

Utilisation of oral health services provided by non-dental health practitioners in developed countries: a review of the literature

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Objective: People who have limited access to dental care may present to non-dental health practitioners for dental treatment and advice. This review synthesised the available evidence regarding the use of non-dental health practitioners for oral health problems and the services provided by non-dental health practitioners to manage such presentations. **Methods:** PubMed and CINAHL databases were searched using key search terms to identify all relevant quantitative and qualitative English-language studies published between 1990 and March 2014. Snowballing techniques were then applied whereby the reference lists of retrieved articles were searched for other relevant citations. Grey literature was searched via Google using the same search terms to identify unpublished work and government reports. **Results:** Of the 43 papers which met the review criteria, 25 papers reported on the use of non-dental health practitioners for oral health problems and 18 on dental care education and training for non-dental health practitioners. Four reports were located from the grey literature on the involvement of non-dental health practitioners in the management of oral health care. **Conclusions:** The review of literature showed that both children and adults utilise non-dental health practitioners for oral health problems. Despite this, Emergency Department medical staff, medical practitioners and pharmacists generally lacked training and knowledge in the management of oral health. Services from non-dental health practitioners mainly focussed on children. The literature on education and training for non-dental health practitioners was limited.

Key words: review, non-dental health practitioners, services, training, education, rural and remote, dental health, health outcomes research, allied health, aboriginal health workers, indigenous health workers

Introduction

Despite a growing awareness of the need for better integration between medicine and dentistry, these two disciplines have existed independently and have different training systems. A person with a dental health problem is expected to see a dental practitioner for treatment or advice. However, patients who lack access to dental services may seek dental care from non-dental health practitioners. They may present to hospital emergency departments (EDs) (Cohen *et al.*, 2002; 2008; 2011), medical practices (Britt *et al.*, 2000; Cohen *et al.*, 2008; 2011; NACDH, 2012) and pharmacists (Cohen *et al.*, 2009b; Pau *et al.*, 2000) for treatment or advice regarding their dental problems. Although these non-dental service settings are an important source of care for people with oral health problems, non-dental health practitioners only provide temporary relief of pain and do not provide definitive treatment (Cohen *et al.*, 2008; 2011). This may represent an inappropriate use of medical services where patients see a non-dental health practitioner for oral health problems that are best managed by or referred to an oral health practitioner (AHMC, 2004). People who delay or who are unable to access treatment can contribute to potentially preventable hospitalisations (PPHs) as they may be admitted to hospital to treat serious infections due to their dental condition. For example, in Australia during 2010–2011, dental conditions accounted for nearly

60,590 avoidable hospital admissions (AIHW, 2012). As a consequence, there are strong imperatives to investigate ways in which better oral health services can be provided in realistic and cost effective ways to those who lack access to dental services.

The aim of this review was to identify and synthesise the available evidence regarding the use of non-dental health practitioners in the provision of services for people who present with dental problems and to propose areas that may warrant further investigation and evaluation.

Methods

In this review, two main questions were asked:

1. What evidence is there for the use of non-dental practitioners in the provision of oral health advice/services?
2. What services do non-dental health practitioners provide in the management of dental problems?

The PubMed and CINAHL databases were searched using selected key search terms to identify all relevant quantitative and qualitative English-language studies published between 1990 and March 2014. Snowballing techniques were then applied whereby the reference lists of retrieved articles were searched for other relevant citations. Grey literature was searched via Google using the

same search terms to identify unpublished work such as government reports.

The key words/phrases used in the search of databases included combinations of the following: *dental problems, dental or oral health care, physicians, pharmacists, education, non-dental health practitioners, emergency department, rural dental care and primary care providers, aboriginal health workers, indigenous health workers.*

The inclusion and exclusion criteria for the search are shown in Table 1 and a summary of the review process is shown in Figure 1. Each paper was read independently by two reviewers with articles included on the basis of relevance to the project. Disagreements between reviewers were resolved by a third reader.

