html> (accessed 26 Mar 2016).
- Sams LD, Rozier RG, Wilder RS, et al. Adoption and implementation of policies to support preventive dentistry initiatives for physicians: a national survey of Medicaid programs. *Am J Public Health* 2013;103:e83–90.
- Close K, Rozier RG, Zeldin LP, et al. Barriers to the adoption and implementation of preventive dental services in primary medical care. *Pediatrics* 2010;125:509–17.
- Olayiwola N, Bodenheimer T, Dubé K, et al. Facilitating care integration in Community Health Centers: a conceptual framework and literature review on best practices for integration into the medical neighborhood. *UCSF Center for Excellence in Primary Care* 2014 http://www.careinnovations.org/uploads/BSCF_Facilitating_Care_Integration_Mar_2014.pdf (accessed 24 Nov 2016).
- Braimoh M, Ogunbodede E, Adeniyi A. Integration of oral health into primary health care system: views of primary health care workers in Lagos State, Nigeria. *J Public Health Afr* 2014;5:35–9.
- Pesaressi E, Villena RS, van der Sanden WJ, et al. Barriers to adopting and implementing an oral health programme for managing early childhood caries through primary health care providers in Lima, Peru. *BMC Oral Health* 2014;14:17.
- Mitchell-Royston L, Nowak A, Silverman J. Interprofessional study of oral health in primary care. *Pediatric oral health research and policy center* 2014 http://www.aapd.org/assets/1/7/Dentaquest_Year_1_Final_Report.pdf (accessed 15 Nov 2016).
- Aguiar DM, Tomita NE, Machado MF, et al. Oral health technicians in Brazilian primary health care: potentials and constraints. *Cad Saude Publica* 2014;30:1560–70.
- Barnett T, Hoang H, Stuart J, et al. "Sorry, I'm not a dentist": perspectives of rural GPs on oral health in the bush. *Med J Aust* 2016;204:26.
- Smith M, Murray-Thomson W. "Not on the radar": dentists perspectives on oral health care of dependent people. *Gerodontology* 2016;1–11.
- Arthur T, Rozier RG. Provision of preventive dental services in children enrolled in Medicaid by nondental providers. *Pediatrics* 2016;137:1–10.
- Langelier M, Moore J, Baker BK, et al. *Case studies of 8 federally qualified Health Centers: strategies to integrate Oral Health*

- with Primary Care. Rensselaer, NY: Center for Health Workforce Studies, School of Public Health, SUNY Albany, 2015. <http://www.oralhealthworkforce.org/wp-content/uploads/2015/11/FQHC-Case-Studies-2015.pdf>. (accessed 2 Jan 2017).
51. Bernstein J, Gebel C, Vargas C, *et al*. Integration of oral health into the well-child visit at federally qualified health centers: study of 6 clinics, August 2014–March 2015. *Prev Chronic Dis* 2016;13:e58.
 52. Tesini DA. Providing dental services for citizens with handicaps: a prototype community program. *Ment Retard* 1987;25:219–22.
 53. Nolan L, Kamoie B, Harvey J, *et al*. The effects of state dental practice laws allowing alternative models of preventive oral health care delivery to low-income children Center for health services research and policy. 2003. https://publichealth.gwu.edu/departments/healthpolicy/DHP_Publications/pub_uploads/dhpPublication_5F628DDE-5056-9D20-3DFE0BE817BF82D7.pdf (accessed 1 Feb 2017).
 54. Rozier RG, Sutton BK, Bawden JW, *et al*. Prevention of early childhood caries in North Carolina medical practices: implications for research and practice. *J Dent Educ* 2003;67:876–85.
 55. Wysen KH, Hennessy PM, Lieberman MI, *et al*. Kids get care: integrating preventive dental and medical care using a public health case management model. *J Dent Educ* 2004;68:522–30.
 56. Pan American Health Organisation. 2006. Proposed 10-year regional plan on oral health. USA: WHO. <http://iris.paho.org/xmlui/bitstream/handle/123456789/5685/ce138.r9-e.pdf?sequence=1&isAllowed=y>. (accessed 25 Nov 2016).
 57. Heuer S. Integrated medical and dental health in primary care. *J Spec Pediatr Nurs* 2007;12:61–5.
 58. Stevens J, Iida H, Ingersoll G. Implementing an oral health program in a group prenatal practice. *J Obstet Gynecol Neonatal Nurs* 2007;36:581–91.
 59. Powell V, Din FM, 2008. Call for an Integrated (Medical/Dental) Health Care Model. Conference on the Electronic Health Record: Best Practices and New Horizons; 1–3 October, 2008. Wake Forest University Translational Science Institute: Winston-Salem, NC, USA, 2008.
 60. Weber-Gasparoni K, Kanellis MJ, Qian F. Iowa's public health-based infant oral health program: a decade of experience. *J Dent Educ* 2010;74:363–71.
