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Education in Dental Public Health and Geriatric Dentistry in the Northern European Dental Hygiene Schools

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Abstract **Original Research Article**

The aim of this study was to survey to what extent dental public health (DPH) and geriatric dentistry (GD) were taught at dental hygiene schools (DHSs) in the Northern European countries with focus on the content, teaching methods, out-reach activities, assessment forms and desired changes. A questionnaire with structured and open questions was sent to the director's office of all DHSs in the Northern European countries (two DHSs in Denmark, four in Finland, seven in Sweden, four in Norway). Eleven DHSs responded (65%). All responding DHSs recognized DPH and GD subjects in their programs. DPH was taught as a separate discipline in seven and GD in eight DHSs. In the rest, DHSs subjects were covered by other courses. The contents were ambiguous. Besides traditional lectures and seminars, most DHSs provided problem-based learning, online courses, case presentations, writing essays, quizzes and various exercises, e.g. teaching other discipline students. All schools provided out-reach activities. Four schools had a separate examination in DPH and eight in GD. Five included DPH in examinations in other disciplines. Three schools recorded DPH and seven GD in the final diploma. The respondents felt that DPH should be taught to their students together with dental students. Study tours abroad to learn how oral health care and preventive work was organized were suggested. In GD more collaboration with other health care professionals was desired. DPH and GD were seen as important disciplines in the Northern European DHSs as these fields represented the main activities of dental hygienists today.

Keywords: Community dentistry; dental hygiene education; dental public health; geriatric dentistry; gerodontology; Northern European countries; questionnaire.

INTRODUCTION

The Northern European countries, Denmark, Finland, Norway and Sweden have well-organized oral health care provision systems. The Public Dental Service (PDS) provides children and adolescents with systematic and prevention-oriented services, mostly free of charge. The PDS also offers subsidised care for elderly and special needs patients, although here the variation between countries is greater. Most these Northern European countries also subsidise adult dental services in the private sector and the use of dental services is generally high [1]. In all these countries, great numbers of dental hygienists have been trained since the 1970s and they play an important role in the provision of oral health care. This can be seen in the population to dental hygienist ratios, which are among the highest in the European economic area EEA [2]. The range of services provided by dental hygienists varies widely depending on treatment sector (public or private) and type of patients (children, adults, elderly or special needs groups) [3]. Dental hygienists' work in paediatric dentistry and periodontics has been greatly appreciated. Prevention of oral diseases among the young has been emphasised during recent decades. A special feature in these Northern European countries is the community-based activities outside dental clinics at schools, kindergartens and institutions, mostly provided by dental hygienists [4].

In the Northern European dental schools, Community Dentistry or Dental Public Health (DPH) was brought into undergraduate dental education in the 1970s. It had become obvious that the dental profession would need to participate in e.g. population oriented preventive programs and to be able to inform and influence-decision makers on dental matters [5].

Gerodontology or Geriatric Dentistry (GD) is a relatively new discipline compared with DPH. In the 1970s and 1980s, many people above 65 years were

edentulous [6], and GD was usually linked to prosthodontics. Today, when people retain most of their teeth into old age [7], the focus has changed from cleaning and repairing dentures to caries prevention [8] and repair of dental restorations. People also live longer with better management of general diseases, due to improved medications. Therefore, home-bound older people and elderly in nursing homes have become an important target group for dental hygienists in recent years [1].

Dental hygienists are educated in university colleges, which, in these Northern European countries, offers shorter professional study programs. At present, dental hygienist education takes 3 to 3.5 years. The European Federation of Periodontology (EFP) recently published curricular guidelines for dental hygienist education. The aim was to assist authorities responsible for dental hygienist educations to reach uniformly high standards throughout its member countries [9]. In addition to the traditional basic biological, medical and dental study subjects, the guidelines state that the students should know "the structures of public health services and community-based activities as well as understand the public health measures in the control of oral diseases and the promotion of health." Many other DPH domains, such as epidemiology, communication and oral health education, planning and evaluation, are mentioned in the recommendations. The term geriatric dentistry could not be found in the document but the study subject is presented in other connections, such as "knowledge of the physiology of ageing and the management problems associated with the dental care with elderly".

Wider use of dental hygienists in the future may be a response to the high and probably increasing costs of dental care [10], as today's large older populations retain their teeth longer and need more regular dental care. It is also likely that political pressures will favour greater health benefits at low cost instead of repeated technical procedures in dental care. This may advance the status of dental hygienists. Information about how well dental hygienist education is oriented towards future challenges, where education in DPH and GD might become more important is contradictory.

The aim of this study was to ascertain to what extent DPH and GD were taught at dental hygienist schools (DHSs) in Denmark, Finland, Norway and Sweden and to describe and compare the content of the education, teaching methods and out-reach activities, the literature used, the assessment forms and the teachers' background. Furthermore, we wanted to know whether the disciplines were considered important, how their teaching was motivated and what kind of future changes were envisaged.

