JÖNKÖPING UNIVERSITY
School of Health and Welfare

Oral health knowledge among nursing students

Main field: Oral health science

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Summary

Background: Oral health is a part of general health and it is therefore important that nurses are able to detect abnormalities in the mouth to refer to dental care. **Aim:** The aim of this study was to examine oral health knowledge regarding oral diseases and oral hygiene among nursing students at two universities - InHolland University and University of Victoria [UVic]. **Method:** This study has a quantitative cross-sectional design based on a questionnaire. Chi-square tests were made to discover differences between the two universities. **Results:** The study consists of a total of 105 questionnaires. The participants had good knowledge of oral hygiene. Concerning knowledge about dental caries, gingivitis, and periodontitis, limited knowledge and several statistical significant differences between the universities were found. The extent of the oral health education was between 1-10 hours in the respective universities. Several nurses considered that they did not feel ready or were unsure if they have enough knowledge about oral health for their future work. **Conclusion:** The study has shown that the nursing students at both InHolland University and UVic have basic knowledge regarding oral hygiene but moderate knowledge in oral diseases regarding development and prevention of dental caries, gingivitis and periodontitis.

Keywords: Caregivers, Education, Oral diseases, Oral hygiene.

Kunskap om oral hälsa bland sjuksköterskestudenter

Sammanfattning

Bakgrund: Oral hälsa är en del av allmän hälsa och därför är det viktigt att sjuksköterskor kan upptäcka eventuella avvikelser i munnen för att remittera vidare till tandvård**. Syfte:** Syftet med studien var att undersöka kunskap om oral hälsa gällande orala sjukdomar och munhygien bland sjuksköterskestudenter vid InHolland University och University of Victoria [UVic]. **Metod**: En kvantitativ tvärsnittsstudie med enkät som datainsamlingsmetod genomfördes bland tredje års sjuksköterskestudenter vid InHolland University och UVic. Chi-2 tester utfördes för att jämföra variabler mellan universiteten. **Resultat:** Studien består av totalt 105 enkäter. Resultatet avseende munhygien visade på goda kunskaper inom ämnet. Resultatet avseende kunskaper om karies, gingivit samt parodontit visade på en begränsad kunskap och skillnader återfanns mellan universiteten. Omfattningen av utbildning inom oral hälsa på programmen låg mellan 1-10 timmar på båda universiteten. Flera sjuksköterskestudenter ansåg att de inte kände sig redo eller var osäkra på om de var redo att tillämpa sina kunskaper inom oral hälsa, genom att upptäcka och jobba preventivt, i framtida arbetet. **Slutsats:** Studien visar att sjuksköterskestudenter har grundläggande kunskaper avseende munhygienen men måttlig kunskap inom orala sjukdomar avseende uppkomst och prevention av karies, gingivit och parodontit.

Nyckelord: Munhygien, Omhändertagande, Orala sjukdomar, Utbildning.

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Introduction

A healthy mouth is an important tool for an individual to achieve a valuable quality of life, to be able to eat, speak and to feel general satisfaction (Petersen, 2003). Oral health should be taken to account as much as any other health condition as it is a part of general health. According to Petersen (2003), health is defined to remain in a physical, mental and social well-being and absence of any type of illness, which also includes oral diseases such as dental caries and periodontitis.

Research has shown that registered nurses lack knowledge within oral health and most registered nurses who lack knowledge of oral health find it difficult to implement oral health care among elderly and hospitalized patients. This means that the patient's total health care needs cannot be fulfilled (Ljungholm & Redebratt, 2007). It has also appeared in some studies that nursing students have limited knowledge of oral health, which is not properly used (Alsrour, Nassrawin & Al-Tawarah, 2013; Singh Kaira, Singh Chhonkar, Kusha, Bhayana & Dabral, 2013; McAuliffe, 2007). It is important for nursing students to receive oral health knowledge in their program in order to manage it in their working life. There are only a few studies within this area, which are from a limited part of the world (Asia, Middle-East and Great Britain) (Alsrour et al., 2013; Singh Kaira et al., 2013; McAuliffe, 2007). This makes it interesting to conduct the study among nursing students in the Netherlands and Canada where the authors were present.

Background

Nurses liability in the Netherlands and Canada

According to the International Council of Nurses [ICN], which includes the Netherlands and Canada, a nurse is someone who encompasses autonomous and collaborative care of all types of individuals in all settings and conditions (ICN, 2002).

The Netherlands

Dutch nurse's areas of expertise are based upon the Canadian Medical Education System [CanMED]. This system is based on seven main groups that specify what skills a nurse should have. The seven areas of expertise are:
- Medical – nurse's responsibilities as caregivers
- Communication – nurse's role as a communicator
- Cooperation – nurse's collaboration with other professions
- Knowledge and scientific – nurse's reflection and work on the basis of science
- Social action – nurse's role as a health promoter
- Organization – nurse's role as an organizer
- Profession and quality- nurse's work from a professional view and with good quality.

The key in a nurse's profession is to follow these areas of expertise to be able to accomplish a good job (Verpleegkundige & Verzorgenden 2020, 2012). In the Netherlands the mouth is usually treated separately from the body and no guidelines are available for nurses regarding oral health. The goals for 2020 for Dutch nurses are to be better able to monitor and investigate oral health. Several evidence-based guidelines and better cooperation between the medical and dental professions should be developed to achieve better oral health (venvn, 2012).

Canada

The nursing profession in Canada is self-regulated and consists of four regulated nursing groups: registered nurses, nurse practitioners, licensed practical nurses and registered psychiatric nurses. Eligibility criteria include making sure registered nurses have the necessary knowledge, judgement, attributes and skills to provide safe, competent and ethical care in the professional setting they enter. They also include other requirements such as language skills, good character, fitness to practice and more (CNA, 2015). Nurses in Canada follow the Clinical Practice Guidelines for Nurses in Primary Care. These guidelines include information regarding identification, diagnosis and treatment of illness and other health issues, which also includes information about oral health, for paediatric, adolescents and adult care (Government of Canada, 2015).