Results

From an initial pool of 619 papers, 43 were published in the literature and met the inclusion criteria. Of those 43 papers, 25 were found to be relevant to the first review question (the use of non-dental health practitioners to treat dental problems) and 18 to the second review question (the type of dental services provided by non-dental health practitioners). Four relevant reports from the grey literature were included (DHS, 2002; Fricker *et al.*, 2009; SA Dental Service, 2010; Slade, 2007). An overview of the findings on the use of non-dental health professionals for dental problems and on the training/type of service provided is shown in Tables 2 and 3 respectively.

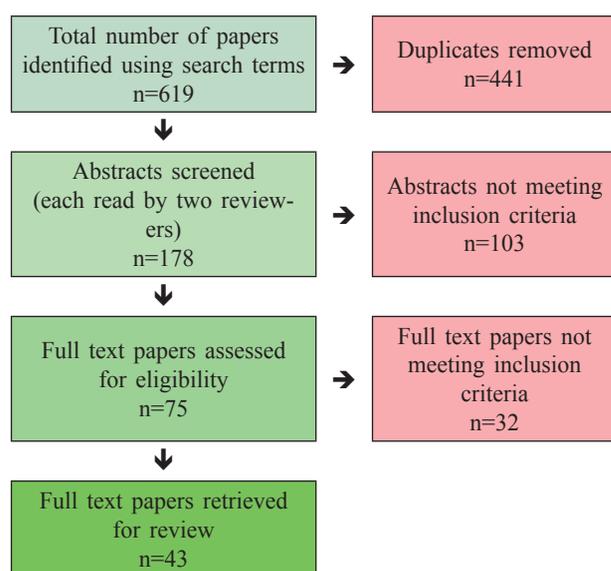


Figure 1. The review process for published papers

There were 25 studies on the use of non-dental health practitioners for oral health problems. Non-dental health practitioners included ED medical staff, General Practitioners/family doctors, pharmacists and pharmacy counter assistants. Of these, 16 studies were conducted in the US, six in the UK, two in Canada and one in New Zealand. Of the eligible articles, nine were retrospective, one was a prospective cross sectional study involving patient database audits, ten were cross-sectional surveys and five were exploratory studies. There were 16 studies that reported on people who presented to Emergency Departments, five to medical (GP) offices and clinics, and three to community pharmacists for dental treatment and advice. There were six studies reporting the use of non-dental health practitioners by adults and 12 by both children and adults.

There were 18 studies and four reports published on services provided by non-dental health practitioners. Of these, 11 studies were conducted in the US, 13 in Australia and one in Canada. Nine studies focused on rural and remote settings (Blinkhorn *et al.*, 2012; Davis *et al.*, 2010b; Mouradian *et al.*, 2003; Pacza *et al.*, 2001b; Roberts-Thomson *et al.*, 2010; Skapetis *et al.*, 2012; 2013; Slade *et al.*, 2011; Walker *et al.*, 2011). A number of studies targeted low income and Aboriginal preschool children. Four reported on interventions and services directed toward older people and four targeted both children and adults. The reports described oral health training for non-dental health professionals in areas such as: oral screenings and the early identification of oral health problems, application of preventive oral health products, and referrals to dentists. Non-dental health practitioners involved included general practitioners, paediatricians, child health nurses, registered nurses, family medicine residents, community pharmacists, receptionists and Aboriginal/Indigenous Health Workers.

Proportions and characteristics of people presenting to non-dental health practitioners

In the US, dental-related visits to Emergency Departments ranged from 1.3% (Hocker *et al.*, 2012) to 4.3% (McCormick *et al.*, 2013) of all ED visits in the retrospective database audit studies. Two cross-sectional telephone surveys in the US indicated 7.1% of 401 households (Cohen *et al.*, 2011) and 8.7% of 272 households (Cohen *et al.*, 2008) presented to an ED for toothache pain relief. A national telephone survey conducted in Canada suggested that 5.4% of adults visited an emergency room for a dental problem which was not associated with trauma (Quiñonez, 2011).