MATERIAL AND METHODS

Based on previous questionnaires and newer textbooks in the disciplines DPH and GD, a questionnaire was constructed, comprising both structured questions with closed response choices (shown in the tables) and open questions. The structured questions used in this paper were:

- Which subjects in Dental Public Health (Community Dental Health/Community Dentistry/Oral Public Health) and Geriatric Dentistry (Gerodontology) are taught to undergraduate students?
- What kind of out-reach (external practice) activities are included?
- Do your students have courses in DPH together with dental students?
- Are there separate final examinations in DPH and GD?
- Does a grade in DPH and GD get printed on the final diploma?

The open questions were:

- Do you have separate Dental Public Health (Community Dental Health/Community Dentistry/Oral Public Health) and Geriatric Dentistry (Gerodontology) disciplines at your school?
- How is the education in DPH and GD positioned in the curriculum?
- What methods, in addition to lectures, are used in teaching DPH and GD?
- Which are the main textbooks recommended in DPH and GD? Is any other literature recommended?
- What type of examinations are used?
- Who is in charge of the teaching of DPH and GD?
- Do you think education in DPH and GD is necessary for your students today and in the future? Please explain why or why not?
- If you had free hands to change the education in DPH and GD, on what would you focus?

The paper-based questionnaire was sent to the directors' offices of all DHSs in Northern European countries (two DHSs in Denmark, four in Finland, seven in Sweden and four in Norway). After two and six months, the non-responding schools were contacted by phone and encouraged to respond. In Denmark one DHS replied, in Finland three, in Sweden three and in Norway all four. Thus, 11 of the 17 DHSs contacted responded, rendering the response rate of 65%. Ethical approval was not needed since the questionnaire was anonymous, participation was voluntary, the study did not aim to create new knowledge about health or disease, and no personal data was collected.

Data were processed using SPSS version 25 (IBM SPSS, Armonk, NY, U.S.). Frequency distributions were used for descriptive statistics.

RESULTS

Teaching in Dental Public Health

All responding schools recognised DPH in their curricula. The study subjects included are listed in Table-1. Seven DHSs (one in Denmark, one in Finland, three in Norway, and two in Sweden) reported having a separate discipline called DPH. Four schools had included DPH subjects in other disciplines. In many DHSs, the DPH subjects were covered both by the discipline itself and by other disciplines (Table-1).

Table-1: Numbers of Dental Hygiene schools (out of 11 that responded) teaching various subjects included in Dental Public Health (DPH) either as a separate discipline or by other disciplines or both. Respondents could choose more than one option

	By the discipline of DPH	By other disciplines	By DPH and other disciplines	Not covered/I don't know
Principles of public health	6	4	1	
Basic epidemiology	7	2	1	1
Epidemiology of oral diseases	6	3	2	
Prevention of oral diseases	5	5	1	
Behavioural sciences	5	5	1	
Sociology	2	6		3
Statistics	5	3	1	2
Ethics in oral health care	5	4	2	
Laws and regulations in dentistry	7	3	1	
Oral health care systems	7	3	1	
Financing oral health care	7	2	1	1
Health insurance systems (incl. oral health)	5	5		1
Health economics	3	5		3
Practice management (e.g. administration)	4	4	1	2
Quality assurance	5	3	1	2
Evidence-based dentistry	6	3	2	
Clinical guidelines in prevention	5	5	1	

DPH was taught to dental hygiene students together with dental students in three DHSs in Norway and in three DHSs in Sweden. The discipline was almost equally distributed throughout the three years of studies. An exception was one DHS in Sweden, which had no teaching during the first year and another DHS, also in Sweden, which did not provide teaching during the last year. Ordinary teachers of DHS (not specified), dental hygienists with PhD degrees, associate professors and professors covered the teaching in DPH.

The discipline was mainly covered by lectures and seminars. Two DHSs in Finland, one in Norway and one in Sweden provided clinical tasks and research projects. In addition, in one DHS in Norway the students carried out research projects, and in one DHS in Sweden they had clinical tasks. Along with traditional teaching activities (lectures and seminars), nine DHSs provided additional teaching activities, such as online courses, problem-based learning, clinical activities, external practice, case presentations, writing project plans and self-studies. All DHSs provided various out-reach activities, the most popular being visiting secondary schools. One DHS in Sweden arranged meetings with parents (Table-2).

