Exploring the oral health curriculum in Australian pharmacy schools

Janet Janjira Chuanon 702326
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Melbourne Dental School University of Melbourne
Abstract

Introduction

Poor oral health continues to be prevalent in Australia despite ongoing advancements in oral health knowledge and care. Without innovative strategies to improve the oral health of the population, the quality of life for an increasing number of Australians will be negatively affected as poor oral health extends beyond the mouth and can affect general health and well-being.

Beyond the dental clinic setting, pharmacists have been recognised in the literature to have an important role in oral healthcare. The potential to expand the role of pharmacists as oral health advisors has also been acknowledged. While previous studies explored the knowledge and opinions of pharmacists regarding oral health, no research has been completed to explore the extent of oral health content that is currently included in Australian pharmacy schools’ curricula or on the knowledge and opinions of the pharmacy students who are about to graduate as health professionals.

Aim

The aim of this study was to investigate the knowledge, attitudes and perceptions towards the role of pharmacists in oral health among final year pharmacy students in Australia, and to investigate the extent of the oral health content in Australian pharmacy curricula.

Methods

A cross sectional study of pharmacy students across 8 Australian pharmacy courses was undertaken using an anonymous online survey. In addition, semi-structured interviews were conducted with pharmacy course coordinators or convenors to discuss the oral health content in their course curricula. Survey results were analysed using SPSS software (SPSS 25.0, Chicago Il, USA) and the findings summarised using descriptive statistics. Phone interviews were recorded, transcribed verbatim and analysed thematically.

Results

A total of 45 pharmacy students across the nation completed the online survey. Almost half of the students (48.9%) reported that oral health was not included in their course. Many believed that pharmacists have an important role in oral healthcare, however only 38.9% perceived that pharmacists were appropriately trained to provide oral health education. Most students (91.7%) believed that
professional relationships between pharmacists and dental practitioners could be improved, and that pharmacists had the potential to be more involved with preventing oral health issues (86.1%).

Three main themes emerged from the course convenor interview study: (1) That pharmacists have a role in oral healthcare, (2) That oral health is being taught in pharmacy courses, however each did so in a varied manner, (3) Lack of space in course curricula is the key barrier for further inclusion of oral health care content in pharmacy courses.

Conclusion

Overall, the findings of this study provide evidence that the oral health content in pharmacy curricula in Australia is inconsistent, with students indicating that they wanted more education on oral health topics. Both students and course convenors recognised that pharmacists have an important role in oral healthcare. Therefore, pharmacy courses in Australia should consider expanding the coverage of oral health content to provide graduates with the confidence and skills they need to improve the oral health of the community.
Declaration

This is to certify that:

i. The thesis comprises only my original work towards the Master of Philosophy except where indicated in the preface.

ii. Due acknowledgement has been made in the text to all other material used.

iii. The thesis is fewer than 50,000 words in length, exclusive of tables, maps, bibliographies and appendices.
Acknowledgments

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GLOSSARY OF TERMS

Community pharmacist: a pharmacist, who works in a community pharmacy, and provides a number of services that include dispensing of prescriptions, counseling of patients at the time of dispensing of prescription and non-prescription medication, medication information to health professionals, patients and the general public, and participation in health promotion programs [1].

Community pharmacy: also known as retail pharmacy, is the most common type of pharmacy that allows the public access to their medications and advice about their health. Traditionally known as a chemist, it is the healthcare facility that is responsible for the provision of pharmaceutical service to a specific community group or region [2].

Dental caries: also known as tooth decay or cavities, is a common diet-related disease that leads to the loss of mineral from teeth. In its early stages it can appear as a white or dark spot on the tooth, but as more mineral is lost a cavity or hole may appear [3].

Dental hygienists: provide oral health assessment, diagnosis, treatment, management, and education for the prevention of oral disease to promote healthy oral behaviours to patients of all ages. Their scope may include periodontal/gum treatment, preventive services and other oral care. Dental hygienists may only work within a structured professional relationship with a dentist [4].

Dental practitioners: dentists, dental hygienists, dental therapists and oral health therapists.

Dental therapists: provide oral health assessment, diagnosis, treatment, management and preventive services for children, adolescents and young adults and, if educated and trained in a program of study approved by the National Board, for adults of all ages. Their scope may include restorative/fillings treatment, tooth removal, additional oral care and oral health promotion. Dental therapists may only work within a structured professional relationship with a dentist [4].
**Dentists:** work as independent practitioners and may practise all parts of dentistry within their competency and training. They provide assessment, diagnosis, treatment, management and preventive services to patients of all ages [4].

**Edentulism:** complete loss of all natural teeth.

**Oral health therapists:** are dual qualified as a dental therapist and dental hygienist. They provide oral health assessment, diagnosis, treatment, management and preventive services for children and adolescents and, if educated and trained in a program of study approved by the National Board, for adults of all ages. Their scope may include restorative/fillings treatment, tooth removal, oral health promotion, periodontal/gum treatment, and other oral care to promote healthy oral behaviours. Oral health therapists may only work within a structured professional relationship with a dentist [4].

**Periodontal disease:** inflammatory disease that affects the soft and hard tissues that support the teeth [5].

**Pharmacy assistant:** work as part of a pharmacy team, under the direction of a pharmacist. Responsibilities may include taking in and handing out prescriptions, dispensing prescriptions, ordering/receiving/loading/unloading deliveries, selling over-the-counter medicines, answering customer questions, pre-packing/assembling and labeling medicines, and referring problems or queries to the pharmacist [6].

**Private pharmacy:** a community pharmacy that is not directly associated with any chain of pharmacies and is not owned by a publicly traded company.
Chapter 1 Introduction

1.1 Oral health in Australia

Oral diseases are considered to be among the most common and costly burden of diseases in Australia. National expenditure on oral health (excluding hospital dental services) was $8.7 billion in 2012-2013, an increase from $5.9 billion in 2002-2003 [7]. In spite of the increased focus and expenditure on oral health, oral diseases remain a major health problem. According to the 2015 ‘Oral health and dental care in Australia: key facts and figures’ report [7]:

- 55% of 6-year-olds had experienced decay in their deciduous (baby) teeth
- 48% of 12-year-olds had experienced decay in their permanent teeth
- 16% of adults had experienced toothache in the previous 12 months
- 19% of adults aged 65 and over had no natural teeth

Furthermore, oral conditions were reported to be the third highest reason for acute preventable hospital admissions in Australia with more than 63,000 Australians hospitalised each year [8].

The consequences of poor oral health can be debilitating. The Australian National Oral Health Plan 2015-2024 [9] highlights that oral health is “fundamental to overall health, wellbeing and quality of life” (p. 1). Poor oral health is linked to general health in four major ways [10]:

1. It is significantly associated with major chronic diseases, which include cardiovascular disease, diabetes, respiratory disease, stroke, and kidney disease.
2. It leads to disability.
3. Oral health issues and major diseases share common risk factors.
4. General health problems may cause or worsen oral health conditions, and vice versa.

From these reports, it is evident that more needs to be done to improve the oral health of Australians.

1.1.1 Oral health of Australian children

Oral diseases have significantly affected Australian children throughout history. In a study completed post World War 2 (1954-
1955), Australian children were found to have one of the highest rates of dental caries among comparable developed countries [11]. Oral diseases in children reduced substantially between the mid-1970s to the mid-1990s with population preventive approaches such as improved access to fluoridated drinking water, the use of fluoridated toothpastes, the provision of preventive oral health services and the adoption of good oral hygiene practices [12]. However by the late 1990s improvements ceased, and there has since been an increase in the prevalence of childhood dental caries and an increase in the mean number of teeth affected by oral disease in children [13]. The National Child Oral Health Study 2012-14 [14] determined that 41.7% of Australian children aged 5-10 years experienced dental caries in their primary dentition. Contributing factors to this trend may include changes in school dental programs across the states and territories, as well as changes in dietary behaviours such as reduced consumption of fluoridated tap water and increased consumption of food and drinks that contain sugar [15].

Poor oral health during childhood is a significant predictor of poor oral health during adulthood and long-term dental problems [16]. Poor oral health additionally relates to inattention, reduced school attendance and performance, feelings of worthlessness, depression, poor self-esteem as well as problems with speech, eating and sleep [17]. For young children dental treatment often requires general anaesthesia, which can be traumatic for the child and also costly for the health system [18].

1.1.2 Oral health of Australian teenagers

The teenage years represent the transitional period from childhood to adulthood and typically describes individuals aged between 13 and 19 (although 12 year olds are sometimes included, and in Australia 18 and 19 year olds are often excluded as they are considered to be adults). When it comes to oral health care, teenagers frequently fall in the gap between younger children who have care provided by Australian school dental services, and adults who are responsible for seeking and paying (in most cases) for their own dental care [19].

While there is deficient data for Australian teenagers across the ages of 13 to 19, the Child Dental Health Survey: Australia 2003-04 [19] reported that dental disease was prevalent in 42.5% of 12 year olds
and 56.9% of 15 year olds (although this data did not include individuals from Victoria). A South Australian study revealed that experiences of dental caries increased between 1996 and 2006 for South Australian teenagers, despite their receipt of regular dental care [20]. It is apparent that a gap between the advances in oral health care and their clinical application with adolescents largely exists.

1.1.3 Oral health of Australian adults

The measures of oral health in adults include untreated dental caries, inadequate dentition, edentulism and periodontal disease. In Australia, approximately three in ten adults have untreated dental caries with rates varying according to geographic location and income (higher rates of dental caries occur in remote areas and in low income households) [21]. Inadequate dentition (having fewer than 21 teeth) is experienced by 11.4% of adults, while edentulism is experienced by 6.4% of the Australian population [22]. Nearly 23% of Australian adults experience moderate or severe periodontal disease, with rates increasing with age and in those with low incomes [22].

Poor oral health can significantly impact individual adults. Beyond the physical impacts of pain, infection and tooth loss, poor oral health is related to self-consciousness, depression, avoidance of social contact, avoidance of smiling and laughing, as well as reduced quality of life [17].

1.1.4 Oral health of the Australian elderly

Australians have one of the highest life expectancies in the world, with each generation living longer than the previous. The latest mortality data predicts that females born in 2013 will have a life expectancy of 84 years and males a life expectancy of 80 years [23]. It is generally accepted that the elderly refers to those aged 65 and over, and with better standards of living and better access to quality healthcare, this population in Australia is continually growing. The number of elderly Australians has tripled over the past 50 years, with 3.4 million in 2014, and an expected increase to 9.6 million by 2064 [23].

Increased lifespans generally coincide with increased ill health, and
this includes oral health issues. Although in the past being edentulous was an accepted norm, today more Australians are keeping their natural teeth well into their later years. In 1979, 60% of elderly Australians were edentulous [24], however by 2013 this number decreased considerably to 19% [7]. With more natural teeth being retained in the elderly, the need for dental care in this population has greatly increased.

The predominant oral health issues in the elderly include dental caries, periodontal disease, dry mouth, tooth wear and oral cancer [25]. Certain elderly subgroups have been identified to experience higher levels of oral disease and conditions [26]. These include community dwelling individuals with dementia, nursing home and boarding house residents, those of lower socio-economic status, those with chronic mental illness, and those with eating and swallowing problems. Studies have shown that this elderly subgroup population experience more retained tooth roots, missing teeth, decayed teeth, and more plaque covered tooth surfaces [26].

Oral health issues in the elderly can have a substantial impact on quality of life. Similar to the adult population, poor oral health in the elderly can lead to a reduced quality of life with avoidance of eating certain foods, speech difficulties, food catching in the mouth, oral pain, avoidance of smiling, and low self-esteem [26].

1.2 Oral diseases and conditions

Australians are affected by a number of oral diseases and conditions. The most common are dental caries, periodontal disease and oral cancer [9].

1.2.1 Dental caries

Dental caries is a microbial disease that is characterized by the demineralisation of the inorganic portion and the destruction of the organic substance of the tooth [27]. Demineralisation occurs when sugars and other fermentable carbohydrates in food or drink react with bacteria present in the dental biofilm on the tooth surface, resulting in the production of bacterial acid. The acid reduces pH levels, and this leads to the loss of calcium and phosphate from the enamel (the outer layer of the tooth).
Saliva has an important protective role when it comes to dental caries as it dilutes and neutralises bacterial acid that causes demineralisation. Once the acid has been neutralised, the reservoir of minerals contained within saliva act to remineralise the tooth. The balancing process of demineralisation and remineralisation occurs multiple times during the day. However when demineralisation frequently exceeds remineralisation, dental caries develops.

The aetiology of dental caries is complex and multifactorial, though there are several associated risk factors. Some of these include:

- **Diet:** As frequent exposure to sugar and fermentable carbohydrates results in the recurring production of bacterial acid and therefore demineralisation. (Fermentable carbohydrates include obvious sugary foods such as cakes, lollies and soft drinks, as well as less obvious foods such as bread, bananas and breakfast cereals [28].)
- **Dental plaque:** If not removed regularly, dental plaque (the oral microbial biofilm that is constantly formed on teeth) undergoes maturation, resulting in pathogenic bacteria.
- **Dry mouth:** As a reduction in saliva leads to a reduction in the acid neutralisation process. Dry mouth can be caused by a number of medications, some medical conditions, radiation to the head or neck, and certain chemotherapy drugs [29].
- **Enamel quality:** Developmental defects of enamel have a greater risk for developing dental caries.
- **Tooth morphology:** Teeth with deep grooves and pits collect more food particles and are often more difficult to keep clean, therefore are at a greater risk of becoming carious.

### 1.2.2 Periodontal disease

Periodontal disease is an inflammatory disease that affects the soft and hard tissues that support the teeth [5]. It is usually caused by a buildup of plaque and pathogenic bacteria on teeth and along the gum line [30]. The immune system reacts to the buildup with an inflammatory response. There are two main stages of periodontal disease: gingivitis and periodontitis.