Education

How to become a nurse in the Netherlands

In the Netherlands, there are two types of nurses (level 1 and 2) that have different tasks and different education levels (figure 1). After they finish their compulsory basic education, up to the age of 12, the students can continue their study in VMBO, which is equivalent to secondary school/high school. VMBO is a four-year education program. There are four different programs in this education, which are TL (theoretical learning path), MBO (secondary professional education), PRO (practical education) and KB (middle management-oriented learning path). Students can become level 2 nurses if they choose to study in the MBO program. This level is the lowest level of the nursing profession and they mostly work with protocols and as a helping hand in the care of patients. These nurses can work in nursing homes and hospitals. Students who instead choose to study the four-year TL program can continue to study a higher general continued professional education called HAVO. HAVO has a program called HBO (higher professional education), which is also a four-year study program. The HBO program provides a study opportunity to become a level 1 nurse. Level 1 nurses have more of a leading role and base their practice on research. Level 1 nurses lead and authorize level 2 nurses. HBO nurses can choose to specialize in three different areas in their third year, which are nursing homes and hospitals, psychiatry and home care and consultation. A level 2 nurse can become a level 1 nurse by studying three years at HBO, starting in the second year. Both levels of the nursing profession are registered nurses and have an identification, but at different levels (G. Min, personal communication, 2nd March 2017).
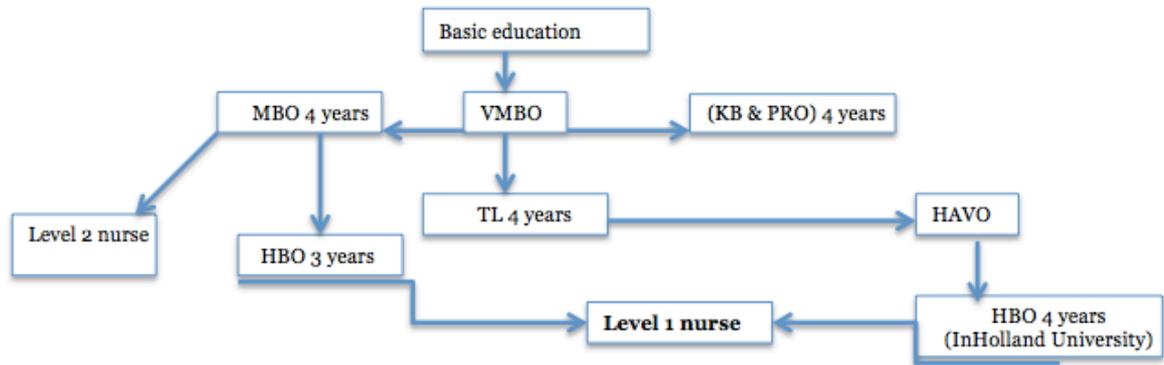
Figure 1: Setup of education in Netherlands.

How to become a nurse in Canada

Canada's education system can differ from region to region. The most common system starts from pre-elementary to compulsory education for 12 years in elementary and secondary, where high school is a part of secondary school. After secondary school, there are four different ways of continuing education. Students can choose to either study two years for an associate's degree, study one to four years in Apprenticeship, Vocational and Technical Training, one to three years for a college diploma or three to four years for a Bachelor's. Requirements for the nursing program are based on educational background where students can apply for it by using high-school level courses or university transfer courses. A grade point average [GPA] is required by a student in order to be accepted in the college/university (Camosun College, N.D.). The nursing program can be completed with a Bachelor's degree in two to four years, which is offered in universities and some university college institutes. The first two years of nursing are at a university college institute and the remaining two years at a university. Canadian nurses are not authorized with a national license; instead they are given the qualified title Registered Nurse [RN] by the provincial/territorial legislation and regulations. Nurses can then work in a variety of practice settings such as public health, home care, palliative care, non-profit agencies and specialized settings for instance diabetes clinics (CNA 2, N.D.).

Nursing program at InHolland University, the Netherlands

InHolland University educates HBO level 1 nurses. Students are studying a four-year program, a total of eight semesters. Within those years, students study courses such as health promotion, human body, psychiatry, diseases, anatomy and physiology, leadership and other health-related topics, as well as practical training in various locations (G. Min, personal communication, 2nd March 2017).

Nursing program at University of Victoria [UVic], Canada

Nursing students study approximately two and a half years at a college institute, such as Camosun College, which is equivalent to five semesters and then transfer to UVic to finish the remaining three semesters, a total of eight semesters (CNA 2, N.D.). Education provided in the first and second semesters at Camosun College in the nursing program includes courses such as anatomy and physiology, professional practice, psychology, leadership, health and healing, nursing practice, consolidated practice experience and also academic writing and literary courses. The third and fourth

semesters contains mostly the follow-up courses for nursing, health and experience, although some additional courses are health care ethics and pathophysiology. Students study the same courses at a more advanced level in the fifth semester and are later transferred to UVic in the sixth semester (Camosun College, N.D.). The courses that UVic provides in the 6th, 7th and 8th semester in the nursing program are equivalent to the courses at Camosun College, however the courses are much more advanced. Additional courses that UVic provides are research courses. Students complete the education with practice experience and practice transitions (University of Victoria, 2017).

Oral health; a part of general health

The mouth is a part of the body, which means that it is a part of general health. Oral health can affect both nutrition, quality of life and increase risk for both general and oral diseases among individuals. Nurses in Swedish health care follow the Revised Oral Assessment Guide [ROAG] where nurses' aim is to identify abnormalities in the mouth, clarify individual needs for oral care action, help with documentation regarding oral health and oral care actions, decisions on contacting dental care and evaluate taken actions for oral health (Senior alert, 2015). The Swedish health and dental care also follow the National Board of Health and Welfare [NBHW], National Guidelines for Adult Dental Care (NBHW, 2011).

Oral diseases impact on general health

Through the years, the perception of oral health has undergone a lot of changes. Oral health was initially considered to be coherent with the absence of diseases in the oral cavity and the teeth. In recent years, the term, oral health, has become broad enough to even include general health and well-being. Since poor oral hygiene can result in other bodily diseases, it is essential for oral hygiene to be carried out regularly and in an appropriate manner. Diseases can for example arise when bacteria, which are accumulated in the oral cavity, are spread to other organs through the bloodstream, and thereby form the base of an infection in a different location than the mouth. Depending on where bacteria end up, they can give different reactions; for instance, if the bacteria reach the heart there is a risk of developing cardiovascular disease (Petersen, 2003; Dalheim, Herud, Jors, Koch & Skaug, 2006).

Nutrition

The mouth has several functions such as chewing, tasting and swallowing food that are important in the everyday life. It is the first step in the digestive system thus important for nutrition (Sand, Sjaastad, Haug & Bjålie, 2007). Pain in the mouth is often correlated with inadequate nutrition. Among elderly, studies have shown that patients with pain in the mouth, dry mouth, ill-fitting dentures and poor taste have a more reduced well-being, psychosocial limitations and nutrition problems (Zusman, Kushnir, Natapov, Goldsmith & Rita, 2016; Makhija et al., 2007). These problems can occur if patients have poor oral hygiene, several medications and impaired muscle function among the elderly (Strang & Barbro, 2012; Andersson, 2014). Alteration in diet and nutrition influences public health and oral health, thus also affecting the quality of life (Makhija et al., 2007; Petersen, 2003).

Quality of life

Verbal communication is made through the mouth and is important for a person's self-esteem. A study by De Souza Barbosa, Gavião, Castelo and Leme (2016) has shown that young individuals' quality of life is adversely affected when they have problems with oral health and are exposed to various oral diseases or disorder such as fluorosis. As for the elderly, it has been shown that oral health can affect well-being, social life and quality of life negatively (Andersson, Furhoff, Nordenram & Wǎrdh, 2007).

Dental caries

Dental caries is infectious and a multifactorial common disease, which means that several factors can cause dental caries to develop such as dietary sugars, fermentable carbohydrates, dry mouth, inadequate brushing and bacterium (Choi, Kim, Cha & Hwang, 2014; Weinberg, Westphal-Theile, Froum & Segelnick, 2015; Petersen, 2003). Dental caries is destruction of the enamel also known as tooth decay and its consistency is soft and sticky when examined with dental instruments. The most common bacteria that are involved in the dental caries process are Streptococcus mutans and Lactobacillus (Ibsen & Phelan, 2014).