Table 1. Inclusion and exclusion criteria

	<i>Inclusion criteria</i>	<i>Exclusion criteria</i>
Time period	1990 – March 2014	Literature earlier than 1990
Language	English	Non-English
Place of study	Australia and comparable countries	Developing countries
Personnel	Management of dental problems by non-dental health practitioners	Management of dental problems by dental health practitioners, defined as: dentists, dental hygienists, dental therapists, dental prosthetists and oral health therapists.

Table 2. Characteristics of the use of non-dental health practitioners for dental problem

Reference	Country	Sample	Study Design	Main Findings
Anderson <i>et al.</i> , 1999	UK	30 family medical practices	Retrospective cross-sectional database audit	Dental problems accounted for 0.3% of attendances.
Buxcey <i>et al.</i> , 2012	New Zealand	49 pharmacists	Exploratory study	Participants highlighted a lack of available resources relating to oral health and systemic disease.
Cohen <i>et al.</i> , 2002	USA	3,639 cases	Retrospective database audit	Increased use of EDs for the treatment of dental problems was noted when dentist reimbursement was eliminated from the policy.
Cohen <i>et al.</i> , 2003	USA	4,326 cases	Retrospective database audit	Approximately 2% of dental-related ED visits during the 4-year study period resulted in a hospital admission.
Cohen <i>et al.</i> , 2007	USA	66 low-income adults	Focus group interviews	Most participants reported multiple barriers to seeking dental care, including the cost of dental care. The severity of the pain was the main reason to seek dental care eventually.
Cohen <i>et al.</i> , 2008	USA	272 low-income adults	Cross-sectional telephone survey	8.7% presented to an ED for toothache pain relief. 20.1% contacted physicians. 58.6% contacted a dentist. The majority who contacted an ED or a physician also contacted a dentist.
Cohen <i>et al.</i> , 2009b	USA	398 households	Cross-sectional study	One in five respondents consulted a pharmacist regarding toothache pain. Approximately 90% of respondents adhered to pharmacist's advice, while 55.7% reported that the advice helped 'a lot'.
Cohen <i>et al.</i> , 2009a	USA	53 low-income adults	Focus group interviews	Toothache pain was the most frequent oral problem resulting in MD/ED visits. Main reason for seeking care from MDs/ED was pain severity. Main reason for not seeking care from dentists was financial barriers.
Cohen <i>et al.</i> , 2011	USA	401 adults	Cross-sectional telephone survey	7.1% contacted an ED, 14.3% contacted a physician. 90.2% contacted a dentist. Lower-income respondents were more likely to seek care from an ED.
Cohen and Cotten, 2006	USA	811 adults	Cross-sectional telephone survey	5.6% saw a physician for a dental problem.
Cohen and Manski, 2006	USA	284,247 cases	Retrospective database audit	3.1% of the US population experienced at least one dental problem reported outside of the traditional office-based dental delivery system.
Davis <i>et al.</i> , 2010a	USA	Over 10,000 cases	Retrospective record audit	Over 10,000 visits to ERs for dental-related problems with total charges reaching nearly \$5 million in 1 year.
Dickinson <i>et al.</i> , 1995	UK	409 pharmacists	Questionnaire	Three-quarters of respondents were asked, at least once a week, for advice on oral health and topics related to dentures. Pharmacists' knowledge in oral health is poor.
Hocker <i>et al.</i> , 2012	USA	1,013 cases	Retrospective chart review	Dental visits accounted for 1.3% of all ED visits. Dental ED visits were more common among the uninsured. Dental ED visits resulted in definitive care or hospital admission, and often resulted in prescription of an antibiotic.
Ladrillo <i>et al.</i> , 2006	USA	1,102 cases	Retrospective database audit	73.4 % had non-traumatic dental complaints. 121% increase in ED visits for dental complaints between 1997 and 2001.
Lee <i>et al.</i> , 2012	USA	3,265 cases	Retrospective database audit	An increasing trend in ED visits for dental issues was most noticeable among the uninsured.
Lewis <i>et al.</i> , 2003	USA	693 cases	Retrospective database audit	EDs are an important point of care for dental-related complaints, particularly for individuals who lack private insurance.

Table 2 continued overleaf...

Table 2 continued ...