Gingivitis is the early and mildest form of periodontal disease. The surface layers of the gums are affected at this stage causing them to become red, swollen and bleed easily [5]. Factors that may contribute to gingivitis include: diabetes, smoking, aging, genetic predisposition, systemic diseases and conditions, stress, inadequate nutrition, puberty,
hormonal fluctuations, pregnancy, substance abuse, HIV infection, and certain medication use [5]. Gingivitis is reversible with professional treatment and good oral hygiene care at home.

Periodontitis is the advanced form of periodontal disease that may occur as a result from untreated gingivitis. Periodontitis not only affects the gums, but it also affects the cementum (the covering of the tooth root), the periodontal ligament (the fibres that connect the tooth root to the bone), as well the supporting bone itself [30]. As periodontitis progresses, the tissues and bone that support the teeth are destroyed by the body’s immune response. Teeth can consequently become loose from this damage and may fall out or need to be removed.

Modifiable risk factors for periodontal disease include:
- Smoking: Cross sectional and longitudinal studies have determined that the risk of developing periodontal disease increases with increased tobacco smoking [31].
- Alcohol: There is evidence to suggest that alcohol consumption is a risk indicator for periodontitis [32].
- Poorly managed diabetes: Multiple studies have shown a relationship between poor glycaemic control and periodontal disease, with one study suggesting that a bi-directional relationship occurs with each disease having a potential impact on the other [33].
- Stress: It has been reported that periodontitis is more widespread and severe in those with higher levels of stress [31].
- Poor nutrition: Nutrition can have a major impact on the growth, development and metabolic activities of the periodontal tissue that surround and support the teeth. One study determined that low dietary intake of calcium and vitamin C was associated with higher rates of periodontal disease [34].

Non-modifiable risk factors for periodontal disease include:
- Genetic factors: Studies of identical twins suggest 50% of susceptibility to periodontal disease is due to host factors [35].
- Osteoporosis: A number of studies have shown a relationship between osteoporosis and alveolar bone loss (i.e. bone that supports the teeth) [31]
1.2.3 Oral cancer

Oral cancer (also known as mouth cancer or cancer of the oral cavity) is often used to describe cancers that occur in the region of the mouth. Oral cancers most commonly occur on the lips, tongue and floor of the mouth, but can also occur in the cheeks, gums, tonsils, salivary glands and roof of the mouth [36]. Symptoms of oral cancer may include [36]:

- A lump in the neck
- Loose teeth
- Swelling or a sore lip that won’t heal
- Difficulty or painful swallowing
- Changes in speech
- Bleeding or numbness in the mouth
- White or red patches in the mouth, including all surfaces of the tongue or gums
- Unexplained weight loss

Approximately 4000 new cases of oral cancer are diagnosed in Australia each year [37]. Oral cancer is an aggressive disease with a survival rate of only 50% over 5 years as it often goes undetected until it is at an advanced stage [38]. Therefore, early detection is vital for successful treatment outcomes.

The two major risk factors associated with oral cancer are:

1. Smoking: Approximately 59% of oral cancers in Australia are caused by smoking [36], with smokers have 7 times the risk of developing oral cancer [37].
2. Alcohol: Approximately 31% of oral cancers are caused by excess alcohol consumption [36,38].

Other risk factors include [38]:

- Sun exposure: As the skin on the lips is delicate and easily damaged by UV rays
- Age: Incidence of oral cancer increases with age
- Poor oral hygiene: There is building evidence that poor oral hygiene and chronic irritation of the soft tissues in the mouth increases the risk of oral cancer, particularly on the tongue and cheeks
- Viral infections: Particularly with human papilloma virus (HPV)
• Nutritional deficiencies
• Genetic predisposition

1.3 Relationship between oral health and systemic diseases

Population based studies have suggested a correlation between oral health status and serious major chronic diseases [10]. Research has focused on the influence periodontal disease has on cardiovascular disease, diabetes, and respiratory diseases; although other diseases such as dementia, chronic kidney disease and certain forms of cancer have also been described [39].

Cardiovascular disease is one of Australia’s largest health problems, affecting one in six Australians or 4.2 million people [40]. In 2015 the number of deaths attributed to cardiovascular disease was 45,392, which equated to one Australian every 12 minutes [40]. There is a large body of evidence that supports the link between cardiovascular disease and oral health, particularly the association between periodontal disease and atherosclerotic heart disease (also known as coronary heart disease), stroke and peripheral vascular disease [41-42]. Numerous studies have also shown increased arterial wall thickness in the presence of periodontal disease [43-44]. Remarkably, no causal relationship has been established between cardiovascular disease and periodontal disease [45], yet evidence suggests that periodontal therapy is associated with reductions in surrogate markers implicated in atherosclerotic cardiovascular disease [46].

Diabetes is the fastest growing chronic condition in Australia and affects approximately 1.7 million Australians [46]. Several oral conditions are associated with diabetes. These include periodontal disease, dry mouth, dental caries, thrush, mouth ulcers, taste disturbances and gum abscesses [48]. Research has shown periodontal disease to be a potential risk factor for poor metabolic control in people with diabetes [49]. In fact a bi-directional relationship between periodontal disease and diabetes has been reported, with Chapple and Genco (2013) expressing that poorly controlled diabetes increases the risk of periodontal disease, while the presence of periodontal disease contributes to poor glycaemic control, the risk of developing type 2 diabetes, and diabetic complications [50].

More than a quarter of Australians are affected by chronic respiratory conditions, of which asthma and chronic obstructive pulmonary disease (COPD) are the most common [51]. A 2006 systematic review on the
association between oral health and respiratory conditions revealed the following [52]:

- Fair evidence of the association between oral health and aspiration pneumonia
- Weak association between oral health and COPD
- Good evidence that improved oral hygiene and frequent professional oral health care reduces the progression or occurrence of respiratory diseases among high-risk elderly adults (e.g. Individuals living in nursing homes and those in intensive care units)

1.4 Review of Australia’s National Oral Health Plan 2015-2024

With the continuing prevalence of poor oral health in Australia, the National Oral Health Plan was developed to “improve health and wellbeing across the Australian population by improving oral health status and reducing the burden of poor oral health [9]”. The goal was to set the national direction for oral health and provide a framework for collaborative action over 10 years by targeting six Foundation Areas. These Foundation Areas include oral health promotion, access to care, systems alignment and integration, safety and quality, workforce, and lastly research and evaluation. What is notable about the plan is that three of the six Foundation Areas (i.e. oral health promotion, access to care, and systems alignment and integration) can also be applied to non-dental health professionals.

1.4.1 Oral health promotion

While health promotion is the process of enabling people to increase control over and to improve their health [53], oral health promotion focuses on strategies to specifically improve oral health. Oral health promotion can be achieved in numerous environments as information, resources and social environments all influence behavioral choices.

Most oral diseases are preventable, and the Australian government has recognized the need to focus on prevention by promoting oral health to all Australians. Oral health promotion involves actions targeted at the population level as well as the individual level, and often involves not only the government and health practitioners, but also community partnerships. An example of oral health promotion at a population level is the fluoridation of community water. It has been determined that this safe cost-effective and protective action has improved oral
health across Australia since its introduction in the 1950’s [54]. Currently, 82.2% of the population has access to fluoridated water and there is a strong aim to increase this figure. Other oral health promotion actions in the National Oral Health Plan focus on improving the oral health literacy of Australians through several programs and policies, with emphasis on targeting priority population groups such as pregnant women, infants, children and adolescents, older adults, and culturally and linguistically diverse groups. Oral health literacy is important as low literacy levels frequently contribute to poorer oral health outcomes and higher healthcare costs.

1.4.2 Access to care

One of the greatest barriers to dental services in Australia is access to care. Poor access to oral health services in regional and remote areas has been well documented [55,56], with the provision of health services decreasing with increased remoteness [57,58]. In 2012 the Australian Institute of Health and Welfare reported that the number of dentists in major cities doubled the number of those in outer regional areas, and almost tripled the number of those in remote/very remote areas [59]. In terms of other dental practitioners, oral health therapists and dental therapists were more evenly distributed amongst the geographical categories, however represented a considerably smaller number compared to dentists [60].

Table 1: Registered dental practitioners per 100,000 population, by practitioner type and remoteness area, 2012 [61]

<table>
<thead>
<tr>
<th>Practitioner type</th>
<th>Major cities</th>
<th>Inner regional</th>
<th>Outer regional</th>
<th>Remote/very remote</th>
<th>Australia(a)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dentists</td>
<td>72.3</td>
<td>45.6</td>
<td>39.7</td>
<td>22.7</td>
<td>64.7</td>
</tr>
<tr>
<td>Oral Health Therapists</td>
<td>3.3</td>
<td>3.3</td>
<td>3.0</td>
<td>1.3</td>
<td>3.2</td>
</tr>
<tr>
<td>Dental Hygienists</td>
<td>8.4</td>
<td>3.7</td>
<td>4.0</td>
<td>2.1</td>
<td>7.0</td>
</tr>
<tr>
<td>Dental Therapists</td>
<td>5.2</td>
<td>6.2</td>
<td>7.7</td>
<td>5.9</td>
<td>5.6</td>
</tr>
<tr>
<td>Dental Prosthethists</td>
<td>5.4</td>
<td>5.6</td>
<td>3.2</td>
<td>0.4</td>
<td>5.1</td>
</tr>
</tbody>
</table>

(a) Includes dental practitioner who did not state or adequately describe their location and those who were overseas.

In addition to a decreased dental workforce in regional and remote areas, other reasons for poorer access to services may include longer distances to travel, perceived lack of time available to travel and lack of available transport [9,57]. Timely access to oral health services is fundamental as it enhances early diagnosis, facilitates timely treatment of oral diseases and conditions, and creates opportunities
for oral health promotion and education [62]. Poor access inevitably leads to lasting and frequently severe impacts on the oral and general health of individuals and population groups. The National Oral Health Plan recognises that dental service providers need to be accessible in terms of geographic location, availability of transport, availability of accommodation, opening hours, appointment mechanisms and social support. While dental services should preferably be located within known hubs (such as shopping centres) that have access to public transport and parking, this may not often be the case, particularly in regional and remote areas. Nevertheless other health services may be available in areas where dental services are lacking, making them ideal locations for basic oral health care.

1.4.3 Involvement of non-dental health professionals

There is great value in building partnerships with other health and allied services to make oral health a focus. Non-dental health professionals often have more regular contact with individuals when compared to dental professionals. The Australian Bureau of Statistics reported that 83% of the population visited a general medical practitioner within a 12-month period, compared to 48% who visited a dental professional [63]. It has also been reported that the average Australian visits a community pharmacy more than 14 times per year [64].

The broader health workforce has great potential when it comes to contributing to oral health care and oral health promotion. Non-dental health professionals can potentially contribute to the improvement of oral health by including dental screening, oral health information, dietary advice, oral hygiene support and appropriate referral for dental care in their general health and wellbeing checks. This particular workforce includes those who are involved in the provision of medical care, health checks, personal care services, education, health promotion and referral pathways. Non-dental health practitioners mentioned in the National Oral Health Plan included:

- Aboriginal and Torres Strait Islander health practitioners and health workers
- Diabetes educators
- Dieticians
- General medical practitioners
- Maternal and child health nurses
• Medical specialists
• Midwives
• Nutritionists
• Registered nurses
• Speech pathologists
• Other care workers and educators in the aged care, disability and early childhood sector

One example of the utilization of the broader health workforce in oral care was a North Carolina preventive oral health care program titled “Into the Mouth of Babes (IMB)”. Initiated in 2000, this program involved training general medical practitioners and pediatricians to deliver preventive services for children up to the age of 72 months. These services included oral health evaluation and risk assessment, educating parents and caregivers on oral health, applying fluoride varnish, and referring children to a dental practitioner when appropriate [65]. Children enrolled in this program who had four or more IMB visits experienced on average a 17% reduction in dental caries related treatments at 6 years of age compared with children who were not enrolled in the IMB program [66].

Australia’s National Oral Health Plan proposes the inclusion of oral health units as core components of medical, health and community services qualifications. The use of broader health professionals in oral health is beneficial as most people access other health services more often than dental services. Further promotion and integration of oral health units as core components of existing and new training packages is required to increase uptake and application in the workplace. Inclusion of oral health in professional practice education for health professionals will also develop further understanding of the relationships between oral health and general health and support the integration of care.

1.5 Pharmacists

1.5.1 Role of pharmacists

Pharmacy has a long history. The first authentic prescription on record dates back to 3700 BC, while the earliest historical record for a drug preparation dates back to 2600 BC [67]. Initially the role of the physician, herbalist and priest were intertwined throughout pharmacy.
It was not until the Middle Ages that these roles began to diverge. In 1240, the German Emperor Frederick II issued a decree that separated the practice of medicine and pharmacy, resulting in the establishment of the pharmacy profession [67]. The decree also provided official supervision of pharmacy practice and ordered pharmacists to prepare drugs “reliably, according to skilled art, and in a uniform, suitable quality.” [67,68]

The traditional role of a pharmacist was to compound and dispense medication, however their role has evolved throughout the years and continues to expand with new opportunities that become available. Aside from compounding and dispensing medication, modern day pharmacists have moved towards a greater clinical role and are involved with [67]:

- Counseling members of the public and other health professionals about medicines (both prescription and over-the-counter), including appropriate selection, dosage and drug interactions, potential side effects and therapeutic effects
- Advising patients on how their medicines are to be taken or used in the safest and most effective way
- Mentoring of new prescribers
- Undertaking medication management reviews
- Evaluating drug utilisation (to ensure optimal therapy)
- Point-of-care testing and monitoring (e.g. blood pressure, blood glucose)
- Community support services (e.g. needle exchange and opioid substitution dispensing)
- Dose administration aids
- Clinical audits
- Health assessments
- Immunizations
- Transitional care
- Disease management services
- Pharmacy staff education regarding medication
- Prescribing reviews

There is a large and growing workforce of pharmacists in Australia that are keeping pace with the healthcare demands of the rising population. Despite the roles pharmacists currently have, “their skills, knowledge and expertise are often under-recognised and under-
utilised” [69]. These highly educated and trained professionals are capable of doing much more for the health of the community.