People with coronal or root caries are more likely to develop arrhythmia in association with periodontal infections, since dental caries are developed adjacent to the gingival margin (Holm-Pedersen et al., 2005). Dietary habits such as consuming refined, industrialized foods and children drinking sweetened drinks from bottles can affect oral health by causing dental caries. Prolonged sugar exposure to the teeth can cause dental caries even among children, known as early childhood caries (Petersen, 2003). Dental caries take time to develop and can be prevented or stopped by extra intake of fluoride (Fejerskov & Kidd, 2008; NBHW, 2011).

Prevention and treatment methods for dental caries include brushing with fluoridated toothpaste twice a day, using interproximal cleaning aids, such as dental floss, and professional treatment. Patients with a high dental caries risk would need extra fluoride treatment, which comes in many forms such as higher fluoridated toothpaste, fluoridated mouthwash and fluoridated tablets (NBHW, 2011). Fluoride strengthens the enamel by a process called remineralisation, where calcium and phosphorous are restored (Ibsen & Phelan, 2014).

Gingivitis

Gingivitis is a common inflammatory process in the gums caused by a white soft bacterial substance called plaque compiled in the gingival margin, which makes it possible for bacteria to attach to the teeth (Wade, 2011; Weinberg et al., 2015). As the amount of plaque increases it spreads itself generally across the gums and alters with the look and consistency of the gingival margin (Choi et al., 2014). It can be developed in a short period of time and its local characteristics are redness, swelling, pain and

bleeding on probing. The gingivitis inflammatory process can either be acute or chronic, it is also reversible (Weinberg et al., 2015).

Inflammation in the gums implies that there is inflammation in the body, which can affect the quality of life among individuals (Chapple et al., 2015). Individuals with gingivitis bleed from the gums while brushing teeth and are mostly in pain, which leads to disregard to brushing teeth or brushing too carefully, leading to more developed gingivitis and pain. The inflammation in the gingiva can be reversed by optimized oral hygiene. The most common way of reducing plaque and inflammation in the gums is by any kind of mechanical cleaning such as; manual brushing and use of interdental brushes in order to clean the interproximal area (Chapple et al., 2015; NBHW, 2011). The professional recommendation for gingivitis prevention is improved oral hygiene, use of toothpaste with antimicrobial substances, mouthwash and professional care (NBHW, 2011). Gingivitis can by further insufficient cleaning of the mouth lead to periodontitis (Weinberg et al., 2015).

Periodontitis

Periodontal diseases are infectious, can be chronic or aggressive, and do not develop unless gingivitis existed previously. Periodontitis is a state of connective tissue attachment loss and alveolar bone loss with the formation of a periodontal pocket (Choi et al., 2014; Ibsen & Phelan, 2014). Common bacteria that form periodontitis are Tannerella forsythensis and Porphyromonas gingivalis also including Helicobacter pylori (Weinberg et al., 2015; Dye, Kruszon-Moran & McQuillan, 2002).

One of the contributing factors for periodontal disease is dental calculus (Weinberg et al., 2015). Dental calculus, also known as calcified plaque, has a strong association with Helicobacter pylori, which means that periodontitis can further develop due to dental calculus. Individuals who have pocket depths over five millimetres deep have a higher risk of developing Helicobacter pylori infection, a chronic gastric disorder (Dye et al., 2002). There are other diseases that can be caused by periodontal bacteria such as diabetes, cardiac arrhythmia and ischemic heart disease as well as coronary artery disease. Periodontal bacteria components and microorganisms have easy access to the blood circulation, which furthermore causes heart diseases. People with both diabetes and cardiovascular disease, in correlation with periodontal bacteria, can be at life threatening risks as these diseases can affect the quality of life (Holm-Pedersen et al., 2005; Buhlin et al., 2011; Petersen, 2003). Periodontitis can be treated in many ways such as improved oral hygiene (by brushing twice a day and using interproximal cleaning aids), quitting smoking and professional care by removal of calculus and overall cleaning of deep pockets (NBHW, 2011).

The intention of the study

The mouth is a part of the human body and should therefore be considered important within health care. The first sign of disease in the body can be detected through the mouth and vice versa. Since many nurses and dental professions have mutual patients, it is of optimal need to understand the connection between oral health and general health and work as a team. It is important for nurses to have adequate knowledge about oral health to be able to provide necessary care and to at least detect

abnormalities in the mouth in order to achieve an optimal health status. Nurses will then be able to take upon the responsibility of oral health among elderly and hospitalized patients. Oral health education for nursing students may differ between countries and studies from Asia, Middle East and Great Britain have shown that nursing students lack knowledge about oral health (Alsrour et al., 2013; Singh Kaira et al., 2013; McAuliffe, 2007). In order to make improvements in this area, there is a need to study this in other parts of the world.

Aim and objective

The aim of this study was to examine oral health knowledge regarding oral diseases and oral hygiene among nursing students at InHolland University and University of Victoria [UVic].

Issues investigated

1. Were there any differences between the universities regarding knowledge about oral hygiene and oral diseases?
2. Were there any differences regarding the amount of oral health education in the nursing program in the respective universities?

Material and Method

Design

This study is a quantitative cross-sectional design based on a questionnaire.

Population

The population for this study were nursing students at InHolland University and UVic. At InHolland University there were 337 nursing students divided into four years (year one 127 students, year two 74 students, year three 72 students and year four 64 students). While at UVic there were 320 nursing students divided into two years, 160 students in each year. The first year in the nursing program at UVic is a continuation of the first two years at a college institute. The first year at UVic is equivalent to the third year at InHolland University.

Selection

The selection for this study was made of a stratified sample of the third-year nursing program. There were 72 third year nursing students at InHolland University and 160 third year nursing students at UVic divided into four classes. The responsible teachers at UVic made another selection regarding which third year classes were available and could be included in the study. Only two classes, 80 nursing students at UVic, were included in this study. The inclusion criterion for the selection was that they had to be nursing students, at InHolland University and UVic, who were completing the third year in the nursing program.

Data collection

Questionnaire

The questionnaire (appendix 1) design was based on two earlier modified studies that have been used in bachelor reports (Ledin & Norlin, 2015; Gren & Juklen, 2010). The questionnaire is divided into two parts; the first part consists of two questions about personal information, sex and year of birth. The second part consists of 14 oral health knowledge based questions.
Year of birth is an open question, while sex and questions 1-14 are multiple-choice questions. The authors added questions number 7, 13 and 14. To make question 1 and 11 more comprehensible the authors modified one alternative from each question. All the questions in the questionnaire were modified from Swedish to English. A native English-speaking teacher from Camosun College examined the English language in the questionnaire and consent letter, to be sure that the language is correct and well written. A few changes were made to the questionnaire regarding the English grammar. The questionnaire also underwent a pilot study.

Pilot study

A pilot study among five native English-speaking dental hygiene students in their second year, at Camosun College, was performed before the questionnaire was used for the study. The dental hygiene students were chosen for the pilot study due to difficulty in getting hold of the first or second year nursing students. The second year dental hygiene students were asked if any one of them would voluntarily like to participate in a pilot study, five students volunteered. The students were given information about the study and were asked to give feedback regarding the difficulty of understanding the questions as well as additional opinions. The students were timed to check how long it took to perform the study. After conducting the pilot study the students felt that the questions were easy to understand and nothing needed to be changed. The time to fill in the study was set to 10-15 minutes.