Reference	Country	Sample	Study Design	Main Findings
Maunder <i>et al.</i> , 2005	UK rural area	17 pharmacies	A semi-structured questionnaire	Common presenting complaints were ulcers and toothache/pain relief.
McCormick <i>et al.</i> , 2013	USA	173,648 cases	Retrospective database audit	4.3% of emergency visits were dental-related. Among these 52.7% were uninsured.
Nasr <i>et al.</i> , 2013	UK	118 Accident and emergency (A&E) doctors	A cross-sectional survey using a questionnaire	A&E doctors surveyed have only partial knowledge of the management of dental injuries. Appropriate training can significantly increase knowledge.
Pennycook <i>et al.</i> , 1993	UK	109 patients	Prospective study (questionnaire)	107 dental patients attended the ED on 109 occasions.
Quiñonez, 2011	Canada	1,005 adults	Cross-sectional and retrospective national telephone interview survey	5.4% visited an ED for a dental problem not associated with trauma. Income and oral pain appeared to be the dominant predictors of the visits.
Ramraj <i>et al.</i> , 2013	Canada	1,049 working poor adults	Cross-sectional telephone survey	6.1% of the sample reported visiting an ED for a dental problem not associated with trauma.
Shortridge <i>et al.</i> , 2009	USA	40,440 cases	Retrospective database audit	Medicaid beneficiaries from rural areas in states with less generous Medicaid reimbursements, have ED care-seeking patterns like those of the uninsured.
Steel <i>et al.</i> , 2011	UK	35 pharmacies	A postal-questionnaire-based survey	Pharmacy counter assistants are not frequently approached by the public for advice on matters of oral health. Respondents identified a role for themselves in educating patients/customers.

Reports also demonstrated that people presented to physicians with dental problems. Two studies conducted in the US revealed that over 20.0% low income and 14.0% adults contacted physicians for their dental problems (Cohen *et al.*, 2008; 2011). Furthermore, findings from the 811 interviews with the US residents over 20 years of age indicated that nearly 6% reported visiting a medical doctor for a dental problem (Cohen and Cotten, 2006). In the UK, visits for oral health problems to medical practices accounted for approximately 0.3% of all visits (Anderson *et al.*, 1999). People not only utilise ED and medical offices for their oral health problem but also pharmacies. In particular, nearly 70% of pharmacies received more than 11 oral health requests weekly in a rural area in the UK (Maunder *et al.*, 2005). Cohen *et al.* (2009b) found that about 20% of respondents consulted a pharmacist regarding toothache pain. Tooth injury and toothache pain were the most frequent problems that resulted in visits to non-dental health services (Cohen *et al.*, 2009a; Lewis *et al.*, 2003) while common presenting complaints to pharmacists were ulcers, toothache and pain relief (Maunder *et al.*, 2005).

Published studies in the US suggested that people who seek care from EDs and medical practices were more likely to be uninsured (Hocker *et al.*, 2012; Lee *et al.*, 2012; McCormick *et al.*, 2013), low-income (Cohen *et al.*, 2008; 2011), lack a usual source of dental care (Cohen and Manski, 2006) and lack private insurance (Lewis *et al.*, 2003). The main reasons for utilising non-dental health practitioners rather than a dentist were pain severity, financial barriers (Cohen *et al.*, 2009a; Quiñonez, 2011) and the cost of dental care (Cohen *et al.*, 2007).

Training in oral health care for non-dental health practitioners

The reviewed literature suggested that non-dental health practitioners lack substantive training in oral health care and therefore could only provide temporary solutions to dental problems e.g. medical staff at EDs provided prescription for pain killers and antibiotics (Cohen *et al.*, 2009b; Hocker *et al.*, 2012; McCormick *et al.*, 2013). A UK study suggested that medical staff at an ED “rarely could make any diagnosis, and management of dental problems for the patients took place on an empirical and symptomatic basis” (Pennycook *et al.*, 1993). A recent UK study (Nasr *et al.*, 2013) suggested that the Accident and Emergency doctors lacked comprehensive knowledge on the management of dental traumas and this would significantly affect their management and diagnosis of the dental injuries they faced. There was a lack of dental services at many EDs and staff were neither trained nor not capable of providing definitive care (Cohen *et al.*, 2002). Davis *et al.* (2010a) suggested that the underlying dental problem was often not resolved as evidenced by the frequency of repeat visits of these patients to the ED. Due to a similar lack of training in oral health care, medical doctors (not at an ED) also appeared to limit their services to the referral of patients to a dentist or the provision of prescriptions (Cohen *et al.*, 2011). Similarly, despite pharmacists having an important role to play in giving oral health advice and alleviating toothache pain (Cohen *et al.*, 2009), they often lacked sufficient train-