1.5.2 Role of pharmacists in oral health care

Emerging evidence has revealed that non-dental health professionals such as pharmacists already have a role in oral health care and have the potential to be effective oral health promoters [70]. The average Australian visits a community pharmacy more than 14 times per year, with 5.5 million Australians asking their pharmacist for health-related advice annually [64]. Pharmacists are trained to work as part of a multidisciplinary team and often take on many collaborative roles. Pharmacists are also well placed and are in a unique position to provide education, advice and possibly services relating to oral health care.

Pharmacists have the potential to play an important role in oral health promotion as they are considered to be highly trusted health care professionals, require no appointments or direct charges, and are more readily accessible than other health care providers [71]. In addition, pharmacists play a key role in providing pain relief medication and advice for toothaches as well as counselling patients about adverse reactions in the oral cavity from medication (the most common adverse reactions being dry mouth, dysgeusia and stomatitis) [72]. Community pharmacies also sell many oral health care products such as toothbrushes, toothpastes, mouthwashes, mouth sprays, mouth gels, floss, and denture preparations. Some oral health products available (such as high strength fluoridated toothpaste) are in fact Schedule 3 Medicines or Pharmacist Only Medicines, meaning that the safe use requires professional advice but is available to the public from a pharmacist without a prescription [73]. Baby formulas and feeding bottles are also often sold at community pharmacies, creating opportunities for pharmacists to provide advice on their safe use to avoid Early Childhood Caries (formerly known as baby bottle decay or nursing caries).

Pharmacists additionally play a key role in oral health when it comes to smoking cessation. Smoking is Australia’s most expensive lifestyle related health condition and is accountable for eight per cent of the total health burden [74]. Pharmacists have an important role that involves assessing nicotine dependence, educating, motivating and
providing assistance for smokers to quit. The Pharmacy Guild of Australia identified four critical attributes of community pharmacists that make them ideal in providing smoking cessation interventions [75]:

1. Their accessibility
2. Their skills in providing behavioral support to patients
3. Being highly trained in providing counselling advice and advice about various medications
4. Retailing smoking cessation products such as nicotine replacement therapy.

1.6 The objectives of this study

1. To explore the available scientific literature on the involvement of non-dental health professionals, including pharmacists and pharmacy students in oral health care.

2. To investigate the knowledge, attitudes and perceptions towards oral health among final year pharmacy students in Australia, and

3. To investigate the extent of oral health content in the pharmacy curricula in Australia

1.7 Significance of this study

The findings of this study will contribute to the improvement of oral health in Australians, reflecting on the important role pharmacists have in oral health care and their potential for greater involvement. Oral health promotion and education should be actioned by all pharmacists, and it is anticipated that this study will assist in gaining a better understanding of what can be enhanced at a tertiary level. This study will contribute to the improvement of oral health education in pharmacy courses across Australian universities, and potentially universities around the world.

CHAPTER 2 LITERATURE REVIEW

2.1 Aim

The aim of this literature review was to explore the available scientific literature on the involvement of non-dental health professionals, including
pharmacists and pharmacy students in oral health care.

2.2 Search Methods

The search encompassed literature in English that was published between January 2000 and August 2017. Criteria for inclusion in this review included case studies, empirical research and systematic reviews. Letters to the editor, conference proceedings and theses were excluded. Studies must have included non-dental health professionals or non-dental health students, and an aspect of oral health.

Electronic searching was performed on Ovid, Scopus, CINAHL, PubMed and Web of Science. The following terms were used in the search strategy: (oral health, dental) AND (pharm*, health professional, nurse, doctor) AND (procedures, oral screen, health promotion, knowledge, education, caries risk assessment, health advice, referrals). Reference lists from articles found to be potentially appropriate were searched for further relevant manuscripts.

After duplicates were removed, a total of 287 records were identified. From these, 249 were reported in English and had abstracts reviewed for relevance. A total of 28 documents were determined to involve an applicable aspect of oral health care with a non-dental health professional, were in scope and consequently subjected to more in-depth analysis. The literature quality assessment tools used were from the U.S National Institute of Health (see Appendix 1-3). The quality of each study was determined to be good, fair or poor based on the number of applicable items according to the listed criteria.
2.3 Results and discussion

Twenty-eight studies [71,77-104] were examined for this literature review. Four of the studies involved pharmacy students, one involved pharmacy assistants and twelve involved pharmacists. Other non-dental health professionals and students were examined in nine of the studies; while the remaining studies included a miscellaneous combination of other related participants, overviews, and a systematic review. Studies were predominantly international with only three studies that involved participants from Australia. The following table summarises the examined studies:
<table>
<thead>
<tr>
<th>Authors</th>
<th>Year</th>
<th>Type of study</th>
<th>Sample</th>
<th>Key findings</th>
<th>Quality of study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Al-Saleh et al</td>
<td>2017</td>
<td>Cross sectional study</td>
<td>279 pharmacists</td>
<td>Community pharmacists are approached frequently for oral healthcare advice, however the majority of them had no oral health training. It is essential to provide continuous oral health education to pharmacists to better serve oral health needs of the community.</td>
<td>Fair</td>
</tr>
<tr>
<td>Barnett et al</td>
<td>2014</td>
<td>Systematic review</td>
<td>43 articles</td>
<td>The review of literature showed that both children and adults utilised 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. The literature on education and training for non-dental health practitioners was limited.</td>
<td>Good</td>
</tr>
<tr>
<td>Baseer et al</td>
<td>2012</td>
<td>Cross sectional study</td>
<td>161 doctors, nurses, pharmacists, technicians and medical students</td>
<td>Oral health knowledge among the health professionals working in King Fahad Medical City, Riyadh was lower than what would be expected of these groups, who had higher literacy levels in health care.</td>
<td>Fair</td>
</tr>
<tr>
<td>Baseer et al</td>
<td>2016</td>
<td>Cross sectional study</td>
<td>200 pharmacists</td>
<td>Pharmacists exhibited an average knowledge, negative attitude, and inadequate self-care practices toward oral health. However, increasing oral health knowledge can have profound improvement in oral self-care practices</td>
<td>Fair</td>
</tr>
<tr>
<td>Bashiru and Omotola</td>
<td>2016</td>
<td>Cross sectional study</td>
<td>189 medical, pharmacy and nursing students</td>
<td>The students’ oral health knowledge, attitude, and behaviour were inadequate and needed to be improved upon. The study also revealed that attitude is a determinant of oral health behaviour among the students.</td>
<td>Fair</td>
</tr>
<tr>
<td>Author(s)</td>
<td>Year</td>
<td>Study Type</td>
<td>Participants</td>
<td>Summary</td>
<td>Rating</td>
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</tr>
<tr>
<td>Bawazir</td>
<td>2014</td>
<td>Cross sectional study</td>
<td>141 pharmacists</td>
<td>The community pharmacists in Riyadh were underutilized in the promotion of oral health. There is a need for training of pharmacists and providing them with access to information on available dental service and oral health products.</td>
<td>Fair</td>
</tr>
<tr>
<td>Buxcey et al</td>
<td>2012</td>
<td>Cross sectional study</td>
<td>49 pharmacists</td>
<td>The majority of pharmacists agreed that providing oral health advice was within their role; however, few did so proactively. They highlighted a lack of available resources relating to oral health and systemic disease. Further training relating to oral health and systemic disease would be necessary to provide the knowledge to support any resources.</td>
<td>Fair</td>
</tr>
<tr>
<td>Cohen</td>
<td>2013</td>
<td>Overview</td>
<td>Pharmacists in the United States</td>
<td>Studies are needed to examine the extent of pharmacist training in oral health, the degree to which pharmacists who receive oral health training incorporate it into their practices, and pharmacist interest in relevant continuing education. Data gathered from such studies will be invaluable in developing appropriate training standards, model curricula, and clinical best practices.</td>
<td>Fair</td>
</tr>
<tr>
<td>Csikar et al</td>
<td>2014</td>
<td>Cross sectional study</td>
<td>26 dental nurses</td>
<td>Initial results suggest that training dental nurses to apply fluoride varnish can increase the number of applications made.</td>
<td>Fair</td>
</tr>
<tr>
<td>Dumitrache et al</td>
<td>2016</td>
<td>Cross sectional study</td>
<td>188 pharmacists</td>
<td>Pharmacists were eager to diversify their health knowledge and practice regarding dental care, prevention and the type of oral hygiene products, in order to meet health inquiries from their patients and improve primary care in public health services.</td>
<td>Fair</td>
</tr>
<tr>
<td>Edwards et al</td>
<td>2006</td>
<td>Cross sectional study</td>
<td>269 general practitioners</td>
<td>General practitioners were the most active health professionals in assessing nicotine dependence and readiness to quit, and also the most active in advising and following up on</td>
<td>Fair</td>
</tr>
<tr>
<td>Source</td>
<td>Year</td>
<td>Study Type</td>
<td>Sample Size</td>
<td>Findings</td>
<td>Fairness</td>
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<tr>
<td>------------------------</td>
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</tr>
<tr>
<td>Gavaza et al</td>
<td>2016</td>
<td>Cross-sectional study</td>
<td>58 pharmacy students</td>
<td>Many students had limited knowledge and education on oral health and indicated that they needed more education on oral health topics. Further research using larger and more representative samples is needed.</td>
<td>Fair</td>
</tr>
<tr>
<td>Golinveaux et al</td>
<td>2013</td>
<td>Written survey before and after receiving interdisciplinary educational intervention</td>
<td>30 paediatric nurse practitioner students</td>
<td>Oral health education programs for paediatric nurse practitioner students can improve their knowledge, confidence, attitudes, and behaviours regarding the incorporation of oral health care services during routine well-child visits</td>
<td>Fair</td>
</tr>
<tr>
<td>Hamissi and Hamissi</td>
<td>2015</td>
<td>Cross-sectional study</td>
<td>100 pharmacists</td>
<td>Pharmacists already provide some amount of oral health advice and they are keen to expand their knowledge.</td>
<td>Fair</td>
</tr>
<tr>
<td>Hein et al</td>
<td>2011</td>
<td>Cross-sectional study</td>
<td>41 associate or academic deans at medical, nursing, and pharmacy schools in universities across Canada, the United States, Europe, Asia, Australia, and New Zealand</td>
<td>The majority of students in these programs were not being instructed to examine the mouth, nor were they being taught how to perform an oral examination. Despite growing awareness of emerging evidence of oral-systemic relationships and recommendations that all health care providers should contribute to enhancing oral health, this knowledge base appears to be substantially deficient in the curricula of pharmacy, nursing, and medical students in many universities.</td>
<td>Fair</td>
</tr>
<tr>
<td>Kaur et al</td>
<td>2015</td>
<td>Cross-sectional study</td>
<td>219 health professionals (doctors, nurses, technicians, pharmacists)</td>
<td>Despite high literacy rates for health care professionals, oral health knowledge was average. They showed a positive attitude towards dental treatment.</td>
<td>Fair</td>
</tr>
<tr>
<td>Kolisa</td>
<td>2016</td>
<td>Cross-sectional study</td>
<td>52 nurses and 382 caregivers</td>
<td>There was evidence of minimal integration of oral health education at maternal and child health sites. The maternal and child health site remains an important and easily accessible area for integration of oral health services with general health in complementing</td>
<td>Fair</td>
</tr>
<tr>
<td>Authors</td>
<td>Year</td>
<td>Study Type</td>
<td>Number</td>
<td>Details</td>
<td></td>
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</tr>
<tr>
<td>Mann et al</td>
<td>2015</td>
<td>Cross sectional study</td>
<td>645 pharmacists</td>
<td>Efforts in prevention of early childhood caries. Pharmacies may be used effectively in oral health promotion by virtue of their frequent contact with members of public.</td>
<td></td>
</tr>
<tr>
<td>Maunder and Landes</td>
<td>2005</td>
<td>Cross sectional studies</td>
<td>17 pharmacies</td>
<td>Pharmacists already provided some degree of oral health advice in the Durham Dales area and were keen to progress this knowledge further through courses and promotional activities.</td>
<td></td>
</tr>
<tr>
<td>Preethi et al</td>
<td>2016</td>
<td>Cross sectional study</td>
<td>270 pharmacy students</td>
<td>The knowledge among the pharmacy students in this study was good although they had deficits in knowledge in a few areas such as flossing, regular visits to the dentist, and selecting dentifrices. Hence, oral health awareness among the pharmacy students should be increased to educate the patients and the community when they begin working in the health-care system.</td>
<td></td>
</tr>
<tr>
<td>Priya et al</td>
<td>2008</td>
<td>Cross sectional study</td>
<td>50 pharmacists</td>
<td>Pharmacists already provide some amount of oral health advice and they are keen to expand their knowledge. Patients regularly ask for their advice on both general and oral health care issues. Pharmacists are presently an underused resource, and it is only now that they are beginning to get the recognition they deserve. There is a definitive need for training of pharmacists and providing them with access to information on available dental services.</td>
<td></td>
</tr>
<tr>
<td>Rajiah and Ving</td>
<td>2014</td>
<td>Cross sectional study</td>
<td>74 pharmacy students</td>
<td>Findings showed that pharmacy students have positive attitudes toward oral health despite having poor knowledge and mediocre practice principles regarding oral health.</td>
<td></td>
</tr>
<tr>
<td>Sharif et al</td>
<td>2016</td>
<td>Cross sectional study</td>
<td>202 nurses</td>
<td>Most nurses in this study frequently advised and referred their pregnant patients to seek dental care. Strategies that promote regular dental visits by health care providers are highly</td>
<td></td>
</tr>
</tbody>
</table>
More emphasis should be placed on strategies to update the knowledge of nurses regarding the importance of oral health care during pregnancy through continuing medical education programs.