Procedure

The responsible teachers of the nursing program at the respective countries were contacted to receive an approval to perform the study. In Canada, several program leaders and teachers were approached in order to receive approval. The questionnaire (appendix 1) and the consent letter (appendix 2) were sent to the responsible teachers at both universities before data collection. A time and place was arranged to begin the data collection in association with their lectures. Only one day was arranged in the respective countries for the data collection, which meant that only the nursing students who were present at that time could participate. The information about the study, its aim and that participation is voluntary was given orally and through a consent letter (appendix 2). The questionnaires were handed out to 54 nursing students at InHolland University and 77 nursing students at UVic by the authors and were collected in envelopes by the teacher to enhance confidentiality. The authors picked up the envelopes after the lectures.

Data analysis

The collected material was inserted in the computer programme Statistical Package of Social Sciences [SPSS] version 21. In order to work with statistics, the variables in the program were decoded to numbers, one for no answer and two for answer. The universities were recoded to numbers as well where number one was set for InHolland University and two for UVic. The data collection consisted of quantitative (year of birth) and qualitative (sex, oral health knowledge, oral hygiene, education) variables. Every question with only one answer alternative (question 3, 6, 13 and 14) have an own variable and all the other questions where more than one alternative could be chosen were split into one variable for each alternative. The results were presented in descriptive statistics (mean, median, standard deviation, range, total and percentage) and analytic statistic (p-value) in the form of tables, figures and text. The year of birth variable was computed to age. The mean, median, standard deviation and range of the variable "age" was calculated and presented in a table. A descriptive statistic frequency table for each question was made to see the total (N) and percent (%) answered on each variable. Statistical analyses were made and all the tests had the significance level of 0.05 (5%). A chi square-test (Pearson and Fisher's exact test) was made to compare the answers between the two universities in order to see if there were any differences between them. Pearson's test was used as a base for all the chi-square tests, to compare the proportions of the groups, but when some of the columns showed low values (less than 5 in more than 20% of the columns) Fisher's exact test was used to attain the correct p-value.

Ethical consideration

The authors had conducted an ethical review along with the supervisor according to Jönköping University before going abroad. Additional ethical review was not necessary at InHolland University and UVic as the one reviewed at Jönköping University was considered valid. Participants in the study were given proper information both orally and written about the study and its aim in order to achieve informed consent. Participation was voluntary and could be dismissed at any time without any reasons given and without affecting their continued education, as autonomy had a high priority. Confidentiality was taken to account, as no other personal information, besides age and sex, was mentioned in the study. Participants' consent was collected in association with the completed questionnaire. Non-maleficence was achieved by avoiding any unnecessary harm brought to the students by not being offensive or judgemental. The selection of the target group was in accordance with the principle of justice, since no one was excluded based on their background such as ethnicity, political views or sexual orientation. Collected data has only been used for this study and no unauthorized person had access to the information (Council of Science, 2002; Henricson, 2012).

Results

A total of 105 nursing students (N=105) participated in the study. At InHolland University 54 nursing students were asked to participate and 53 (n=53) questionnaires were collected, which gave one external loss. At UVic 77 nursing students were asked to participate and 52 (n=52) questionnaires were

collected, which gave 25 external losses. The answer frequency was 80%. Out of N=105 nursing students there were 17 males and 88 females (table 1).

Table 1: Distribution of participants in the respective universities

University	Variable	n(%)
InHolland	Sex	
	Man	11 (20.8)
	Woman	42 (79.2)
	Total	53 (100)
UVic	Sex	
	Man	6 (11.5)
	Woman	46 (88.5)
	Total	52 (100)

Some participants at both universities chose not to answer the question about year of birth (InHolland, n=4 and UVic, n=5). The participants were slightly younger at InHolland University (mean 22.9) than at UVic (mean 25.8) (table 2).

Table 2: Description of age regarding median, mean, standard deviation and range in respective university

University	Variable	N=96 (%)	Median	Mean	Sd	Range
InHolland	Age	n=49 (92.5)	22	22.9	2.6	20-34
UVic	Age	n=47 (90.4)	24	25.8	4.1	21-42

Oral hygiene and oral diseases

The majority of the participating nursing students at both universities answered that daily oral care is an important strategy to keep teeth healthy (InHolland 90.6%, UVic 96.2%), table 3. Both universities were also unanimous regarding the best time to brush teeth, which was after the last meal of the day (InHolland 77.4%, UVic 86.5%) followed by after breakfast (InHolland 43.4%, UVic 57.7%). A higher number of nursing students at UVic (33.3%) answered that drinking water frequently is an important strategy to keep teeth healthy compared to the nursing students at InHolland University (7.5%), (p-value= 0.001). Another statistical significant difference (p-value= 0.014) regarding brushing teeth was found, where more nursing students at UVic (30.8%) than at InHolland University (11.3%) answered that after lunch is the best time to brush teeth during the day.

Table 3: Response rates for oral hygiene habits at InHolland University and UVic

Question	N=105	University		Total n(%)	p-value (Pearson chi-square)
		InHolland n(%)	UVic n(%)		
What is the most important strategy to keep teeth healthy? ²	n=104				
Regular dentist appointments		18 (34.0)	25 (49.0)	43 (41.3)	0.119
Daily oral care		48 (90.6)	50 (96.2)	98 (94.2)	0.205¹
Adequate diet and nutrition		15 (28.3)	23 (45.1)	38 (36.5)	0.075
Drink water frequently		4 (7.5)	17 (33.3)	21 (20.2)	**0.001***
When is the best time to brush teeth during day? ²	n=105				
Before breakfast		15 (28.3)	10 (19.2)	25 (49.5)	0.275
After breakfast		23 (43.4)	30 (57.7)	53 (50.5)	0.143
After lunch		6 (11.3)	16 (30.8)	22 (21.0)	**0.014 ***
After the last meal of the day		41 (77.4)	45 (86.5)	86 (81.9)	0.222

¹= Fisher's exact test
²= Since it is a multiple-choice question it is not possible to attain a 100% answer frequency for each question
*= P<0.05
***= P<0.001

Three questions; *What might calculus on the teeth look and feel like*?, *What colour are healthy gums*? and *In what way does toothpaste with fluoride affect the teeth*? gave similar answers by the nursing students both at InHolland University and UVic and no statistical significant differences were found. Regarding the question about how calculus looks and feel like, a majority of the nursing students (n=102) answered that it feels hard and has a light colour (InHolland 62.3%, UVic 69.2%) (p-value=0.525). Results regarding the question about the colour of healthy gums, nursing students (N=105) at both InHolland University (94.3%) and UVic (92.3%) were unanimous that the colour of healthy gums is pink (p-value=0.556). Considering the knowledge about the effect that fluoridated toothpaste has on teeth, nursing students (N=105) at both InHolland University (88.7%) and UVic (98.1%) answered that fluoridated toothpaste strengthens the teeth (p-value=0.244).

The results regarding the questions about development and prevention of dental caries show that the nursing students at InHolland University (77.4%) answered equally that not brushing one's teeth and constantly eating candy can develop dental caries (table 4). Although, the nursing students at UVic (86.5%) answered that dental caries are developed by not brushing one's teeth. A statistical significant difference (p-value=0.006) between the two groups regarding the question about development of dental caries caused by meals that are rich in carbohydrates, a high answer frequency was found at UVic (36.5%) compared to InHolland University (13.2%). Regarding the question related to dental caries prevention, the nursing students at both InHolland University (92.3%) and UVic (80.8%) answered that brushing teeth twice a day could prevent dental caries. Another statistical significant difference (p-value=0.016) was found between the universities regarding the question about preventing dental caries by drinking water, where more nursing students at UVic (50.0%) than at InHolland University (26.9%) chose this alternative.