Table 3. Training/type of service provided by non-dental health practitioners

Reference	Country	Non-dental health practitioner type	Training/type of service provided	Target population	Main Findings or Conclusion
Blinkhorn <i>et al.</i> , 2012	Australia	Aboriginal Health Workers	Dental health education program	Aboriginal children from six months of age	The results have not been published.
Cruz <i>et al.</i> , 2004	USA	Paediatric and family physicians	Dental screening and referral to dentists	Low income children less than 3 years of age	Nearly 78% were likely to refer children who had signs of early decay.
Davis, <i>et al.</i> , 2010b	Rural Canada	Physicians, physician assistants, nurse practitioners	Primary care clinicians trained to conduct basic oral health screenings	Children and adults	46% of screened patients had oral health conditions detected.
DHS, 2002	Australia	Community pharmacists	Online continuing education program	Older people	The website developed an Internet based oral health training program that provides a flexible model for community pharmacists to meet their continuing professional education requirements.
Fricke <i>et al.</i> , 2009	Australia	Registered nurses, care workers, GPs	Train the trainer model, the use of oral health assessment tool	Older people	The program can be delivered successfully by non-dental health practitioners.
Grant <i>et al.</i> , 2007	USA	General practitioners	Oral screening, parent oral health counseling and application of fluoride varnish	Low income children aged 6-36 months and their carers	1,081 visits and 655 patients were documented during the study period.
Holve, 2008	USA	Paediatricians	Application of preventive oral health products	Low income Native American children	Fluoride varnish applied at well child care visits can reduce early childhood caries in children.
Mouradian <i>et al.</i> , 2003	USA (rural communities included)	Family medicine residents	Public health overview; oral health promotion and practice; normal dental development/ common oral pathology; dental caries; fluoride varnish; collaborating with dentists; dental trauma and emergencies; oral-systemic health interactions/children with special health care needs.	Low income birth to five years children	81 residents were trained. Gained in oral knowledge after training.
Pacza <i>et al.</i> , 2001a	Australia	Aboriginal Health Workers (AHWs)	Three modules: 1, Introduction to oral health and hygiene; 2, Applied oral health; 3, Oral health delivery	Aboriginal people	27 AHWs participated in pilot training programs for modules 1 and 2. AHWs could implement long-term preventive measures to improve community oral health.
Pierce <i>et al.</i> , 2002	USA	Paediatric primary care providers	Oral screening/early identification of oral problems and dental referral	Low income children younger than 3 years of age	After 2 hours of training in infant oral health, the family primary care providers obtained an adequate level of accuracy in identifying children with dental conditions.
Ponnusamy <i>et al.</i> , 2013	Australia	Receptionists	Triage by trained receptionists using triage software installed on their computers	All patients	Receptionists can be used in innovative ways to deal with the current workforce shortage and funding constraints in the public health sector.

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Table 3 continued...