 61. Kruger E, Jacobs A, Tennant M. Sustaining oral health services in remote and indigenous communities: a review of 10 years experience in Western Australia. *Int Dent J* 2010;60:129–34.
 62. Integrated primary and Community Care (IPCC) Development plans for the South West Growth Centre (SWGCG). NSW Government 2012 https://www.swsilhd.nsw.gov.au/pdfs/SWGC_IPCCS.pdf. (accessed 14 Mar 2016).
 63. GrantmakersIn Health. Returning the Mouth to the Body: integrating oral health & primary care. 2012 http://www.gih.org/files/FileDownloads/Returning_the_Mouth_to_the_Body_no40_September_2012.pdf (accessed 13 Dec 2016).
 64. U.S. Department of Health and Human Services. *Considerations for oral health integration in primary care practice for children*. Rockville, Maryland: U.S. Department of Health and Human Services, 2012. <https://www.hrsa.gov/oralhealth/oralhealthprimarychildren.pdf>. (accessed 14 Feb 2016).
 65. NHS Commissioning Board. *Securing excellence in commissioning NHS dental services*. England: NHS, 2013. <https://www.england.nhs.uk/wp-content/uploads/2013/02/commissioning-dental.pdf>. (accessed 02 Feb 2017).
 66. U.S. Department of Health and Human Services. Integration of Oral Health and Primary Care Practice. Health Resources and Services Administration. 2014 <https://www.hrsa.gov/publichealth/clinical/oralhealth/primarycare/integrationoforalhealth.pdf> (accessed 3 Mar 2016).
 67. U.S. Department of Health and Human Services. Oral health strategic framework 2014–2017. *Public Health Rep* 2016;131:242–57.
 68. Ramos-Gomez FJ. A model for community-based pediatric oral health: implementation of an infant oral care program. *Int J Dent* 2014;2014:1–9.
 69. Abrams M, Chung L, Fisher M, *et al*. San Francisco children's oral health strategic plan 2014–2017. 2014 http://assets.thehcn.net/content/sites/sanfrancisco/Final_document_Nov_2014_20141126111021.pdf (accessed 13 Dec 2016).
 70. Pucca GA, Gabriel M, de Araujo ME, *et al*. Ten years of a national oral health policy in Brazil: innovation, boldness, and numerous challenges. *J Dent Res* 2015;94:1333–7.
 71. Pourat N, Martinez AE, Crall JJ. Better together: co-location of dental and primary care provides Opportunities to improve Oral Health. *Policy Brief UCLA Cent Health Policy Res* 2015;Sep(PB2015-4):1–8.
 72. Pucca Junior GA, Lucena EH, Gde, Cawahisa PT, Pucca G, Gomes de Lucena EH. Financing national policy on oral health in Brazil in the context of the Unified Health System. *Braz Oral Res* 2010;24(suppl 1):26–32.
 73. Leutz WN. Five laws for integrating medical and social services: lessons from the United States and the United Kingdom. *Milbank Q* 1999;77:77–110.
 74. Bloom B, Krathwohl DR. *Taxonomy of educational objectives: the classification of educational goals, by a committee of college and university examiners. Handbook I: Cognitive Domain*. New York: NY: Longmans, Green, 1956.
 75. World Health Organization. The World Health report 2008: primary health care now more than ever. 2008 http://www.who.int/whr/2008/whr08_en.pdf (accessed 12 Apr 2016).
 76. Lamarche P, Beaulieu MD, Pineault R, *et al*. Choices for Change: the path for restructuring primary health care services in Canada: *Canadian Foundation for Healthcare Improvement*. 2003 http://tools.hhr-rhs.ca/index.php?option=com_mtree&task=att_download&link_id=4431&cf_id=68&lang=en (accessed 13 Dec 2016).
 77. Titler M. *The evidence for evidence-based practice implementation. in: Hughes R, editor. patient safety and quality: an evidence-based handbook for nurses*. Rockville: Agency for Healthcare Research and Quality (US), 2008.
 78. Kodner D. Introduction to integration. all together now: a conceptual exploration of Integrated Care. *Healthcare Quarterly*;13:6–15.
 79. Tzasis P, Evans JM, Owen S. Reframing the challenges to integrated care: a complex-adaptive systems perspective. *Int J Integr Care* 2012;12.
 80. Pomerantz AS, Corson JA, Detzer MJ. The challenge of integrated care for mental health: leaving the 50 minute hour and other sacred things. *J Clin Psychol Med Settings* 2009;16:40–6.
 81. Dickinson H, Glasby R, Mand J. The challenges of delivering integration. *J Integr Care* 2014;22.
 82. Lapkin S, Levett-Jones T, Gilligan C. A systematic review of the effectiveness of interprofessional education in health professional programs. *Nurse Educ Today* 2013;33:90–102.
 83. Shrader S, Kostoff M, Shin T, *et al*. Using communication technology to enhance interprofessional education simulations. *Am J Pharm Educ* 2016;80:13.