Table 4: Response rates regarding question about dental caries development and prevention at InHolland University and UVic

| Question | N=105 | University | | | |
		InHolland n(%)	UVic n(%)	Total n(%)	p-value (Pearson chi-square)
How do dental caries develop? [2]	n=105				
By eating meals that are rich in carbohydrates		7 (13.2)	19 (36.5)	26 (24.8)	**0.006****
By smoking		21 (39.6)	22 (42.3)	43 (41.0)	0.780
By not brushing ones teeth		41 (77.4)	45 (86.5)	86 (81.1)	0.222
By constantly eating candy		41 (77.4)	32 (61.5)	73 (69.5)	0.078
By using toothpaste without Fluoride		5 (9.4)	9 (17.3)	14 (13.3)	0.235
By using dental floss		5 (9.4)	0 (0)	5 (4.8)	0.057[1]
How are caries prevented? [2]	n=104				
By brushing teeth once a week		0 (0.0)	0 (0.0)	0 (0.0)	1.000
By brushing teeth twice a day		48 (92.3)	42 (80.8)	90 (86.5)	0.085
By cleaning the area between teeth		38 (73.1)	41 (78.8)	79 (76.0)	0.491
By consuming less sugar based foods		38 (73.1)	33 (63.5)	71 (68.3)	0.292
By using toothpaste with fluoride		19 (36.5)	27 (51.9)	46 (44.2)	0.114
By drinking water		14 (26.9)	26 (50.0)	40 (38.5)	**0.016***
By quitting smoking		21 (40.4)	26 (50.0)	47 (45.2)	0.325

[1]= Fisher's exact test
[2]= Since it is a multiple-choice question it is not possible to attain a 100% answer frequency for each question
*= P<0.05
**= P<0.01

When it comes to the cause of bleeding gums, a majority of the nursing students at both universities answered that the cause of bleeding gums is bacteria on the teeth and gums (InHolland 66.0%, UVic 92.3%), but there was still a statistical significant difference (p-value=0.001) between the universities despite the choice of answer. More nursing students at UVic had chosen this alternative in comparison with the nursing students at InHolland University (table 5). Another statistical significant difference (p-value=0.039) was found regarding the cause of bleeding gums, where more nursing students at UVic (34.6%) than at InHolland University (17.0%) answered that smoking is the cause.

Table 5: Response rates for the question about the causes for gingivitis at InHolland University and UVic

| Question | N=105 | University | | | |
		InHolland n(%)	UVic n(%)	Total n(%)	p-value (Pearson chi-square)
What causes the gums to bleed (gingivitis)? [2]	n=105				
Brushing teeth aggressively		33 (62.3)	24 (46.2)	57 (54.0)	0.098
Brushing teeth too much		9 (17.0)	11 (21.2)	20 (19.0)	0.586
Insufficient brushing		23 (43.4)	25 (48.1)	48 (45.7)	0.630
Bacteria on the teeth and gums		35 (66.0)	48 (92.3)	83 (79.0)	**0.001*****
Hereditary		5 (9.4)	9 (17.3)	14 (13.3)	0.235
Smoking		9 (17.0)	18 (34.6)	27 (25.7)	**0.039** *

[2]= Since it is a multiple-choice question it is not possible to attain a 100% answer frequency for each question
*= P<0.05
***= P<0.001

The nursing students (N=105) at both universities answered that brushing more gently is the best thing to do if the gums bleed while brushing teeth (InHolland 56.6%, UVic 71.2%), followed by brushing more effectively (InHolland 54.7%, UVic 44.2%). No statistical significant differences were found (p-value=brush more gently 0.121; brush more effectively 0.283).

The majority of the nursing students at both universities answered bacteria as the main cause for tooth loss (InHolland 83.0%, UVic 88.5%), table 6. As to recognize if someone is suffering from bone loss, nursing students at InHolland University (43.4%) answered that it was by a dark staining on the teeth whereas the nursing students at UVic (50.0%) answered that it was when the teeth are worn down. Two statistical significant differences were found regarding how to recognize if someone is suffering from bone loss. The alternative "the teeth are worn down" showed a statistical significant difference (p-value=0.023), higher at UVic (50.0%) than at InHolland University (28.0%), whereas the alternative "there is a dark staining on the teeth" showed a statistical significant difference (p-value=0.001) higher at InHolland University (43.4%) than at UVic (9.6%).

Table 6: Response rates regarding questions about periodontitis at InHolland University and UVic

Question	N=105	University		Total n(%)	p-value (Pearson chi-square)
		InHolland n(%)	UVic n(%)		
What causes tooth loss (Periodontitis)? ²	n=105				
Bacteria		44 (83.0)	46 (88.5)	90 (85.7)	0.426
Smoking		24 (45.3)	27 (51.9)	51 (48.6)	0.496
Plain tea		1 (1.9)	0 (0.0)	1 (1.0)	1.000¹
Sugar		29 (54.7)	24 (46.2)	53 (50.5)	0.380
Hereditary		11 (20.8)	12 (23.1)	23 (21.9)	0.774
How can you tell if someone is suffering from bone loss? ²	n=102				
The teeth appear very long		16 (32.0)	18 (34.6)	34 (33.3)	0.779
The teeth are worn down		14 (28.0)	26 (50.0)	40 (39.2)	**0.023***
There are several holes in the teeth		15 (30.0)	24 (46.2)	39 (38.2)	0.093
There is dark staining on the teeth		23 (43.4)	5 (9.6)	28 (27.5)	**0.001***

¹= Fisher's exact test
²= Since it is a multiple-choice question it is not possible to attain a 100% answer frequency for each question
*= P<0.05
***= P<0.001

Regarding the best way to prevent periodontitis, the nursing students (N=105) at both InHolland University (84.9%) and UVic (75.0%) answered that the best way to prevent periodontitis is by brushing teeth twice a day. The nursing students at both universities (InHolland 73.6%, UVic 73.1%) were also unanimous regarding prevention of periodontitis by choosing the alternative "cleaning the area between the teeth". More nursing students at UVic (55.8%) chose "by quitting smoking" than at InHolland University (45.3%) as a preventative method for periodontitis. Despite this, it has the second lowest response rate. No statistical significant differences were found (p-value=by brushing teeth twice a day 0.205; by cleaning the area between the teeth 0.953; by quitting smoking 0.283).

Oral health education

Questions regarding the number of hours of oral health education in the respective universities showed that the majority of the nursing students at both InHolland University 32(60.4%) and UVic 24(46.2%), received between 1-10 hours of oral health education in the program (figure 2). No statistical significance (Fisher's exact test, p-value= 0.102) was found.
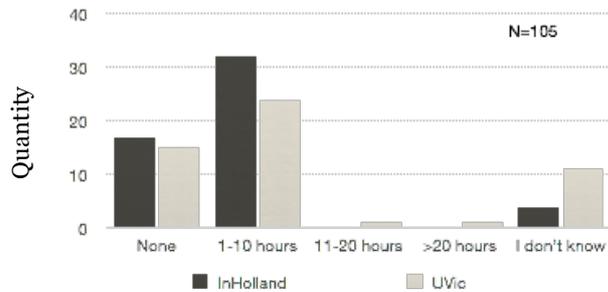

Figure 2: Response regarding the question about the number of hours of oral health education the nursing students have in their program.