Reference	Country	Non-dental health practitioner type	Training/type of service provided	Target population	Main Findings or Conclusion
Quiñonez <i>et al.</i> , 2006	USA	General practitioners	Application of preventive oral health products	Low income children aged 9 to 42 months	Application of fluoride varnish in the physician's office is effective in reducing caries in low-income children.
Rozier <i>et al.</i> , 2003	USA	Paediatricians, registered nurses, physicians' assistants, nurse practitioners	Continuing medical education lectures and interactive sessions, practice guidelines for patient interventions, case-based problems, practical strategies for implementation, a toolkit with resource materials, and follow-up training.	Low-income children from birth to 3 years of age	1,595 medical professionals were trained.
Roberts-Thomson <i>et al.</i> , 2010	Australia	Primary care workers including indigenous health workers	Fluoride varnish applications, training primary care workers, and health promotion for oral health at an individual, family and community level.	Remote Indigenous Australian children (18-47 months)	The intervention did not produce any significant change in oral health behaviours, clinical measures of oral hygiene, or community programmes promoting oral health.
Schaff-Blass <i>et al.</i> , 2006	USA	Paediatric residents (doctors)	Didactic sessions, hands-on instruction by paediatric dentists and residents, preventive dentistry prompts, and change strategies to introduce oral health into practice.	Children	Improvement in residents' knowledge and their confidence in providing oral health services.
SA Dental Service, 2010	Australia	General Practitioners, Child Health Nurses, Practice Nurses, Aboriginal Health Workers, Migrant Health Service staff	A simple <i>Lift the Lip</i> screening and referral tool to assist with the identification of children needing a referral.	Children aged 6 months to 5 years	Increase in the number of pre-schoolers accessing the School Dental Service and being referred to a dentist.
Slade <i>et al.</i> , 2011	Australia	Primary health care workers including Aboriginal Health Workers	Fluoride varnish applications. Water consumption and daily tooth cleaning with toothpaste advocated. Dental health promoted in community settings. Primary health care workers trained in preventive dental care.	Aboriginal children 18 months to less than 48 months	Health care workers in remote Aboriginal communities should receive training and support in the provision of a comprehensive program to prevent dental caries.
Slade, 2007	Australia	General Practitioners and Registered Nurses	Dental screening and referral to dental care.	Community-dwelling elderly population	Significant improvement in patients' average ratings of oral health and quality of life.
Skapetis <i>et al.</i> , 2012; 2013	Australia	Primary care providers including regional and rural hospital ED doctors	Workshop in the management of dental emergencies.	Children and adults	Increase in provider knowledge and skills
Walker <i>et al.</i> , 2011	Australia	Indigenous Health Workers	Interviews conducted with Indigenous Health Workers to explore their views of the development of an oral health role and to identify facilitators and barriers to sustainable role development.	Indigenous people	There is a need for training of all members of the primary health care team and not only Indigenous Health Workers in oral health to support the development of the Health Worker oral health role.
Wolfe <i>et al.</i> , 2004	USA	Physicians, medical students, nurses, nutritionists, childcare, and outreach workers	An oral health promotion and disease prevention education and training program.	Low-income children	2,000 health providers were trained.

ing and knowledge in this area (Dickinson *et al.*, 1995; Maunder *et al.*, 2005).

A range of educational training involving non-dental health practitioners was reported in the literature. In a Canadian study, the local dentist trained the primary care providers of a rural family medicine practice to perform basic oral health screening for people who presented to the practice for an appointment (Davis *et al.*, 2010b). Similarly, in a US study, paediatricians, family physicians and providers in community health clinics were trained to provide preventive dental services to low-income children and their care givers (Rozier *et al.*, 2003). In addition, in the US, training programs for family medicine residents and non-dental health and human service workers have been shown to increase their oral health knowledge (Mouradian *et al.*, 2003; Wolfe *et al.*, 2004) and capability to adopt these preventive dental services within a one-year period (Grant *et al.*, 2007).

In Australia, a short educational workshop in the management of dental emergencies was conducted with primary care providers including rural and remote practitioners (Skapetis *et al.*, 2012; 2013). Primary care providers at six months after the intervention reported that the training was associated with a significant and sustained growth in proficiency and confidence to manage dental problems (Skapetis *et al.*, 2012). The *Better Oral Health in Residential Care Project* conducted in five Australian aged care facilities demonstrated that general practitioners and registered nurses were able to identify residents requiring a dental referral (Fricker *et al.*, 2009). The project demonstrated that the oral health status of residents improved rapidly and that an aged care Registered Nurse could become an oral health champion and deliver training to other staff through the adoption of a 'train the trainer' model (Fricker *et al.*, 2009).