<table>
<thead>
<tr>
<th>Study</th>
<th>Year</th>
<th>Study Type</th>
<th>Sample Size</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steel and Wharton</td>
<td>2011</td>
<td>Cross sectional study</td>
<td>35 pharmacy assistants</td>
<td>Pharmacy assistants were infrequently approached by the public for advice on matters of oral health and advice was not often volunteered despite reasonable knowledge on the subject. Respondents identified a role for themselves in educating patients/customers, which they were keen to expand.</td>
</tr>
<tr>
<td>Taing et al</td>
<td>2016</td>
<td>Cross sectional study</td>
<td>144 pharmacists</td>
<td>This study highlighted that Australian pharmacists have an important role in oral health and there is opportunity to enhance this role, and address risk factors such as smoking with further training, support and education.</td>
</tr>
<tr>
<td>Thema and Singh</td>
<td>2013</td>
<td>Overview</td>
<td>Primary care nurses</td>
<td>Inputs in the education curriculum and continuing education for registered nurses on issues such as oral examination and oral health education, can contribute to turning programmatic health integration into a reality.</td>
</tr>
<tr>
<td>Valle-Oseguera and Boyce</td>
<td>2015</td>
<td>Overview</td>
<td>181 primary care nurses</td>
<td>Collaborations between dentists and pharmacists would increase patient safety, patient satisfaction and overall patient well-being.</td>
</tr>
<tr>
<td>Wigen and Wang</td>
<td>2017</td>
<td>Children were referred to dental services using criteria developed by dental personnel (in one county in Norway for one year)</td>
<td>By using established referral routines, all children referred to the dental services were at-risk children who required early contact with dental personnel.</td>
<td></td>
</tr>
</tbody>
</table>

2.3.1 Studies involving pharmacy students

One of the earliest studies to formally explore and document the oral health curricula of non-dental health professionals (specifically in
medicine, nursing and pharmacy) was published in 2011 by Hein et al [77]. This study particularly focused on the oral-systemic content that was being taught in predoctoral/undergraduate curricula of medical, nursing and pharmacy schools in English speaking universities around the world. The quality of this study was determined to be fair with a 23% response rate and skewed representation from the disciplines being investigated. Despite awareness of oral-systemic relationships and recommendations that all health care professionals contribute to oral health, this study concluded that oral health curricula were largely deficient in many of the investigated universities. This result may only be valid for the participating universities and may not be applied to universities globally.

Studies that explored the oral health knowledge of pharmacy students have been conducted in Malaysia [78], Nigeria [79], India [84], and the United States [80]. The quality of these studies was considered to be fair as they all involved self-reporting surveys, which may have introduced some reporting bias. Convenience sampling technique was used in studies completed by Rajiah and Ving [78] and Bashiru and Omotola [79], resulting in sampling that may not be generalizable. Although there were variations in all the studies in terms of the questionnaires distributed, the overall conclusion was that pharmacy students had poor oral health knowledge and that more education was needed on oral health topics.

Attitudes towards oral health were also explored in studies completed by Rajiah and Ving [78] and Bashiru and Omotola [79]. In Rajiah and Ving’s study, the majority of final year undergraduate pharmacy students showed a positive attitude towards oral health (i.e. attitudes towards tooth brushing, dental check-ups, fluoridated toothpastes, sugary food and drink habits), despite having poor oral health knowledge and “mediocre” practice principles [83]. Bashiru and Omotola’s study also revealed that the majority (65.6%) of pharmacy students had a positive attitude towards oral health [79]. The authors of this study recognized that this percentage was inadequate as it meant that approximately 35% of students showed negative attitudes towards oral health, hence they acknowledged that improvements were needed in terms of oral health education.

2.3.2 Studies involving pharmacy assistants

A 2011 British study investigated the role pharmacy counter assistants
had with oral health; the result being that they were infrequently approached for advice on the topic and that advice was not often volunteered [102]. There was the potential for a reasonable amount of bias in this study as only a small number of pharmacy counter assistants were sampled (35 participants) and they were all from a particular area in Great Britain.

### 2.3.3 Studies involving pharmacists

Compared to pharmacy students and pharmacy assistants, a greater number of studies investigated pharmacists and oral health. These studies can be categorized into two main groups: those that investigated the oral health knowledge and attitudes of pharmacists, and those that investigated the role of pharmacists in oral health care.

In terms of oral health knowledge, results varied from pharmacists having average knowledge to inadequate knowledge. One study reported that very few oral health recommendations were given by the pharmacists being investigated due to “a lack of scientific knowledge regarding oral health care and products” [81]. However, all participants in this study were from private pharmacies within the one city in Saudi Arabia, therefore the study’s conclusion made may not be generalizable. Another study revealed that only 28% of participating pharmacists provided oral health care product advice based on their knowledge, with an equal number providing advice based on instructions given by doctors or dentists [82]. The same study also revealed that only 36% of participating pharmacists were aware of the benefits of fluoride, with 50% being unaware of the benefits and 14% believing that there were no benefits to fluoride in toothpastes [82].

Baseer and colleagues’ 2016 study also investigated pharmacists’ attitudes towards oral health [83]. Attitude in this study was defined as “the inclination to react in a certain way to a certain situation, and to see and interpret events according to certain predispositions”. The self-reported data in this study might have introduced bias through over and underreporting due to social desirability. A convenience sampling technique was also used with all participants being health professionals who worked at the same medical facility in Saudi Arabia. Results from this study revealed a negative attitude towards oral health (i.e. attitudes towards dental visits, smoking habits, replacement of missing teeth with artificial teeth), possibly due to lack of knowledge from the participating pharmacists [83]. All studies
that explored oral health knowledge and attitudes of pharmacists similarly concluded that pharmacists required more oral health training as well as access to information on available dental services [81-83].

While it has been well established that pharmacists are involved in providing some degree of oral health advice to the community [71,85-90], a number of studies have indicated that pharmacists have not been appropriately educated on the topic of oral health themselves. Only one quarter of the pharmacists surveyed in a Saudi Arabian study felt confident in providing oral health care advice, as the majority had no formal training courses in oral health during their undergraduate pharmacy programs [85]. Pharmacists in a New Zealand study highlighted a lack of available resources relating to oral health for them to access [86]. These studies may not be representative of pharmacists around the world, as there are likely to be differences in education and training in every country, and at every institution.

Pharmacists are certainly eager to expand their oral health knowledge and practice in order to meet enquiries from their patients, as well as improve primary care in public health services [88,92]. Many pharmacists desired further training and education, whether it be through courses or through promotional activities [89,90]. There is also evidence that supports the need for growing partnerships and collaborations between pharmacists and dental professionals [93].

### 2.3.4 Studies involving other non-dental health professionals

A 2014 literature review revealed that both children and adults utilise non-dental health professionals for oral health problems [94]. Aside from pharmacists, other non-dental health professionals primarily involved with oral health care include doctors, primary nurses and maternal-child health nurses. Studies exploring oral health knowledge have been completed with doctors and medical students [94-97], as well as primary and maternal-child health nurses [97-101]. Despite having high literacy rates in health care, oral health knowledge with these health professionals was predominantly average and “lower than what would be expected of these groups” [95]. Literature on education and training for non-dental health practitioners has been limited [94]. An overall positive attitude towards oral health has been shown [95,97], with suggestions to improve oral health education within curricula and to have continuing education and referral routines.
for these health professionals [93,96,99-101].

When it comes to smoking cessation activities, general practitioners were found to be the most active health professionals in assessing nicotine dependence and readiness to quit smoking, as well as following up on patient progress with quitting in comparison to dentists, dental hygienists and pharmacists [103]. As previously discussed, this issue is relevant to oral health care as smoking significantly increases the risk of oral cancer, oral mucosal lesions, gingival recession, dental caries, periodontal disease, and impaired healing after periodontal treatment [104].

2.3.5 Recommendations

Studies that investigated the role pharmacists have in oral health care suggested improvements such as inclusion of oral health content in tertiary education, having continuous professional development education on oral health for pharmacists [85,86], and growing partnerships and collaborations between pharmacists and dental healthcare professionals [87,103]. Such improvements could lead to improved oral health literacy and capacity to support oral health in patients, as well as a greater understanding of the roles each health profession has when it comes to optimal patient care. A 2013 overview on enhancing pharmacists’ role as oral health advisors concluded that further studies were required to examine the extent of pharmacist training in oral health, the degree to which pharmacists incorporate oral health their practices, and pharmacists’ interest in relevant continuing education [71].

While these reviewed studies identified what was lacking, they did not deeply investigate the issues at hand and how they could be resolved. There is limited data on the oral health education that non-dental health professionals receive before they graduate, with no data on what is currently being taught at various institutions. Australian studies are particularly lacking, with no existing studies on the extent of oral health in the curriculum of Australian pharmacy schools, or on the knowledge, attitudes and perceptions pharmacy students have towards oral health. Another area that requires further exploration is the development of quality oral health courses tailored specifically for pharmacists and the assessment of oral health knowledge, attitudes and perception before and after course participation.
2.3.6 Summary

The reviewed studies had the same ultimate goal, which was to improve oral health in the population. With oral diseases continuing to be prevalent in society, these studies focused on the role non-dental health professionals (particularly pharmacists) have or potentially have in this field. Each study concluded that in order to become more proficient oral health advisors and have an impact on society, non-dental health professionals required more oral health education and training.

2.4 Conclusion

Although pharmacists have been identified as playing a key role in oral health care, further studies are needed to examine the extent of oral health education and course content pharmacy institutions deliver, in order to develop appropriate training standards and curricula which can then contribute to oral health improvements in the population.

CHAPTER 3 SURVEY OF ORAL HEALTH KNOWLEDGE, ATTITUDES AND PERCEPTIONS AMONGST FINAL YEAR PHARMACY STUDENTS IN AUSTRALIA

3.1 Aim

The aim of this cross sectional study was to investigate the knowledge, attitudes and perceptions towards oral health among final year pharmacy students in Australia, and to investigate the extent of oral health in the pharmacy curriculum.

3.2 Methodology

3.2.1 Survey development

In order to reach a range of participants from around Australia, an online survey was created. The use of online surveys was considered to be most advantageous in this case as it enabled electronic distribution and anonymous data collection. Other benefits of having an online survey included being low in cost and being time effective as it eliminated the need for manual data entry.
In developing questions for the survey, previous studies and key themes were investigated from the literature review. A number of studies had used surveys to investigate oral health knowledge, perceptions and/or attitudes amongst pharmacists and pharmacy students, and survey questions in this study were adapted from those previous studies [78-80,84,90].

The student participant survey comprised of 16 questions that were divided into three main sections. The first section covered demographic information such as age, gender, course type (Bachelor or Masters level course), and the state where the course was delivered. The second section explored the inclusion of oral health in the course curriculum. Questions included whether oral health was part of the pharmacy course, the time spent in the course on oral health, the topics covered, and the elements that could prevent or assist with the integration of oral health into the course curriculum. The final section was included to obtain information about the students’ own knowledge, attitude and perception towards oral health.

There were several considerations during the development of the student participant survey. Firstly, responses obtained from the survey needed to be comprehensive, accurate and readily analysed. Further, questions in the third section had to be of a level that could effectively gauge the final year students’ knowledge, attitudes and perceptions.

Ease of completion was imperative to ensure adequate response rates, as there was no prize incentive for participation. The survey was structured to include various types of questions that ranged from ticking appropriate options to answering a small number of open-ended questions, which allowed for more detailed responses for qualitative analysis. A copy of the survey is included in Appendix 4.

A plain language statement (see Appendix 5) was included with the online survey, providing a brief explanation of the purpose of the research and informing participants of any potential risks associated with their involvement. Once students had read the plain language statement they were directed to complete the online survey, implying their consent.
3.2.2 Ethical considerations and approval

This project had ethics approval from the University of Melbourne Human Research Ethics Committee (HREC) Ethics ID: 1749518 (see Appendix 6). Participation posed minimal risk for survey participants, as the survey was voluntary, anonymous and conducted over the Internet. Collected data was transferred to password-protected computer files for data analysis. The attached plain language statement also included the contact details of the student researcher, supervisors, as well as that of the Manager of Human Research Ethics (Office for Research Ethics and Integrity at the University of Melbourne), in case participants required further information or had any concerns with the conduct of the research.

3.2.3 Recruitment of student participants

The survey targeted Australian pharmacy students (adults aged over 18 years) who were in their final year of university study in 2017. Eighteen universities across Australia were identified as having pharmacy courses, and relevant university staff were identified and contacted via email (contact details were freely available on university websites), to introduce the project and to gain consent to distribute the survey to final year pharmacy students. For universities that consented, a link to the online survey was distributed to students initially through university staff. Due to low response rates, pharmacy intern training programs were contacted in early 2018 to further disseminate the survey to the same 2017 final year pharmacy student cohort. Out of the six intern training programs, only the ‘Pharmaceutical Society of Australia’ program responded and placed the survey link on their Intern Training Portal.

3.2.4 Inclusion and exclusion criteria

The inclusion criteria for the survey were students studying in their final year of pharmacy at an Australian university in the year 2017. Students were excluded if they were not enrolled in a pharmacy course or were enrolled in other year levels. The survey was in English and had no exclusion criteria regarding age, gender or course location.
3.2.5 Data analysis

Data was automatically collected and collated by the Survey Monkey tool. The resulting data was subsequently entered into a spreadsheet (Microsoft Excel) and then transferred to SPSS 25.0 statistical software (SPSS 25.0, Chicago IL, USA) for analysis. For items in the knowledge and attitude sections of the survey, each correct response was scored “one” while incorrect and not sure responses were scored “zero”. The individual scores were summed up to deliver a total score.