The question regarding the nursing student's own opinion about their knowledge within oral health in order to be able to work with oral health related prevention in their future career showed similar results at both universities. The majority of nursing students at InHolland University 19(37.7%) answered that they have enough knowledge within oral health while the majority of the nursing students at UVic 19(36.5%) answered that they did not have enough knowledge (figure 3). No statistical significance (Fisher's exact test, p-value= 1.000) was found.
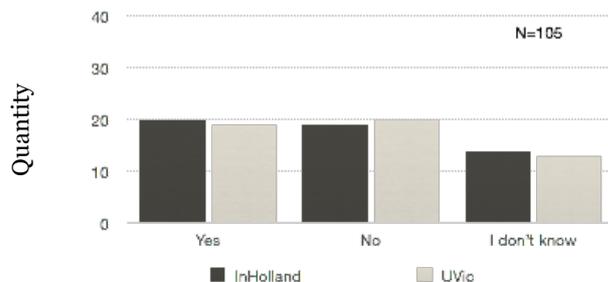

Figure 3: Response regarding the question about how prepared the nursing students consider themselves working with oral health in their future career.

Discussion

The results that have been collected from the questionnaires, filled by the nursing students at InHolland University and UVic, show that their knowledge regarding oral hygiene is satisfying and two statistical significant differences were found between the two groups. The results regarding causes for dental caries, gingivitis, periodontitis and its preventative methods were limited to an extent, where

more statistical significant differences could be seen between the universities. The average oral health education in the program was between 1-10 hours in the respective universities.

Method discussion

The study has a quantitative design where the data collection was based on a questionnaire. The design of the study was determined based on the purpose of the study. Since our study's purpose leans towards a quantitative aspect and is based on structured measurements, this design was chosen as the research method for this study. The author's goal was to collect as many participants as possible, with a minimum of 100 participants, in a short period of time, which could easily be fulfilled through a questionnaire and still remain representative (Henricson, 2012).

The questions in the questionnaire were formed as multiple-choice questions where more than one alternative could be selected in some questions. This could have led to confusion as some of the questions that required a response for only one option, resulted to several options being chosen by the participants. In order to simplify for the participants, the questions that required a response for only one option could have been added sequentially with clarified instructions that only one option is required. The remaining multiple-choice questions could then be followed by instructions that more than one option can be selected. The disadvantage of this kind of study is that it contains closed questions and the options are already chosen which does not allow participants to write down their own thoughts, comments or descriptions of how they perceived or interpreted the questions (Trost, 2012). Another disadvantage with multiple-choice questions is that the participants might not have taken them seriously and therefore picked several alternatives where they managed to pick several correct answers. This could be seen through a few of the participant's answers. A strong point of the study is that it is based upon previously used questionnaires. This gives a higher validity to the study given that the measurement method has been used earlier (Henricson, 2012). However, in this study, only parts of two previously modified questionnaires were used, which leads to the fact that this study leans towards a new measurement method. Consideration was taken to account of the difficulties from the previous study's questionnaires during the establishment of the questionnaire for this study. This meant that the authors took care of the errors that had been made previously and corrected them before conducting this study. Due to reviews from the original study, a modification was made in one the alternatives in question 11.

The reliability of the study is considered strong since the same questionnaire was used in both countries and that the collection of data took place in a similar way (Henricson, 2012). Before the data collection, the nursing students at InHolland University received information regarding the study and when it was to be collected. At UVic, the nursing students did not get any information before the data collection even though the author asked for it; instead they received the information in association with the data collection. This could have affected the reliability. This may mean that several nursing students at InHolland University were more prepared for the study and chose to participate in comparison with the nursing students at UVic and thus had lower external losses. The nursing

students at InHolland University might have also felt more obliged to participate in the study and prepared in advance regarding oral health compared to the nursing students at UVic.

The questionnaire underwent a pilot study, which means that the study was tested on a smaller group before the actual study was performed. This is usually done to test the study layout and technology prior to the collection of data. The pilot study was conducted to test the content of the questionnaire and to find out if it was easy to fill out by the participants (Eliasson, 2010). The pilot study was tested by English-speaking dental hygiene students in Canada to verify English vocabulary in the questionnaire. The dental hygiene students did not have difficulty understanding the terms in the questionnaire since the words were obvious for them, this has negatively affected the objectivity and another population should have conducted the pilot study. This was done without regard to Dutch students who do not have English as their native language, which could be seen as a reason for more dropouts in the questions at InHolland University than at UVic. The nursing students had difficulty understanding the word calculus and bone loss. This could have been avoided if the authors used easier words, such as, tartar instead of calculus, or tartar with calculus in parenthesis, and tooth loss instead of bone loss. In order to avoid this, a pilot study should have been performed at InHolland University as well and not only at UVic. In the question regarding the hours of oral health education given, most nursing students at InHolland University chose 1-10 hours although a few of them circled or noted that it was closer to one hour than ten hours. The authors realized that the gap between the amount of hours was too much and could have been decreased in order to get a better understanding of the precise hours.

The data collection in each country took place in one day, which meant that the nursing students who were not present for class were unable to participate in the study. In order to reduce the vast external loss, several days should have been arranged so that more nursing students would have had the chance to participate in the study. The results could have been more representative by having an increased number of participants. The authors were also present during the distribution of the questionnaire. This may have affected the nursing students both with an advantage and disadvantage. The advantage is that the authors were able to present themselves and their work, as well as being able to go through the participant's rights orally regarding confidentiality, anonymity and that participation is voluntary. The disadvantage may have been that they felt pressurized to participate despite there being no pressure from the authors. After the questionnaires were distributed, the nursing students were given the opportunity to read through the consent letter and fill in the questionnaire. The questionnaires were then submitted by each nursing student in an envelope to the responsible teachers and later retrieved by the authors. This could be a strong attribution in the study since no pressure was put upon the nursing students and that they were given time to read thoroughly and make a decision. However, another disadvantage may have been that the nursing students forgot to submit their filled questionnaire after their class.

Consent of the study was collected/considered obtained in association with the completion of the questionnaire. This can be discussed, if this was considered ethically correct, since it is important

according to rule number one in ethics to get written consent by the participants. This could not be achieved in this study in order to enhance anonymity since no names needed to be given to the authors and thus remained completely anonymous. The only way to collect consent was in association with the completion of the questionnaire. In order to perform this in an ethically correct way, it was important for the authors to include a consent letter explaining how consent was collected (Council of Science, 2002).

Result discussion

Oral hygiene and oral diseases

The nursing students at both universities had basic knowledge regarding oral health. The majority of the nursing students were aware of what colour healthy gums have, how calculus looks and feels like, what is needed to maintain good oral health and when it is the best time to brush teeth during the day. However, the amount of answers regarding the alternative about brushing teeth after lunch stood out among the nursing students. Approximately a third of the nursing students at UVic believed that brushing teeth after lunch is important. This may indicate that they might not have enough knowledge regarding this or simply chose the alternative because it sounds better. Another reason for this may be that both countries follow different guidelines and interpret the requirement for brushing teeth differently. The requirement for brushing teeth, according to the Swedish NBHW (2011), is twice a day in order to achieve optimal oral health, once in the morning after breakfast and once at night after the last meal of the day. A statistical significant difference was found regarding strategies to maintain healthy teeth, where a third of the nursing students at UVic chose the alternative "drinking water frequently". Water is a better hydrating option, although there is no evidence reinforcing that drinking water is beneficial in order to maintain optimal oral health.