In Australia, the oral health role of Aboriginal Health Workers (AHWs) have been explored in several studies (Blinkhorn *et al.*, 2012; Pacza *et al.*, 2001a; Roberts-Thomson *et al.*, 2010; Slade *et al.*, 2011; Walker *et al.*, 2011). In particular, an oral health training program was piloted in AHW training facilities in rural and remote Western Australia with 27 AHWs (Pacza *et al.*, 2001a). Through this training, it was expected that AHWs would be encouraged to provide preventive care to improve community oral health. In another study, in response to the need for the development of innovative approaches to prevent early childhood caries in Aboriginal communities, a dental health education program for Aboriginal children aged from six months was being delivered by AHWs (Blinkhorn *et al.*, 2012). Slade and colleagues (Slade *et al.*, 2011) examined a dental health program in remote Aboriginal communities of Australia's Northern Territory. The program involved in training primary health workers including Aboriginal health workers to provide preventive dental care.

Studies of pharmacists were very limited although an online continuing education program for community pharmacists to provide oral health advice to older people has been developed in the state of Victoria, Australia (DHS, 2002). Recently, the use of receptionists to screen emergency dental callers has been explored in the state of Tasmania, Australia. Here, receptionists of the public emergency dental service were trained to implement and

manage a computer based telephone triage system for emergency dental care (Ponnusamy *et al.*, 2013). All callers were asked questions regarding their presenting dental complaint. The system automatically analysed patient responses for the severity of the presenting complaint and determined their priority for a dental appointment (Ponnusamy *et al.*, 2013).

Services provided by non-dental health practitioners included screening for oral problems, fluoride varnish application, and counselling of caregivers on oral health practices (Grant *et al.*, 2007; Holve, 2008; Rozier *et al.*, 2003). One study reported that after two hours of training, physicians and physician assistants could perform oral screenings reaching the accuracy of dentists (Pierce *et al.*, 2002). Similarly, *Lift the Lip* programs have been implemented successfully in South Australia, Australia (SA Dental Service, 2010). Here, a simple *Lift the Lip* screening and referral tool has been developed to assist with the identification of pre-school children needing a referral to a dentist. In the same State, oral screening provided by General Practitioners as part of the older persons wellness check, has also been reported as successful (Slade, 2007).

Although referral to a dentist is one of the services that non-dental health practitioners provided, the literature suggests that the level of confidence in screening/risk assessment and self-perceived referral difficulty are the two most important factors influencing the likelihood that a primary care provider refers their patient to a dentist (Cruz *et al.*, 2004). Physicians who had higher confidence in their ability to perform screenings and reported low overall referral difficulty were more likely to refer patients. An important lesson from this program was that to ensure effective and appropriate involvement of primary care providers, the appropriate training, encouragement and problems with the dental referral environment should be addressed (Cruz *et al.*, 2004).

Discussion

Findings from this review indicated that people who are uninsured, have low-income levels, lack a usual source of dental care and do not have private insurance, tend to present to Emergency Departments, medical practices and pharmacies for dental-related problems. This is consistent with findings from an Australian dental survey which indicated that nearly 30% of people avoided or delayed seeing a dentist because of the cost (Chrisopoulos *et al.*, 2013) and that this 30% are more likely to rely on public dental services. However, due to long waiting lists and significant wait time for public dental care, people may not participate in preventive practices such as regular check-ups and, when oral health problems do arise, may seek treatment through emergency visits to a hospital or non-dental health service provider for symptom relief and referral. Treatment in an ED is costly, incomplete and may not solve the underlying cause of the dental issues (Davis *et al.*, 2010a). Staff at EDs have limited knowledge and training in the management of dental problems (Nasr *et al.*, 2013; Pennycook *et al.*, 1993) although they may be called upon to triage, diagnose, and provide some basic treatment (Lewis *et al.*, 2003).