Descriptive statistics were used to describe the study sample, with comparisons using the ANOVA test. Numbers and percentages were reported for counts, mean and standard deviation for normally distributed continuous variables. Significance was set at a level of 0.05.

3.3 Results

3.3.1 Study sample

A total of eight universities consented to distributing the online survey link to their students. A total of 45 responses were received and descriptively analysed. It was noted that a significant proportion of target participants were not given the opportunity to access the survey due to universities declining participation, and not being enrolled in the Pharmaceutical Society of Australia’s Intern program (as students could have chosen to be enrolled in one of the other five intern training programs).

3.3.2 Demographics

The characteristics of the student participants are summarised in Table 3.
<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Students (n=45)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Course type</strong></td>
<td></td>
</tr>
<tr>
<td>Bachelor of Pharmacy</td>
<td>89% (40)</td>
</tr>
<tr>
<td>Master of Pharmacy</td>
<td>11% (5)</td>
</tr>
<tr>
<td><strong>State/Territory course is delivered</strong></td>
<td></td>
</tr>
<tr>
<td>QLD</td>
<td>4.4% (2)</td>
</tr>
<tr>
<td>NSW</td>
<td>15.6% (7)</td>
</tr>
<tr>
<td>VIC</td>
<td>22.2% (10)</td>
</tr>
<tr>
<td>SA</td>
<td>13.3% (6)</td>
</tr>
<tr>
<td>WA</td>
<td>24.4% (11)</td>
</tr>
<tr>
<td>NT</td>
<td>0% (0)</td>
</tr>
<tr>
<td>TAS</td>
<td>20% (9)</td>
</tr>
<tr>
<td>ACT</td>
<td>0% (0)</td>
</tr>
<tr>
<td><strong>Age</strong></td>
<td></td>
</tr>
<tr>
<td>20-29</td>
<td>86.7% (39)</td>
</tr>
<tr>
<td>30-39</td>
<td>4.4% (2)</td>
</tr>
<tr>
<td>40-49</td>
<td>4.4% (2)</td>
</tr>
<tr>
<td>&gt;50</td>
<td>4.4% (2)</td>
</tr>
<tr>
<td><strong>Gender</strong></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>22.2% (10)</td>
</tr>
<tr>
<td>Female</td>
<td>77.8 (35)</td>
</tr>
</tbody>
</table>

All Australian states except the Northern Territory and the Australian Capital Territory were represented. The students had a mean age of 25.8 [SD,7.8] years, with the majority being female (77.8%), and enrolled in a Bachelor of Pharmacy degree (88.9%).
3.3.3 Oral health in course curriculum

Approximately half the students stated that oral health care was included in their course (51.1%). One student responded with spending approximately 10 hours on the topic of oral health, however the majority of students answered with spending 2-5 hours on the topic (39.1%).

Table 4: Oral health topics

Twenty-one students responded to the question that explored the oral health topics covered in their pharmacy course. Oral thrush was determined to be covered by all students who answered this question, however very few responded with covering the topics of oral health advice for pregnant/breastfeeding women, loose or broken dentures and mouthguards (less than 5.0%).

Of those who did not have oral health as a portion of their course (48.9%), the vast majority (81.8%) wanted the topic to be included. Students were also asked why they wanted this inclusion, and a number of recurring responses were noted. These responses will be thoroughly explored in the discussion and can be grouped as follows:

• Having the need to provide optimum patient care
• Being an important part in clinical practice
• Relating to prescription medication
• Relating to the over-the-counter products
• Lack of pharmacist knowledge in this area
• Pharmacists being potential oral health educators
• Personal interest

Students were asked about the potential barriers for integrating oral health care into their course. A total of thirty students answered this question, with 63.0% (n=19) responding with an overloaded curriculum; therefore time restraints would be the predominant barrier for integration.

“Course structures are already exhausted throughout a semester to ensure all content can be completed within a certain time frame and this may prevent the integration of another topic” Student 30

Another common response to potential barriers was the viewpoint that oral health care was of low importance.

“I believe that [pharmacists’] perception about the importance of oral health care outside of basic hygiene is limited [and is] not seen as important as other conditions” Student 2

“There is a perception that oral health care [is] not as important than other diseases” Student 28

Other barriers mentioned included:
• Oral health care not being relevant to pharmacy
• ‘Lack of university organisation’

Students were also asked about the potential enablers for integrating oral health care into their course. Twenty-one students answered this question, with a number of ideas suggested. Three key recurring responses were noted from the suggestions. These were:

1. Increased awareness of the importance of oral health
2. Better incorporation into the course with relevant topics
3. Having a dental professional educate on the topic
3.3.4 Knowledge about oral health

The participants’ knowledge about oral health is summarised in the following table, with an asterisk (*) signifying correct responses.

<table>
<thead>
<tr>
<th>Knowledge</th>
<th>% Agree</th>
<th>% Not sure</th>
<th>% Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dental plaque is food debris that remains on the teeth after eating</td>
<td>50.0 (18)</td>
<td>11.1 (4)</td>
<td>38.9 (14)*</td>
</tr>
<tr>
<td>Dental plaque contributes to dental decay</td>
<td>94.4 (34)*</td>
<td>5.6 (2)</td>
<td>0.0 (0)</td>
</tr>
<tr>
<td>Dental plaque contributes to periodontal disease</td>
<td>83.3 (30)*</td>
<td>13.9 (5)</td>
<td>2.8 (1)</td>
</tr>
<tr>
<td>Oral health can affect general health</td>
<td>91.7 (33)*</td>
<td>8.3 (3)</td>
<td>0.0 (0)</td>
</tr>
<tr>
<td>General health can affect oral health</td>
<td>88.9 (32)*</td>
<td>8.3 (3)</td>
<td>2.8 (1)</td>
</tr>
<tr>
<td>Deciduous (aka baby) teeth are not important as they are replaced by permanent (aka adult) teeth</td>
<td>2.8 (1)</td>
<td>16.7 (6)</td>
<td>80.6 (29)*</td>
</tr>
<tr>
<td>Sugary foods and drinks contribute significantly to dental decay</td>
<td>97.2 (35)*</td>
<td>2.8 (1)</td>
<td>0.0 (0)</td>
</tr>
<tr>
<td>Fluoridated toothpastes help to prevent dental decay</td>
<td>86.1 (31)*</td>
<td>13.9 (5)</td>
<td>0.0 (0)</td>
</tr>
<tr>
<td>Toothbrushes should be replaced every 3-4 months</td>
<td>61.1 (22)*</td>
<td>22.2 (8)</td>
<td>16.7 (6)</td>
</tr>
</tbody>
</table>

Thirty-six students responded to the survey section that explored oral health knowledge. Most of the respondents (91.7%) believed that oral health could affect general health and vice versa (88.9%). More students believed that dental plaque contributed to dental decay (94.4%) compared to periodontal disease, with almost one fifth of respondents either disagreeing (2.8%) or being unsure (13.9%).

Students who acknowledged having oral health as a component of their university course had a mean correct score of 84.6% [SD = 13.1], while those who did not have oral health in their course had a mean correct score of 75.1% [SD = 25.8] (P value = 0.162).
3.3.5 Attitudes about oral health

The participants’ attitudes about oral health is summarised in the following table, with an asterisk (*) signifying appropriate responses.

<table>
<thead>
<tr>
<th>Attitude</th>
<th>% Agree</th>
<th>% Not sure</th>
<th>% Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regular dental check-ups can prevent oral health issues</td>
<td>97.2 (35)*</td>
<td>2.8 (1)</td>
<td>0.0 (0)</td>
</tr>
<tr>
<td>Having bad teeth is genetic and not related to self-care</td>
<td>0.0 (0)</td>
<td>8.3 (3)</td>
<td>91.7 (33)*</td>
</tr>
<tr>
<td>Bleeding gums is normal during flossing</td>
<td>17.1 (6)</td>
<td>17.1 (6)</td>
<td>65.7 (23)*</td>
</tr>
<tr>
<td>Bleeding gums is normal during brushing</td>
<td>5.6 (2)</td>
<td>16.7 (6)</td>
<td>77.8 (28)*</td>
</tr>
<tr>
<td>Tooth loss is a normal part of growing old</td>
<td>19.4 (7)</td>
<td>25.0 (9)</td>
<td>55.6 (20)*</td>
</tr>
<tr>
<td>Self-care is important for preventing oral health issues</td>
<td>97.2 (35)*</td>
<td>2.8 (1)</td>
<td>0.0 (0)</td>
</tr>
<tr>
<td>The state of my teeth and the health of my mouth is important to me</td>
<td>94.4 (34)*</td>
<td>5.6 (2)</td>
<td>0.0 (0)</td>
</tr>
</tbody>
</table>

The vast majority of students agreed that regular dental check-ups can prevent oral health issues (97.2%), that self-care is important for preventing oral health issues (97.2%), and that their teeth and the health of their mouth was of importance to them (94.4%). Students were less certain about the occurrence of bleeding gums during flossing and brushing, and the process of tooth loss as being a normal part of growing old.

3.3.6 Perceptions about oral health

The participants’ perceptions about oral health is summarised in the following table.
Table 7: Oral health perceptions of student participants (n=36)

<table>
<thead>
<tr>
<th>Perception</th>
<th>% Agree</th>
<th>% Note sure</th>
<th>% Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>All oral health issues should be referred to a dental practitioner</td>
<td>47.2 (17)</td>
<td>5.6 (2)</td>
<td>47.2 (17)</td>
</tr>
<tr>
<td>Pharmacists have an important role in oral healthcare</td>
<td>77.8 (28)</td>
<td>11.1 (4)</td>
<td>11.1 (4)</td>
</tr>
<tr>
<td>Interprofessional relationships between pharmacists and dental practitioners could be improved</td>
<td>94.4 (34)</td>
<td>5.6 (2)</td>
<td>0.0 (0)</td>
</tr>
<tr>
<td>I believe it is within the scope of pharmacists to identify certain oral health issues</td>
<td>91.7 (33)</td>
<td>2.8 (1)</td>
<td>5.6 (2)</td>
</tr>
<tr>
<td>I believe pharmacists are appropriately trained to provide oral health education to patients</td>
<td>38.9 (14)</td>
<td>5.6 (2)</td>
<td>55.6 (20)</td>
</tr>
<tr>
<td>I believe pharmacists can do more to prevent oral health issues</td>
<td>86.1 (31)</td>
<td>8.3 (3)</td>
<td>5.6 (2)</td>
</tr>
</tbody>
</table>

In the survey sample, 77.8% of students agreed that pharmacists have an important role in oral healthcare, with 91.7% believing that it is within a pharmacist’s scope to identify certain oral health issues. However only 38.9% believed that pharmacists were appropriately trained to provide oral health education. This perspective could also relate to the mixed viewpoint that all oral health issues should be referred to a dental practitioner. Most students (91.7%) believed that professional relationships between pharmacists and dental practitioners could be improved and that pharmacists had the potential to be more involved with preventing oral health issues (86.1%).

In fact, 83.9% of participants (n=31) believed that a pharmacist’s role included the provision of oral health promotion to patients, with many stating that pharmacists were easier and preferable to access than other health professionals, and that oral health promotion was part of their role as pharmacists.

“Many patients are more comfortable approaching a pharmacist for advice than a dental practitioner due to certain barriers e.g. cost of dental treatment...” Student 12

“I believe that a pharmacist has a role in all health promotion areas, which includes oral health.” Student 5

Students who did not believe that pharmacists had a role in providing oral health promotion felt that they were not qualified to do so, or
that it was not a part of their job.

“[Oral health promotion] is in the scope of dentists and not our field.” Student 41

3.4 Discussion

Although other studies have been conducted with Australian community pharmacists exploring their role in oral health care, none have provided an assessment of the education pharmacists receive on oral health prior to becoming qualified. This is the first national study that explores the oral health care training Australian pharmacy students receive prior to graduating and is the first to evaluate the knowledge, attitudes and perceptions they have towards oral health.

3.4.1 Student sample

While all possible efforts were made to obtain a representative sample, the findings of this study must be considered in light of several methodological limitations. The student participants in this study were not representative of Australia’s pharmacist population in terms of place of representation or in terms of age. As sampling was dependent on course convenors distributing the survey to the students, not all states and territories were effectively sampled. The age distribution was as expected, as the majority of pharmacy students would be younger than graduated pharmacists. A trend in gender participation was noted with female students being the predominant responders (77.8%) and a greater proportion of female pharmacists in the workforce (62.4%).

3.4.2 Oral health in course curriculum

According to accreditation standards for pharmacy programs in Australia and New Zealand, learning domains potentially associated to oral health care include:

• Learning domain 1: The health care consumer
  o The pharmacist’s contribution to the promotion of good health and disease prevention
  o Aetiology and epidemiology of major diseases and the principles of their treatment
• Symptoms recognition and management, the principles of differential diagnosis, important diagnostic methods and tests, and medical terminology
• Clinical reasoning, collaborative decision-making and documentation.

• Learning domain 5: Health care systems and the roles of professionals
  o Health care systems in Australia or New Zealand (as applicable) including roles of pharmacists and other health care professionals in primary, secondary and tertiary health care.
  o Interprofessional communication, teamwork and collaborative decision-making.

• Learning domain 6: The wider context
  o Population health
  o Scientific, clinical, health services and social services research; methods, results and their application as they are relevant to pharmacy [105]

As there are no standard learning objectives relating to oral health, each pharmacy program can vary regarding what they teach and the extent to which it is taught. This notion aligns with the results of the study about the oral health topics covered according to the pharmacy students. There were no clear patterns with routinely covered topics or even with topics that were not routinely covered. The most common oral health topics were determined to be oral thrush, mouth ulcers, general oral hygiene and analgesia medication to relieve oral-related pain. Evidence from this study indicated that these topics might have been covered while students learnt about over-the-counter products, during subject units that focused on specific anatomical areas (e.g. gastrointestinal tract), or even class of medication (e.g. analgesic medication). It was noted that a number of other listed topics could also have been associated with over-the-counter products (e.g. advice on quitting smoking, teething in children, xerostomia, mouthguards), however according to the students, these topics were not as thoroughly covered. Such disparities in learning about oral health topics ultimately result in pharmacy students graduating with varying levels of oral health knowledge.