Regarding the question about development of dental caries, both universities were unanimous that dental caries can be developed by not brushing one's teeth as well as eating candy often, which can be seen in several studies (Choi et. al., 2014; Weinberg et al., 2015; Petersen, 2003). The nursing students missed or lacked knowledge regarding the effects that carbohydrates have on dental caries. There was a statistical significant difference between the universities regarding this question, where more nursing students at UVic believed that high consumption of carbohydrates can develop dental caries, whereas only a few nursing students at InHolland University chose that alternative. A reason to this may be that the nursing students at UVic received more information about oral health than the nursing students at InHolland University. No conclusion of this can be made as this study was based only on the extent of education and not its content. Diet and nutrition is an important part when it comes to dental caries. As mentioned earlier in the background, high carbohydrate and sugar consumption can lead to dental caries. It is therefore important to be aware of the diet that hospitalized patients receive, as the food may contain a high amount of carbohydrates and sugar (Hujoel, 2009; Petersen, 2003). It is also important to reduce the intake of sugar in nursing homes, in the form of buns and cakes, in combination with coffee during the day.

The majority of the nursing students believed in the question about fluoride's effect on the teeth, that fluoride has a strengthening effect, yet the response rate was low regarding the cause of dental caries associated with toothpaste without fluoride. Regarding prevention of dental caries, less than half of the nursing students chose fluoride as a preventative agent against dental caries. This shows that the nursing students lack knowledge about the importance of using toothpaste with fluoride and the fact that toothpaste without fluoride can increase the risk of dental caries (Fejerskov & Kidd, 2008). Surprisingly, two fifths of the nursing students believed that smoking affected the development of dental caries, which is not entirely correct. Smoking cannot be related to the development of dental caries, although can have some influence in association with treatment of dental caries (Bernabe, Delgado-Angulu, Vehkalahti, Aromaa & Suominen, 2014). Fluoride is highly recommended as a preventative agent against dental caries, as it can both prevent and stop dental caries from developing (NBHW, 2011).

The alternative quitting smoking in association with prevention of dental caries was chosen by half of the nursing students. It was anticipated that most of the nursing students chose the alternative "quitting smoking" as a preventative method for dental caries, since most of them believed that smoking was one the causes for the development of dental caries. A statistical significant difference between the universities was found regarding the alternative "drinking water", where half of the nursing students at UVic chose it as a preventative method for dental caries. This result can be linked to the question regarding how to maintain optimal oral health, where the alternative "drinking water" also had a high response rate among nursing students at UVic. Water can help rinse leftovers in the mouth, but cannot be used as a preventative agent, even if it is recommended most of the time, by dental care and health care, as an aid for patients with dry mouth in order to prevent dental caries. Other aids can be helpful for treating dry mouth for example moisturizing gel, which has a more durable effect than water. It is therefore important for nursing students to have this knowledge, as they can recommend other helping aids against dry mouth than water as a preventative method against dental caries.

Gingivitis is an inflammatory process that can be caused by bacteria on the teeth and gums, which the majority of the nursing students have answered. Despite this, a statistical significant difference was found between the universities, where more nursing students at UVic answered "due to bacteria" than the nursing students at InHolland University. A reason for this could have been that almost the same amount of the nursing students at InHolland University answered, "brush more aggressively" which altered with the results. This could mean that they might lack the knowledge or might have accidently picked the correct alternative by picking several of them. A high response rate was found regarding bleeding associated with aggressive tooth brushing. Aggressive tooth brushing does not cause bleeding in association with gingivitis, however it can cause gingival retractions. A statistical significant difference was found regarding bleeding in the mouth caused by smoking, where the greater response rate was by the nursing students at UVic than at InHolland University. Even though the response rate was a fourth part of the total, it is high enough to conclude that they lack knowledge that smoking inhibits bleeding and thus conceals instead of exposing diseases (Gautam et al., 2011). The gingival

inflammatory process takes four days to develop but 21 days to dispose of by brushing more effectively, which had just under half of the response rate (Weinberg et al., 2015). The majority of the nursing students considered brushing more carefully to be the best way to eliminate bleeding. If one brushes too carefully, there is a chance that all the bacteria will not disappear and the inflammation will remain.

The majority of the nursing students considered bacteria to be the reason behind the occurrence of periodontitis. This is correct since the bacteria Tannerella forsythensis, Porphyromonas gingivalis and Helicobacter pylori are commonly associated with periodontitis (Weinberg et al., 2015; Dye et al., 2002). More than half of the nursing students also believed that sugar was another reason behind the occurrence of periodontitis, which is incorrect since sugar is mostly associated with dental caries than with periodontitis (Maynihan & Petersen, 2004). Just less than 50% of the nursing students chose the alternative "smoking" as a cause for periodontitis, which is considered a small percentage since it has shown that smoking has an effect on periodontitis and its progression (Gautam et al., 2011). Heredity is also another cause for periodontitis, although had a low response rate (Weinberg et al, 2015). Since bacteria associated with periodontitis can affect other diseases, such as diabetes and cardiovascular diseases, it is important for the nursing students to be aware that patients with these kinds of diseases should be free from periodontitis. The majority of the nursing students considered brushing twice a day as a preventative method for periodontitis, which is legitimate and recommended by the Swedish NBHW (2011). Evidently, there was a high response rate for the alternatives "less sugar intake" and "quitting smoking" as preventative methods for periodontitis, since most of the nursing students believed that sugar and smoking were causes for periodontitis.

Results, of the question regarding how to tell if someone is suffering from bone loss, have shown that most of the nursing students at UVic answered, "the teeth are worn down" while the majority at InHolland University chose "there is dark staining on the teeth". These answers are incorrect as worn down teeth indicates attrition and dark staining on the teeth can be a sign of dental caries. Only one third of the participants chose the correct answer to the question, which is, "the teeth appear very long" (Weinberg et al, 2015). The nursing student's answers can depend on either them not understanding the question, nor understanding the term "bone loss" or simply lack knowledge within this area. A possible reason as to why one third of the nursing students chose the right alternative may be due to several alternatives being picked, hence managed to eventually pick the correct answer. This verifies that the nursing students do not have the knowledge to indicate that someone is suffering from periodontitis. As mentioned earlier, periodontitis can have an effect on other bodily diseases, such as diabetes and cardiovascular diseases. This makes identifying periodontitis just as important as having knowledge about periodontal bacteria.

The study by Gren and Juklen (2010) who study nurses' oral health knowledge in Sweden, have come to equivalent results as in this study. Nurses in Sweden have equal oral health knowledge as in the Netherlands and Canada. Something they address in their study that may be of interest is the importance of having an exam within oral health in the nursing program, instead of only having it in a

one hour long class. This makes the nursing students take oral health as an important part of their education.