Given this need, oral health education and training programs for ED staff have been reported in the literature, but appear not to be widespread. In particular, there were only two studies (both Australian) in which a short educational workshop was provided to primary care providers including rural and remote practitioners in the management of dental emergencies (Skapetis *et al.*, 2012; 2013). As described previously, an oral health triage system utilising appropriately trained dental receptionists illustrates an innovative response to deal with a current workforce shortage and public health sector funding constraints (Ponnusamy *et al.*, 2013). Whilst highly encouraging, the outcome measures reported in these studies were mostly process orientated and participant reflective rather than clinically-based indicators.

The Scottish Dental Clinical Effectiveness Programme (SDCEP) has published the guidance called 'Management of Acute Dental Problems'. The guidance could be used by both dental and non-dental health professionals in any healthcare setting. Based on the main presenting symptoms, the guide helps health professionals identify any prompt action to give to the patient and to decide the appropriate health professional of subsequent care by providing decision support flowcharts (SDCEP, 2013a). The guide also provides further advice about the initial management and subsequent care for a wide variety of conditions that may present as acute dental problems (Scottish Dental Clinical Effectiveness Programme, 2013a). 'Management of Acute Dental Problems' is provided in three forms as follows:

- Full Guidance (SDCEP, 2013a) includes decision support flowcharts and further advice on the management of a range of clinical conditions.
- Quick Reference Guide (SDCEP, 2013b) includes decision support flowcharts.
- Web App (SDCEP, 2013c) is an interactive electronic version of the full guidance.

It was noted by the SDCEP that non-dental health professionals may be particularly interested in the Quick Reference Guide and Web App.

Although people present at pharmacies for their oral health advice and treatments (Dickinson *et al.*, 1995; Maunder *et al.*, 2005), oral health training may be an area neglected in their under and postgraduate education (Dickinson *et al.*, 1995). The World Health Organization (WHO) global policy for improvement of oral health (Petersen, 2008) called on its country members to increase their oral health workforce capacity by training primary care providers to deal with shortages of dental health practitioners and set up appropriate referral systems to ensure proper service backup by dentists. Pharmacists have reported a lack of resources and training relating to oral health and systemic disease (Buxcey *et al.*, 2012). One study reported that rural pharmacists raised the issues around referrals and advice regarding oral health care and a lack of support for their integration into primary healthcare teams (Maunder *et al.*, 2005). This review located only one report of a continuing education program for community pharmacists (DHS, 2002), though it has been suggested that because of their frequent interactions with customers and patients, pharmacy counter assistants could have a greater involvement in oral health promotion

as part of a holistic community-based health promotion strategy (Steel *et al.*, 2011).

This review demonstrated that both adults and children present to medical practices for oral health issues. However, with the exception of one Canadian report (Davis *et al.*, 2010b), the training programs and services described here, for the large part, concentrated on the physician's role in providing preventive services, oral screening and assessment for younger population groups.

In Australia, whilst the oral health role of Aboriginal Health Workers (AHWs) is advocated, there appears to have been little sustainable development of the role of AHWs and no evaluation of the impact of the role on the oral health of Aboriginal communities (Blinkhorn *et al.*, 2012). A study in the Northern Territory, Australia (Slade *et al.*, 2011) found that although nurses and AHWs were trained in providing preventive dental services, these primary health workers provided only a few varnish applications, due to a heavy workload and a high turnover of remote health care workers. A later Australian study (Walker *et al.*, 2013) found strong support among remote health personnel for the development of the oral health role of AHWs and the need to develop training for remote health workers to deal with oral disease.

The limitation of this review is that critical appraisal of the articles reviewed was not undertaken. Nevertheless, the review provides a comprehensive summary on the use of oral health services provided by non-dental health practitioners in both urban and rural settings.

Conclusion

The review of the literature suggests that both children and adults do present to non-dental health practitioners with oral health problems. Despite this, these primary care providers lack training and knowledge in management of oral health. The literature on education and training for non-dental health practitioners is limited. This review also found that the involvement of non-dental health practitioners in the management of dental problems mainly focused on low income and indigenous children. It is important that these non-dental health practitioners are provided with training in oral health management and are supported as part of a multidisciplinary health care team to improve oral health outcomes for the disadvantaged population. Further research into oral health education and training for non-dental health practitioners especially those in rural and remote areas should be explored and clinical outcomes should be measured.

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