Students expressed interest in learning about oral health and this correlates with Taing et al.’s [90] research, which concluded that Australian pharmacists desired further education and training in oral
healthcare.

As previously discussed, pharmacists have an important role in community healthcare, and part of this role involves providing optimal patient care through knowledge of health conditions, medication and products available at pharmacies. The students who participated in this study understood this role and felt that having appropriate oral health education and training would be highly valuable for their clinical practice. Consistent with the evidence found in previous literature on pharmacists’ attitudes [81-83], students in this study felt that pharmacists lacked knowledge in oral health and that there was great potential for them to become oral health educators, demonstrating that they considered this capability to be important.

The principal barrier that would prevent oral health integration into pharmacy courses was determined to be overloaded curricula. It is without a doubt that pharmacy courses contain a sizeable amount of content, and the notion of integrating oral health should not involve removing or replacing content but build upon content that is already present. Examples of how this could be achieved include:

- Case scenarios that are focused on oral health
- Incorporating oral health promotion with general health promotion
- Including oral health conditions as a disease topic
- Discussing oral adverse effects relating to medication
- Extending product knowledge to include a wider variety of dental related products that are available in community pharmacies
- Having an online module on oral health for pharmacy professionals available for students to access

The perception that oral health care was of low importance was the other key barrier. One way to address this barrier could be to incorporate oral health into the subject of population health, and to make evident the effects poor oral health has not only on the Australian healthcare system but also on quality of life. Another way to change the perception of pharmacy students would be to change the perception of their lecturers. The influence of lecturers is something that should be considered, as it can significantly impact students’ learning experiences.

The students in this study agreed that there was a need to increase awareness on the importance of oral health and have better
incorporation of oral health topics into relevant course units. Another enabler that was mentioned to improve the integration of oral health into pharmacy courses was to have a dental professional educate on the topic. This would certainly provide students with access to valuable knowledge and expertise, however this may not be feasible at all pharmacy schools for various reasons such as university staffing policy, lack of dental professional contacts and university budgeting.

3.4.3 Student knowledge, attitudes and perceptions about oral health

Data analysis on the knowledge section of the survey revealed a higher mean percentage of correct responses with students who had oral health included in their curriculum compared to those who did not. Nevertheless, overall correct responses for both groups were equitably high and not statistically significant. This suggested that the students’ oral health knowledge might not have been attributed from their pharmacy course, but from other sources. As the results in this study may not be entirely representative of pharmacy students across Australia, inferential statistics were not performed.

There were a high number of incorrect and unsure responses for two knowledge areas: the definition of dental plaque and how often toothbrushes should be replaced. Considering that a majority of students recognised that dental plaque contributed to dental decay and periodontal disease, it was anticipated that they would know what dental plaque actually is. Meanwhile toothbrushes are commonly sold in community pharmacies and the lifespan of a toothbrush is a topic that pharmacists should be educating their customers on.

The generally positive attitudes displayed by the students in this study were consistent with that of previous studies on pharmacy students [78,79,84]. Similar to results in Rajiah and Ving’s study [78], the predominant opinion was that regular dental check-ups were necessary for individuals. It was also encouraging to find that a majority of students felt that self-care was important (97.2%), and that the state of their teeth and the health of their mouths were of importance to them (94.4%).

Pharmacy students were less certain about bleeding gums and about tooth loss being a normal part of growing old. Bleeding gums is not
meant to occur during personal dental cleaning however a substantial number of students felt unsure or felt that it was, in fact, normal to bleed during flossing (34.2%) and brushing (22.3%). This could be attributed to their own personal experiences with bleeding gums or from lack of education on the topic. This theory can also be applied to the students’ misguided view on tooth loss, as they may have experienced tooth loss themselves or know of people who have experienced this, and consequently view the process as a normal occurrence of aging.

As health care professionals, a pharmacist’s attitude not only affects their own oral health behaviour, it also affects the health behaviour of their patients and their community. It is vital for pharmacists to have positive attitudes towards oral health.

There were mixed results when it came to the students’ perceptions of oral health. Although 77.8% of students agreed that pharmacists have an important role in oral healthcare, 22.2% of students either disagreed or were unsure. This emphasises the need to alert pharmacy students on the role they will have in oral health once they become pharmacists in the community. It was also largely viewed that relationships could be improved between pharmacists and dental practitioners. Opportunities for open communication and a better understanding of each profession would help patients understand what is needed for optimal oral health.

An equal number of students agreed and disagreed that all oral health issues should be referred despite a majority (91.7%) believing that pharmacists were able to identify certain oral health issues. This highlighted the differing levels of knowledge and confidence in treating oral health conditions that may present in a pharmacy setting. There were also conflicting viewpoints on whether pharmacists were appropriately trained to provide oral health education to patients, with 55.6% (n=36) of students believing that they were not appropriately trained. This perception once again highlights the need for improved education in their curriculum, as most students (86.1%) felt that pharmacists could do more to prevent oral health issues.

3.4.4 Summary

An adequate level of oral health knowledge is required for pharmacy
students to educate and motivate the populace on good oral health care once they start working in the community. Almost half of student respondents reported to not have oral health included in their course, and those who did had the topic covered in inconsistent and varying degrees. Overall there was recognition that pharmacists have a role in oral health and that education needs to be improved in this area. Based on the findings of this online survey, there appears to be a need to enhance the oral health content in pharmacy curricula.

CHAPTER 4 COURSE CONVENOR INTERVIEWS EXPLORING ORAL HEALTH CURRICULUM IN AUSTRALIAN PHARMACY SCHOOLS

4.1 Aim

The aim of conducting semi-structured interviews with pharmacy course convenors was to investigate the extent of oral health in the pharmacy curriculum. This was completed with the intention of developing and evaluating an oral health education module for pharmacy students across Australia as part of a separate project.

4.2 Methodology

4.2.1 Interview development

The semi-structured interview questions were developed to compare the results and opinions of pharmacy students and their university course convenors (see Appendix 9). A semi-structured approach was chosen for its inherent flexibility and the expectation that the views of the course convenors will be more freely expressed compared to an interview that is confined to a standard set of questions or a survey.

Interviews took place over the phone, and consent was gained from the interviewees to have their interviews recorded. Interview questions included demographic information such as the course convenor’s position and the number of final year pharmacy students at their university. Other questions focused on oral health in the current course curriculum, and also included the course convenors’ opinions about this topic from both a tertiary and professional level. The interview concluded with thanking the respondent for his or her participation and offering a copy of the recorded interview for their own records. Interviews were expected to take between 5-10 minutes due to the time demands of the university staff interviewed. The
interviews took place at scheduled times arranged between the student researcher and the course convenor interviewees.

4.2.2 Ethical considerations and approval

The interview section of this project had ethics approval from the University of Melbourne Human Research Ethics Committee (HREC) Ethics ID: 1749518 (see Appendix 6). Participation posed minimal risk for interviewees, as the interview was voluntary, and the privacy and confidentiality of the participants was protected. Participants were de-identified in transcribed interviews, and transcriptions were stored on password-protected computer files for analysis. The attached plain language statement (see Appendix 8) also included the contact details of the student researcher, supervisors, as well as that of the Manager of Human Research Ethics (Office for Research Ethics and Integrity at the University of Melbourne), in case participants required further information or had any concerns with the conduct of the research.

4.2.3 Recruitment of course convenors

Pharmacy course convenors were identified from information that was freely available from university websites. The most appropriate staff member (i.e. staff who were involved with developing course content or were teaching aspects related to oral health) from each university was contacted via email (see Appendix 7) to introduce the project and to invite them to participate in a semi-structured interview. Course convenors from seven Australian universities consented to participate.

4.2.4 Inclusion and exclusion criteria

Inclusion criteria for course convenors were that they had to be involved in a pharmacy course at an Australian university in the year 2017. The interviews were conducted in English and there were no exclusion criteria regarding age or gender of the interviewees.

4.2.5 Data collection

Prior to the interviews, a plain language statement (see Appendix 8) was emailed to the course convenors detailing the purpose of the research, the objectives of the interview, and any potential risks associated with their involvement. Interviews began with reaffirming
the objectives of the interview, and permission was sought to record each interview.

Audio recordings of the phone interviews were collected with a Xiaomi Mi 5 using the Call Record function. The completed interviews were then transcribed verbatim by the student researcher. The audio files and transcriptions were then reviewed by research supervisors to confirm accuracy. The audio files were then deleted.

4.3 Result

4.3.1 Study sample

After initially receiving a low response rate for phone interviews, course convenors were reapproached to participate in the study with the option of replying to interview questions via email. Out of a total of eighteen universities, seven consented to be interviewed for this project (38.9%), with six declining participation (33.3%) and five (27.8%) not responding. A total of eight participants from seven Australian universities were involved in this section of the study. Phone interviews were conducted with five of the participants, while three participants chose to answer the interview questions via email.

<table>
<thead>
<tr>
<th>University</th>
<th>Type of Interview</th>
<th>Position</th>
</tr>
</thead>
<tbody>
<tr>
<td>University 1</td>
<td>Phone</td>
<td>Head of Pharmacy</td>
</tr>
<tr>
<td>University 2</td>
<td>Phone</td>
<td>Lecturer</td>
</tr>
<tr>
<td>University 3</td>
<td>Phone</td>
<td>School Administrative Officer</td>
</tr>
<tr>
<td>University 4</td>
<td>Phone</td>
<td>Lecturer</td>
</tr>
<tr>
<td>University 5</td>
<td>Phone</td>
<td>Head of Pharmacy</td>
</tr>
<tr>
<td>University 6</td>
<td>Email</td>
<td>Lecturer</td>
</tr>
<tr>
<td>University 7</td>
<td>Email</td>
<td>Lecturer (x 2)</td>
</tr>
</tbody>
</table>

4.3.2 Data analysis

Interviews were transcribed and analysed using thematic analysis. The thematic analysis method was chosen for its flexibility, as it is not tied to a particular theoretical perspective. It also provided the opportunity to find new themes by looking for patterns in the data and connecting them into meaningful groups that capture the topic [108].

Transcripts were initially analysed using open coding which involved thorough examination of the data in order to gain a sense of how
patterns and themes could be clustered. From these initial codes, meaningful data that related to the research topic were gathered and grouped together. As themes emerged, the transcripts were read and re-read looking for further integrating examples. As a minimum standard, themes were to be prevalent in most of the interviews to exclude the possibility of being particular to one individual.

Three main themes were identified from the interviews with the pharmacy course convenors:
- Pharmacists have a role in oral health care
- Oral health is being taught in pharmacy courses
- Lack of space in the course curriculum is the key barrier for further inclusion of oral health content in pharmacy courses

4.3.3 Pharmacists have a role in oral health care

All participating course convenors believed that pharmacists have a role in oral health care, with one describing this role as being “under recognized”. Several acknowledged that primary health care provided to the community involves the management of oral health, with one participant commenting:

“[Pharmacists are] the most accessible health care professional, I believe pharmacists play a key role in the management of oral health. Pharmacy customers often present with oral health issues (e.g. mouth ulcers, teething, adverse drug reactions). Therefore, it is important that pharmacists are educated on oral health in order to adequately manage these presentations.” Course convenor 7

A number of course convenors also recognised the important referral relationship that exists between pharmacists and dental practitioners. One convenor stated:

“Pharmacists should be able to recognise and differentially be able to diagnose which conditions can be managed at the pharmacy level and recommend appropriate treatments, but have an understanding of potentially more serious diagnoses and comorbidities which would require referral to another health professional.” Course convenor 6
4.3.4 Oral health is being taught in the pharmacy courses

All participating universities taught oral health care in their curriculum, however each used a different approach. These were the comments given:

“It’s something that we try to incorporate into subjects as relevant.” Course convenor 1

“[Oral health is] part of our over the counter and integrated pharmacology and therapeutics unit. There are some oral health modules that are contained in there.” Course convenor 2

“We teach that as a lecture and then the students do role plays...where they have a patient with a problem and they’ve got to assess...whether to refer it or whether they can manage it over the counter.” Course convenor 4

“We have a two hour sort of didactic lecture and then we have one hour of case studies and going through looking at different products and things, so very hands on...” Course convenor 5

“Lecture, tutorial/practical for role play exercises, self-directed learning from required reading materials.” Course convenor 6

“[Oral health] content is currently being taught using lectures and tutorials.” Course convenor 7

“[Oral health] content is currently taught using lectures, tutorials and workshops.” Course convenor 8

Undergraduate courses in this sample would teach oral health content from second year onwards, whereas postgraduate courses had this content taught from first year onwards. Excluding one university participant who was unable to answer this question due to their role as being the School Administrative Officer and not a course convenor, three of the remaining six universities were satisfied with the oral health care content that was currently being taught; whereas the other three universities felt that improvements could be made. One university convenor reported:

“Anything which is extending the role of the pharmacist and helping
to diversify their skillset I think we can bolster.” Course convenor 2

Another university recognised:

“[Oral health is] one of the areas we have identified as I suppose being a little bit lacking... we probably don’t link side effects and medications. We don't really deal with that too effectively...” Course convenor 4

All participants had an interest in further developing an oral health care program. One of the universities revealed that they were considering developing a module for the oral health content in their course, and another mentioned:

“It would be useful to have a standardised online module for teaching and learning purposes.” Course convenor 6

4.3.5 Barriers for further inclusion of oral health care in pharmacy courses

The participants identified a number of barriers that would prevent an oral health program from being successfully implemented. The recurring barrier was determined to be time or capacity in the curriculum. Convenors 2, 5, 6 and 7 all referred to issues of time limitations.