Oral health education

The question regarding the number of hours of oral health education in each university varied even though the majority of the nursing students considered it to be between 1-10 hours. The nursing students at InHolland University received 90 minutes of oral health education by a nursing teacher during their first year in the program (G. Min, Personal communication, 2nd March 2017). This was clearly seen in the results as most participants chose the alternative 1-10 hours, although circled or noted the precise number of hours they considered to receive as mentioned earlier in the method discussion. However a reason behind a few participants choosing the alternative "none" or "I don't know" could have been due to absence of that particular class or simply repressed memory as it had been a while since the class was taken. The answers were slightly mixed at UVic. Nursing students come to UVic from different college institutes after completing the first part of the education (5 semesters). This makes it difficult to know how much oral health education they had received in their previous college institutes, thus challenging to know the reasoning behind their answers. The oral health knowledge that the nursing students already have, apart from what they received in their programs, can have several underlying reasons. Some of the reasons may be that they have received the information directly through their dental care centre or that they have acquired the knowledge through previous education. At InHolland University, for example, some nursing students may already be level 2 nurses and may have received the information from their previous program. The nursing students at UVic might have gained their knowledge within oral health from their previous college institute before transferring to UVic.

The largest amount in both universities did not feel ready or were unsure to work with oral hygiene in their future career. This may depend on the perspective the prepared nursing students have in terms of oral health as a whole. An example may be that those nursing students who consider the mouth to be important learn and gain knowledge effortlessly in comparison to others. It also depends on how the nursing students perceive as enough knowledge within oral health, where some might believe that knowing oral hygiene more than oral diseases is enough.

It is important that nursing students steadily receive lessons in oral health, repeatedly through the program so that what they learn is not forgotten. A way of providing trustworthy and valuable knowledge is that a knowledgeable teacher within the subject, such as a teacher who is essentially a dental hygienist or a dentist, holds the lessons. Another option may be to interact with dental hygienists or dentists early during their study time to learn how to co-operate between the professions. This is in order to give the nursing students enough knowledge and prepare them for future work within oral health. The goals for 2020 for the Dutch nurses (Venvn, 2012) are to be better able to monitor and investigate oral hygiene, which is why it is important to start working on achieving this goal early through their education. This is by paying attention to the importance of oral health as part of general health. By following this, they will not only achieve the 2020 goal, but also prepare the

nursing students for future collaboration with other professions, which is one of the seven areas of expertise (Verpleegkundige & Verzorgenden 2020, 2012).

This study supports earlier studies concerning nursing students' limited knowledge about causes and preventative methods for oral diseases. This study cannot be a representative for the other countries in these continents, however it can be implemented as a basis for other studies. More studies regarding the content of the oral health education in the nursing program need to be conducted to be able to draw a reliable conclusion.

Conclusion

Results have shown that nursing students at InHolland University and UVic have basic knowledge regarding oral hygiene, but moderately to a limited extent regarding the causes and preventative methods of oral diseases. The lack of knowledge was seen mostly regarding sugar and smoking's effect on dental caries and periodontitis, and the impact that diet and nutrition has on dental caries. Some statistical significant differences could be seen between the universities regarding development and prevention of dental caries, gingivitis and periodontitis. Nurses often meet patients with impaired health and with oral health knowledge they have the opportunity to earlier detect abnormalities and refer the patient to dental care. This can increase cooperation between dental care and health care by indicating and referring patients to dental care for further oral care in early stages.

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Appendix 1- Questionnaire

Questionnaire

JÖNKÖPING UNIVERSITY
School of Health and Welfare

Sex: □ Male
            □ Female
            □ Other

Year of birth:........................

For the following questions, select one or more of the alternative answers.

1. What is the most important strategy to keep teeth healthy?
            □ Regular dentist appointments
            □ Daily oral care
            □ Adequate diet and nutrition
            □ Drink water frequently

2. When is the best time to brush teeth during the day?
            □ Before breakfast
            □ After breakfast
            □ After lunch
            □ After the last meal of the day

3. What colour are healthy gums?
            □ Dark red
            □ Red
            □ Pink

4. What causes the gums to bleed (gingivitis)?
            □ Brushing teeth aggressively
            □ Brushing teeth too much
            □ Insufficient brushing
            □ Bacteria on the teeth and gums
            □ Hereditary
            □ Smoking

5. What is the best thing to do if the gums bleed when brushing teeth?

    □ Brush harder

    □ Stop brushing

    □ Brush more gently

    □ Brush more effectively

6. In what way does toothpaste with fluoride affect the teeth?

    □ Strengthens your teeth

    □ Weakens your teeth

    □ Doesn't have an affect

7. How do dental caries develop?

    □ By eating meals that are rich in carbohydrates

    □ By smoking

    □ By not brushing ones teeth

    □ By constantly eating candy

    □ By using toothpaste without fluoride

    □ By using dental floss

8. How are caries prevented?

    □ By brushing teeth once a week

    □ By brushing teeth twice a day

    □ By cleaning the area between teeth

    □ By consuming less sugar based foods

    □ By using toothpaste with fluoride

    □ By drinking water

    □ By quitting smoking

9. What causes tooth loss (periodontitis)?

    □ Bacteria

    □ Smoking

    □ Plain tea

    □ Sugar

    □ Hereditary

10. What is the best way to prevent tooth loss (as a result of periodontitis)?

    □ By brushing teeth twice a day

    □ By brushing teeth more rarely (1-2 times per week)

    □ By cleaning the area between teeth

    □ By consuming less sugar based foods

    □ By quitting smoking

11. How can you tell if someone is suffering from bone loss?

□ The teeth appear very long

□ The teeth are worn down

□ There are several holes in the teeth

□ There is dark staining on the teeth

12. What might calculus on the teeth look and feel like?

□ Hard, with a light colour

□ Soft, with a dark colour

□ A dark patch

□ Soft, with a light colour

13. How many hours of oral health related theory do you have in the nursing program?

□ None

□ 1-10 hours

□ 11-20 hours

□ > 20 hours

□ I don't know

14. Do you think that you have sufficient knowledge regarding oral health to provide the care needed for your future patients oral needs?

□ Yes

□ No

□ I don't know

THANK YOU KINDLY FOR TAKING THE TIME TO COMPLETE THIS QUESTIONNAIRE!

JÖNKÖPING UNIVERSITY
School of Health and Welfare

Oral health knowledge among nursing students

Before you decide to participate please read this consent letter, which contains valuable information regarding the purpose of the study.

The aim of this study is to examine oral health knowledge among nursing students in two University programs. These include InHolland University in Netherlands and University of Victoria in Canada.

Why is this study important?

According to nursing competencies, a nurse should have basic knowledge of oral health since it is a part of general health and their career. The results of this study aim to identify areas where knowledge regarding oral health is present and where there may be voids among nursing students. It is important for nursing students to receive adequate theory about oral health to be able to provide patients' oral as well as overall general health needs.

Participants' rights

Participation is voluntary and may be discontinued at any time. Consent to participate in the study will be assumed along with the completion of the questionnaire. There are no names connected to the questionnaires. The information you provide will be kept confidential. Only the authors will administer and collect data from the completed questionnaires. The results will be reported in the form of tables and charts, where no individual responses can be identified. The survey takes about 10-15 minutes to complete.

If you have any questions about the study don't hesitate to contact us for more information.

Sincerely,
Helen Odisho and Hina Khan