Other barriers that were identified included prioritising importance of oral health over other topics within the curriculum, lack of access and funding to those with expertise in the area of oral health, as well as staff resources:

“...not having a really good resource that we can use I think is where we’re lacking.” Course convenor 4

4.4 Discussion

4.4.1 Role of pharmacists in oral health care

Pharmacists in Australia go through rigorous study and training to become highly knowledgeable experts in the fields of medication and health. The knowledge and skills gained at university are rarely
entirely utilised and therefore become under recognised in practice. This concept is supported by previous studies and expert statements describing pharmacy services as being “under-used” [69,81,89]. The comment from one course convenor that the role of pharmacists in oral health is “under recognised” fully supports this viewpoint.

All course convenors agreed that pharmacists have a role in oral health care, which reinforces the need to improve the service that is being provided to the community. Similar to findings in Cohen’s study [71], pharmacists were described as being the “most accessible health care professional”. There is no doubt that oral health issues are presented in pharmacy settings, however the subject of what can be managed and what needs to be referred is an area that needs to be further explored. While it was mentioned by course convenors that referral relationships exist, the exact nature of what pharmacists refer needs to be examined. Considering that pharmacy students are taught varying levels of oral health knowledge and practice, it is possible that some pharmacists are unnecessarily referring patients to dental practitioners despite their issues being resolvable with education or even products available in the pharmacy. The opposite could be the case with pharmacists not referring when appropriate. In Taing et al’s study [90], only one in ten of the pharmacists involved had oral health emergency procedures in place, suggesting that patients were potentially missing out on appropriate care.

4.4.2 Oral health content in pharmacy courses

Although all pharmacy course convenors who were interviewed stated that oral health was taught within the course curriculum, approximately half of the pharmacy students (51.1%) that were surveyed recalled the topic being taught. This is likely due to the array of methods and the different depths of content through which the topic is being taught.

With no uniform learning objectives, there are likely to be areas that are missed, resulting in pharmacists graduating with uneven skill levels. The fact that one course convenor admitted that the topic of oral side effects linking to medications was lacking is an example of how pharmacy students graduate without reaching their full potential as oral health care promoters.
4.4.3 Barriers

The barriers identified by course convenors are critical points that need to be considered in order for changes to be made in the course curriculum. Suggestions on how to overcome the main barrier of not having the capacity to add further material into the course have already been discussed in section 3.4.2. Educating pharmacy course convenors could help bring their attention to the importance of oral health and the impact it has on general health, and potentially increase motivation on the topic to pharmacy students. Conversely it is important for pharmacists to understand that prescription medication dispensed by them on a daily basis may have serious impacts on the oral health of their patients. Having an accredited website or module that is dedicated to oral health care for pharmacy professionals would help to resolve the issue of finding good resources to support the promotion of oral health in the community.

4.4.4 Summary

The findings in this section of the study provide evidence that the role of pharmacists in oral health is recognised by pharmacy educators. While some course convenors were satisfied with the current oral health course content, others acknowledged that improvements could be made. The main barrier inhibiting further development of oral health in the pharmacy courses is the limited capacity within each course.

CHAPTER 5 STRENGTHS AND LIMITATIONS

Literature review

The strength of the literature review was in its systematic approach. A critical appraisal tool was used to help summarize each article and to assess the suitability for inclusion in the review.

A limitation that should be considered was the potentially relevant articles that were not identified during the search and thus were not included in the review. Articles in languages other than English may have been overlooked, however most academic research aim to be published in English language journals.
Student participant survey

Content validity of survey questions relied on the veracity of previous studies discussed in the literature review. Validity and reliability of results should be interpreted with caution, and as such further investigation into this subject is warranted.

The main limitation of this section of the study related to participant recruitment and the small sample size, which restricted the ability to perform any complex statistical analysis. Students were required to complete an online self-reporting survey, with low response rates received. A 2008 meta-analysis determined that online surveys resulted in an 11 per cent lower response rate compared to other types of survey modes [106]. Hardcopy surveys were not utilised, as they would have been difficult to distribute, more expensive, more time consuming and less accurate to analyse. Another factor that significantly affected response rates was the distribution of the survey. Only eight of the eighteen universities agreed to have their students participate. Comparably, only one of six pharmacy intern-training programs agreed to participate, drastically decreasing the number of potential participants. The issue of low salience may be another cause for low response rates. University students are commonly approached with surveys and the topic of oral health may not have been perceived as one of importance or interest, resulting in fewer respondents and possibly a selection bias. Follow up reminders were not issued to the students but in this instance may not have significantly increased response rates. Due to the low response rates in this study, generalisation of findings should be considered as hypothesis-generating only.

The use of a self-reporting survey might be considered a limitation as it may have introduced recall and social desirability bias. External validation from course convenors would have alleviated potential recall bias found with the students, and having anonymous survey responses would have allowed students to be more authentic with their answers. In fact using a self-reporting survey was ideal for this study as it enabled extensive perspectives and opinions from the students.

The results of this study is valuable and could change the perception of both students and their educators when it comes to the importance
of oral health and the research still required in the area.

*Course convenor interview*

As this is the first known study to report on the viewpoints and opinions of pharmacy course convenors in relation to oral health-related coursework, no other studies were used to validate the interview questions. Interview questions were designed to correlate with the data obtained from the student surveys to provide alternate insight on the topic.

The interview section of the study had limitations with sample size and with qualitative analysis. To increase the sample size, participants were given the option of replying to interview questions via email, however this method did not allow opportunities for follow up questions and further discussion of responses.

The primary difficulty was getting course convenors to participate in this study, which ultimately resulted in a small number of participants. Yet qualitative research necessitates having a small sample size due to the detailed and intensive work required for the study [107]. In addition, the purpose of this section of the study was to investigate the extent of oral health in the pharmacy curriculum and this was achieved, considering the assortment of results that were reported which included key themes and issues. There is recognition that an in depth investigation of the themes was not possible due to the short interview time frames. The information collected may provide a useful basis for larger studies in the future.

Thematic analysis was used on the qualitative data, which can result in bias. To reduce this bias, triangulation of the data with the student survey results was used to compare findings and to support data validation.

**CHAPTER 6 CONCLUSION AND RECOMMENDATIONS**

The results in this study support the findings in previous literature identifying pharmacists as having a role in oral health care. Pharmacists are considered to be trustworthy professionals who are more readily accessible than other health practitioners, and are ideally positioned to provide opportunistic oral health promotion and education to the community.
Despite pharmacists having a recognised role in oral health, their education and training in this area is extremely varied in Australia. Pharmacy course convenors expressed mixed opinions about how satisfied they were with their current oral health content, whereas final year pharmacy students wanted to be better educated on oral health topics and recognised that course improvements could be made. In regards to oral health knowledge, pharmacy student participants in this study had adequate basic knowledge, and largely positive attitudes and perceptions towards oral health.

In order to achieve better oral health outcomes in the population through pharmacist intervention and education, the following is recommended:

1. Further research should be undertaken regarding the oral health content in the pharmacy curricula at Australian universities not included in this study.

2. Ensure the consistent delivery of high quality oral health education to pharmacy students by incorporating appropriate oral health competencies within the learning domain of the accreditation standards.

3. Develop oral health course content in universities in such a way that does not require removing existing course content. One example of how this could be achieved is to identify opportunities in pharmacy curricula where oral health examples and cases could be integrated. Another example is the development of an oral health care module made for pharmacy students to access outside of university class times; or even for pharmacists to access in order to further their education, refresh their knowledge, or obtain continuing professional development (CPD) points.
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APPENDICES

Appendix 1: Quality Assessment Tool for Observational Cohort and Cross-Sectional Studies

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Yes</th>
<th>No</th>
<th>Other (CD, NR, NA)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Was the research question or objective in this paper clearly stated?</td>
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<tr>
<td>2. Was the study population clearly specified and defined?</td>
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<tr>
<td>3. Was the participation rate of eligible persons at least 50%?</td>
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<tr>
<td>4. Were all the subjects selected or recruited from the same or similar populations (including the same time period)? Were inclusion and exclusion criteria for being in the study prespecified and applied uniformly to all participants?</td>
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<tr>
<td>5. Was a sample size justification, power description, or variance and effect estimates provided?</td>
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<tr>
<td>6. For the analyses in this paper, were the exposure(s) of interest measured prior to the outcome(s) being measured?</td>
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<tr>
<td>7. Was the timeframe sufficient so that one could reasonably expect to see an association between exposure and outcome if it existed?</td>
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<tr>
<td>8. For exposures that can vary in amount or level, did the study examine different levels of the exposure as related to the outcome (e.g., categories of exposure, or exposure measured as continuous variable)?</td>
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<td>Criteria</td>
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<td>No</td>
<td>Other (CD, NR, NA)*</td>
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<tr>
<td>9. Were the exposure measures (independent variables) clearly defined,</td>
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<tr>
<td>valid, reliable, and implemented consistently across all study</td>
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<tr>
<td>participants?</td>
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<td>10. Was the exposure(s) assessed more than once over time?</td>
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<tr>
<td>11. Were the outcome measures (dependent variables) clearly defined,</td>
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<tr>
<td>valid, reliable, and implemented consistently across all study</td>
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<td>participants?</td>
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<td>12. Were the outcome assessors blinded to the exposure status of</td>
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<td>participants?</td>
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<tr>
<td>13. Was loss to follow-up after baseline 20% or less?</td>
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<td>14. Were key potential confounding variables measured and adjusted</td>
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<tr>
<td>statistically for their impact on the relationship between exposure(s)</td>
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<tr>
<td>and outcome(s)?</td>
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</table>

*CD, cannot determine; NA, not applicable; NR, not reported
## Appendix 2: Quality Assessment Tool for Systematic Reviews and Meta-Analyses

<table>
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<th>Criteria</th>
<th>Yes</th>
<th>No</th>
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<tbody>
<tr>
<td>1. Is the review based on a focused question that is adequately formulated and described?</td>
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<tr>
<td>2. Were eligibility criteria for included and excluded studies predefined and specified?</td>
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<tr>
<td>3. Did the literature search strategy use a comprehensive, systematic approach?</td>
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<tr>
<td>4. Were titles, abstracts, and full-text articles dually and independently reviewed for inclusion and exclusion to minimize bias?</td>
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<tr>
<td>5. Was the quality of each included study rated independently by two or more reviewers using a standard method to appraise its internal validity?</td>
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<td>6. Were the included studies listed along with important characteristics and results of each study?</td>
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<td>7. Was publication bias assessed?</td>
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<tr>
<td>8. Was heterogeneity assessed? (This question applies only to meta-analyses.)</td>
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*CD, cannot determine; NA, not applicable; NR, not reported
# Appendix 3: Quality Assessment Tool for Before-After (Pre-Post) Studies With No Control Group

<table>
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<th>No</th>
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</thead>
<tbody>
<tr>
<td>1. Was the study question or objective clearly stated?</td>
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<tr>
<td>2. Were eligibility/selection criteria for the study population prespecified and clearly described?</td>
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<tr>
<td>3. Were the participants in the study representative of those who would be eligible for the test/service/intervention in the general or clinical population of interest?</td>
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<tr>
<td>4. Were all eligible participants that met the prespecified entry criteria enrolled?</td>
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<tr>
<td>5. Was the sample size sufficiently large to provide confidence in the findings?</td>
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<tr>
<td>6. Was the test/service/intervention clearly described and delivered consistently across the study population?</td>
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<tr>
<td>7. Were the outcome measures prespecified, clearly defined, valid, reliable, and assessed consistently across all study participants?</td>
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<tr>
<td>8. Were the people assessing the outcomes blinded to the participants' exposures/interventions?</td>
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<tr>
<td>9. Was the loss to follow-up after baseline 20% or less? Were those lost to follow-up accounted for in the analysis?</td>
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<tr>
<td>10. Did the statistical methods examine changes in outcome measures from before to after the intervention? Were statistical tests done that provided p values for the pre-to-post changes?</td>
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<tr>
<td>11. Were outcome measures of interest taken multiple times before the intervention and multiple times after the intervention (i.e., did they use an interrupted time-series design)?</td>
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<tr>
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<tr>
<td>12. If the intervention was conducted at a group level (e.g., a whole</td>
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<tr>
<td>hospital, a community, etc.) did the statistical analysis take</td>
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<tr>
<td>into account the use of individual-level data to determine effects</td>
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<tr>
<td>at the group level?</td>
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</table>
Appendix 4: Student participant survey

Exploring the knowledge, attitudes and perceptions towards oral health among final year pharmacy students in Australia

1. Please select your current course:
   - Bachelor of Pharmacy
   - Master of Pharmacy

2. Where is your course delivered?
   - QLD
   - NSW
   - VIC
   - SA
   - WA
   - NT
   - TAS
   - ACT

3. What is your age (in years)?
   

4. What is your gender?
   - Male
   - Female

5. Is oral health care a part of your course?
   - Yes
   - No

6. How much time was spent on the topic of oral health care throughout your course?
   - <1 hour
   - 1-2 hours
   - 2-5 hours
   - Other (please specify):
     

7. Topics covered (select all that apply):

- Mouth ulcers
- Oral thrush
- Toothache
- Xerostomia
- Teething in children
- General oral hygiene
- Oral health advice
- Dental caries (tooth decay)
- Periodontal disease (gum disease)
- Oral cancer
- Analgesia medication to relieve oral-related pain
- Advice about drug-related adverse oral events
- Sensitive teeth
- Gum problems
- Halitosis
- Mouthguards
- Broken teeth or fillings
- Oral health advice for pregnant women
- Oral health advice for breastfeeding women
- Loose or broken dentures
- Advice about quitting smoking
- Oral health products
- When to refer to a dental practitioner

8. Would you like oral health care to be a part of your course

Yes - Please explain why: 

No - Please explain why: 

9. What would prevent the integration of oral health care into your course?


10. What would assist with the integration of oral health care into your course?


11. Please select the most appropriate response:

<table>
<thead>
<tr>
<th>Statement</th>
<th>Agree</th>
<th>Disagree</th>
<th>Not sure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dental plaque is food debris that remains on the teeth after eating</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Dental plaque contributes to dental decay</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Dental plaque contributes to periodontal disease (gum disease)</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Oral health can affect general health</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>General health can affect oral health</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Deciduous (aka baby) teeth are not important as they are replaced by permanent (aka adult) teeth</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Sugary foods and drinks contribute significantly to dental decay</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Fluoridated toothpastes help to prevent dental decay</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Toothbrushes should be replaced every 3-4 months</td>
<td>☐</td>
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</table>

12. Please select the most appropriate response:

<table>
<thead>
<tr>
<th>Statement</th>
<th>Agree</th>
<th>Disagree</th>
<th>Not sure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regular dental check ups can prevent oral health issues</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Having bad teeth is genetic and not related to self-care</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Bleeding gums is normal during flossing</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Bleeding gums is normal during brushing</td>
<td>☐</td>
<td>☐</td>
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</tr>
<tr>
<td>Tooth loss is a normal part of growing old</td>
<td>☐</td>
<td>☐</td>
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</tr>
<tr>
<td>Self-care is important for preventing oral health issues</td>
<td>☐</td>
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</tr>
<tr>
<td>The state of my teeth and the health of my mouth is important to me</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>
13. Please select the most appropriate response:

<table>
<thead>
<tr>
<th></th>
<th>Agree</th>
<th>Disagree</th>
<th>Not sure</th>
</tr>
</thead>
<tbody>
<tr>
<td>All oral health issues should be referred to a dental practitioner</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pharmacists have an important role in oral healthcare</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interprofessional relationships between pharmacists and dental practitioners could be improved</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I believe it is within the scope of pharmacists to identify certain oral health issues</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I believe pharmacists are appropriately trained to provide oral health education to patients</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I believe pharmacists can do more to prevent oral health issues</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

14. Are you interested in learning more about oral health care?

- Yes
- No
- Not sure

15. Do you believe that a pharmacist’s role includes the provision of oral health promotion to patients?

Yes - Please give reasons: __________

No - Please give reasons: __________

Not sure - Please give reasons: __________

16. Do you have any additional comments?

___________________________

THANK YOU FOR COMPLETING THE SURVEY
Appendix 5: Plain language statement for student participants

Plain Language Statement
Melbourne Dental School

Project: Exploring the knowledge, attitudes and perceptions towards oral health among final year pharmacy students in Australia

Dr Melanie Hayes (Responsible Researcher)
Tel: +61 3 9341 1535 Email: melanie.hayes@unimelb.edu.au

Dr Hanny Calache (Co-supervisor)
Tel: +61 3 924 68261 Email: hanny.calache@deakin.edu.au

Ms Janet Chuanon (Master of Philosophy student)
Email: jchuanon@student.unimelb.edu.au

Introduction
Thank you for your interest in participating in this research project. The following few pages will provide you with further information about the project, so that you can decide if you would like to take part in this research.

Please take the time to read this information carefully. You may ask questions about anything you don't understand or want to know more about.

Your participation is voluntary. If you don't wish to take part, you don't have to. If you begin participating, you can also stop at any time.

What is this research about?
The aim of this research is to examine the knowledge, attitudes and perceptions of current final year pharmacy students of Australia towards oral health, and the extent of inclusion of oral health in their curriculum.

What will I be asked to do?
Should you agree to participate, please follow the link >here< to complete the online survey. It should take approximately 5-10 minutes to complete the survey.

What are the possible benefits?
While there are no direct benefits to completing the survey, participating students are given an opportunity to reflect and examine their knowledge and viewpoints on oral health. Participation in the survey may also lead to the inclusion of oral health in the pharmacy curriculum across Australian courses and in the incorporation of oral health promotion as part of the role of a graduated pharmacist.

What are the possible risks?
There are no risks related to this study.
**Do I have to take part?**
No. Participation is completely voluntary. You are able to withdraw (quit) at any time. Once you have submitted the survey, your data cannot be withdrawn as the survey is anonymous.

**Will I hear about the results of this project?**
At the completion of the study, a one-page report on the results will be made available upon request by contacting the Responsible Researcher via email: melanie.hayes@unimelb.edu.au. Research findings will be written up in a Masters thesis and be submitted for publication.

**What will happen to information about me?**
All research records will be securely stored at the University of Melbourne until the completion of the study. All data will be retained for five years, as per university guidelines. The confidentiality of the information provided by you as part of this study will be safeguarded subject to any legal requirement. The findings from this study may be published. To satisfy their legal responsibilities, the investigators and the University of Melbourne’s Human Research Ethics Committee will have access to study related information.

**Where can I get further information?**
If you would like more information about the project, please contact the Responsible Researcher; Dr Melanie Hayes: melanie.hayes@unimelb.edu.au

**Who can I contact if I have any concerns about the project?**
This research project has been approved by the Human Research Ethics Committee of The University of Melbourne (Ethics ID: 1749518). If you have any concerns or complaints about the conduct of this research project, which you do not wish to discuss with the research team, you should contact the Manager, Human Research Ethics, Office for Research Ethics and Integrity, University of Melbourne, VIC 3010. Tel: +61 3 8344 2073 or Email: HumanEthics-complaints@unimelb.edu.au. All complaints will be treated confidentially. In any correspondence please provide the name of the research team or the name or ethics ID number of the research project.
Appendix 6: Ethics Approval letter for study

07 February 2018

Prof J.G. Satur
Melbourne Dental School
The University of Melbourne

Dear Prof Satur,

I am pleased to advise that the Melbourne Dental School Human Ethics Advisory Group has approved the following Minimal Risk Project.

Project title: Exploring the oral health curriculum in Australian pharmacy schools
Researchers: Prof J G Satur, Dr H Calache, J Chuanon, Dr M J Hayes
Ethics ID: 1749518.3

The Project has been approved for the period: 29-Jun-2017 to 31-Dec-2018.

It is your responsibility to ensure that all people associated with the Project are made aware of what has actually been approved.

Research projects are normally approved to 31 December of the year of approval. Projects may be renewed yearly for up to a total of five years upon receipt of a satisfactory annual report. If a project is to continue beyond five years a new application will normally need to be submitted.

Please note that the following conditions apply to your approval. Failure to abide by these conditions may result in suspension or discontinuation of approval and/or disciplinary action.

(a) Limit of Approval: Approval is limited strictly to the research as submitted in your Project application.

(b) Amendments to Project: Any subsequent variations or modifications you might wish to make to the Project must be notified formally to the Human Ethics Advisory Group for further consideration and approval before the revised Project can commence. If the Human Ethics Advisory Group considers that the proposed amendments are significant, you may be required to submit a new application for approval of the revised Project.

(c) Incidents or adverse affects: Researchers must report immediately to the Advisory Group and the relevant Sub-Committee anything which might affect the ethical acceptability of the Project, including adverse affects on participants or unforeseen events that might affect continued ethical acceptability of the Project. Failure to do so may result in suspension or cancellation of approval.

(d) Monitoring: All projects are subject to monitoring at any time by the Human Research Ethics Committee.

(e) Annual Report: Please be aware that the Human Research Ethics Committee requires that researchers submit an annual report on each of their projects at the end of the year, or at the conclusion of a project if it continues for less than this time. Failure to submit an annual report will mean that ethics approval will lapse.

(f) Auditing: All projects may be subject to audit by members of the Sub-Committee.

Please quote the ethics registration number and the name of the Project in any future correspondence.

On behalf of the Ethics Committee I wish you well in your research.

Yours sincerely,

Prof Ivan Darby – Acting Chair
Melbourne Dental School Human Ethics Advisory Group
Appendix 7: Email invitation to university course convenors to participate in the study

Dear [participant],

My name is Janet Chuanon and I am a graduate student at the University of Melbourne. For my Masters thesis, I am examining the extent of inclusion of oral health in the curriculum of Australian pharmacy schools.

I graduated as a pharmacist in 2009 and as an oral health therapist in 2016, and currently practise in both fields. I have an interest in exploring the knowledge and attitudes towards oral health in pharmacy students as well as exploring pharmacy school oral health curriculums, as I strongly believe that pharmacists have the potential to play a significant role in oral health care.

I am inviting you to participate in this research by forwarding this online survey link to your final year pharmacy students: https://www.surveymonkey.com/r/RQ8PGQ8

In addition to the online survey, this project will also involve conducting short 10-minute phone interviews with pharmacy course coordinators/convenors regarding oral health in the curriculum. I have attached the plain language statements for both the online student survey and the phone interviews for your review. Should you consent to the phone interview, please let me know when it would be best to contact you. (Or could you please forward this to the appropriate pharmacy course coordinators/convenors).

Your participation will be greatly appreciated. Thank you for your time and consideration. I look forward to hearing from you.

Sincerely,

Janet Chuanon
(Student Researcher)
Appendix 8: Plain language statement for course convenors

Plain Language Statement
Melbourne Dental School

**Project:** Exploring the oral health curriculum in Australian pharmacy schools

Dr Melanie Hayes (Responsible Researcher)
Tel: +61 3 9341 1535 Email: melanie.hayes@unimelb.edu.au

Dr Hanny Calache (Co-supervisor)
Tel: +61 3 924 68261 Email: hanny.calache@deakin.edu.au

Ms Janet Chuanon (Master of Philosophy student)
Email: jchuanon@student.unimelb.edu.au

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**Introduction**
Thank you for your interest in participating in this research project. The following few pages will provide you with further information about the project, so that you can decide if you would like to take part in this research.

Please take the time to read this information carefully. You may ask questions about anything you don't understand or want to know more about.

Your participation is voluntary. If you don't wish to take part, you don't have to. If you begin participating, you can also stop at any time.

**What is this research about?**
The aim of this research is to investigate the extent of inclusion of oral health in pharmacy school curriculums across Australia.

**What will I be asked to do?**
Should you agree to participate, you will be asked a series of questions in a semi-structured interview which will be recorded.

**What are the possible benefits?**
While there are no direct benefits to participating in the interview, participation may lead to the inclusion of oral health in the pharmacy curriculum across Australian courses and the incorporation of oral health promotion as part of the role of a graduated pharmacist.

**What are the possible risks?**
There are no risks related to this study.
Do I have to take part?
No. Participation is completely voluntary. You are able to withdraw (quit) at any time. Recorded interviews will be made non-identifiable.

Will I hear about the results of this project?
At the completion of the study, a one-page report on the results will be made available upon request by contacting the Responsible Researcher via email: melanie.hayes@unimelb.edu.au. Research findings will be written up in a Masters thesis and be submitted for publication.

What will happen to information about me?
All research records will be securely stored at the University of Melbourne until the completion of the study. All data will be retained for five years, as per university guidelines. The confidentiality of the information provided by you as part of this study will be safeguarded subject to any legal requirement. The findings from this study may be published. To satisfy their legal responsibilities, the investigators and the University of Melbourne's Human Research Ethics Committee will have access to study related information.

Where can I get further information?
If you would like more information about the project, please contact the Responsible Researcher; Dr Melanie Hayes: melanie.hayes@unimelb.edu.au

Who can I contact if I have any concerns about the project?
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Appendix 9: Course convenor semi-structured interview questions

Introduction:

Hi, my name is Janet and I am a graduate student from the University of Melbourne. Thank you for taking the time to chat to me about your University's pharmacy course, more specifically the extent of inclusion of oral health in the curriculum. Can I check that you are happy for me to record this discussion so that I don't miss anything? Do you have any questions before we start?

<table>
<thead>
<tr>
<th>Primary questions</th>
<th>Possible prompting questions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Section A</strong></td>
<td></td>
</tr>
<tr>
<td>What is your current position?</td>
<td></td>
</tr>
<tr>
<td>How many final year pharmacy students are at your university?</td>
<td></td>
</tr>
<tr>
<td>What are your thoughts on pharmacists' role in oral health?</td>
<td>Do pharmacists have a role?</td>
</tr>
<tr>
<td></td>
<td>Should pharmacists be educated on oral health?</td>
</tr>
<tr>
<td>Is oral health care in the pharmacy curriculum? (If yes continue with Section A and B. If no go straight to section B)</td>
<td></td>
</tr>
<tr>
<td>Tell me what you know about this</td>
<td>What content is covered?</td>
</tr>
<tr>
<td></td>
<td>Who is teaching the content?</td>
</tr>
<tr>
<td></td>
<td>Who developed the content?</td>
</tr>
<tr>
<td></td>
<td>How is the content being taught? (Lecture? Tutorial? Online Module?)</td>
</tr>
<tr>
<td></td>
<td>When during the course is oral health care taught?</td>
</tr>
<tr>
<td></td>
<td>How much time is spent on oral health care?</td>
</tr>
<tr>
<td>Are you satisfied with the current oral health care content? Please explain why/why not</td>
<td>Would you like any improvements with the content? Please explain.</td>
</tr>
<tr>
<td><strong>Section B</strong></td>
<td></td>
</tr>
<tr>
<td>In your opinion, when and how should oral health care be taught in the curriculum?</td>
<td>Eg. Intensive block over a short period of time? Spread out across the years? With topics that are related such as medication related dry mouth?</td>
</tr>
<tr>
<td>Would there be an interest in developing/further developing an oral health care?</td>
<td></td>
</tr>
</tbody>
</table>
Minerva Access is the Institutional Repository of The University of Melbourne

Author/s: 
Chuanon, Janet Janjira

Title: 
Exploring the oral health curriculum in Australian pharmacy schools

Date: 
2019

Persistent Link: 
http://hdl.handle.net/11343/230670

File Description: 
Final thesis file

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