Table-2: The number of dental hygiene schools (out of 11 that responded) providing indicated out-reach (external practice) activities as a part of Dental Public Health discipline

Activity	Yes	No
Visit to a maternity- and child welfare clinic	6	5
Meetings with parents at maternity- and child welfare clinics	5	6
Visit to a nursery (child day care centre)	8	3
Meetings with parents at child day care centres	4	7
Visit to a primary school	8	3
Visit to a secondary school	11	-
Meetings with parents at schools	1	10
Visit to an institution for disabled	8	3

The literature used varied greatly between the DHSs. Mainly, sources in the native language were used. One school in Finland had no textbooks, but instead used articles as the main literature. The other two Finnish DHSs used articles and several chapters from textbooks, among which "Heikka *et al.*, 2015 Terve suu ("The healthy mouth") [11] was common for both schools. In Norway, all schools used textbooks. "Mæland, 2010 *Forebyggende helsearbeid: folkehelsearbeid i teori og praksis*" (Preventive public health work) [12] and Klepp *et al.*, 1995 *Ungdom for helse. Fra teori til praksis i helsefremmende arbeid med ungdom*" (Health promotion among the young) [13] were the most common books. In addition, two DHSs in Norway had prepared their own compendiums. In one of them, governmental documents were included. Another Norwegian DHS allowed a free choice of additional literature. In Sweden, all schools used different textbooks or chapters from textbooks. One Swedish DHS mentioned various articles and national guidelines.

In four schools, the dental hygiene students took a separate examination in DPH. In Finland this was an online, written examination. In Norway, the examination comprised a written online examination, a written report and an oral presentation from external practice. In Sweden there was a written examination, an oral presentation, a home assignment, a seminar presentation with opponents, and a clinical examination with patients. Five DHSs included subjects of DPH in examinations in other disciplines; out of which two DHSs in Finland and Sweden did not have DPH as a separate discipline. Three schools in Norway and Sweden with separate final examinations in DPH, printed the grade of the DPH curriculum in the diploma. In the Danish and Finnish DHSs that responded, DPH was not mentioned on the diploma.

Importance of the subject and desired improvements

All respondents considered the DPH as an important study subject for dental hygienists in the future. "This is mainly what dental hygienists are working with," as one of the respondents expressed it. Another respondent stated that "students need to realise that there are social reasons for bad health. Other strategies to prevent diseases and promote health than the traditional ones should be used".

When asked what they would like to change in hygienist education, the respondents suggested that DPH should be taught to dental hygienists together with dental students. Organised excursions abroad together with students of other relevant disciplines were also suggested in order to find out how oral health care and preventive work was organised in other countries. The DHSs, with no clinical activities, expressed a wish to have such activities included in the discipline.

Teaching in Geriatric Dentistry

Eight out of the 11 responding DHSs (one DHS in Denmark, two in Finland, four in Norway, and one in Sweden) reported that GD was a separate discipline, and that the study subjects included were covered by the GD discipline itself in most of the DHSs (Table-3). Teaching in GD became more extensive towards the end of the studies, during the second and the third year in most of the DHSs.

Table-3: Number of dental hygiene schools (out of 11 that responded) covering the subjects included in teaching /education of Geriatric Dentistry (GD) either as a separate discipline or by other disciplines or both by Geriatric Dentistry and other disciplines. Respondents could choose more than one option

	By the discipline of GD	By other disciplines	By GD and other disciplines	Not covered/I don't know
Demography	5	2	2	2
Biological and physiological aspects of ageing	7	2	2	
Sensory changes and communication	6	2	3	
Psychiatric disorders in old age	7	2	1	1
Disability in old age	7	2	2	
Common medical problems among elderly	5	3	3	
Nutrition and oral health of elderly	4	2	4	1
Pharmacology and aging	7	2	2	
Medical history taking	5	3	2	1
Epidemiology of oral diseases	7	3	1	
Prevention of oral diseases among elderly	7	2	2	
Oral health-related quality of life	7	2	1	1
Access of oral health care services	5	2	4	
Oral health care of homebound people	8	2	1	
Oral health care of nursing home residents	8	2	1	

Besides lectures and seminars provided by practically all schools, most schools provided clinical training (one DHS in Denmark, two in Finland, three in Norway, two in Sweden). All the DHSs provided out-

reach activities. Visits to nursing homes and meetings with their personnel were incorporated in these activities at all the 11 DHSs. Two DHSs in Finland and one in Sweden had a research project in this discipline (Table-4). In addition, nine DHSs (one in Denmark, three in Finland, three in Norway, two in Sweden) used complementary teaching forms such as on-line courses, problem-based learning, presentations of patient cases, simulations, writing essays, self-chosen literature, own studies, projects, teaching other discipline students, videos, quiz, teach-back, discussions about patient cases and producing various information materials for health education.

Table-4: The number of dental hygiene schools providing indicated out-reach (external practice) activities as a part of Geriatric Dentistry discipline

Activity	Yes	No
Visit home nursing unit	8	1
Visit a day hospital	6	3
Visit an old peoples' home (nursing homes)	11	-
Meeting with personnel at nursing homes	11	-
Visit home-bound elderly at their homes	6	3
Meeting with home nursing personnel	8	2
Visit a Geriatric department at a hospital	5	4
Meeting with personnel at hospital	2	5

Various textbooks and chapters of textbooks, mainly in the native language, scientific papers, websites and guidelines were used. One DHS in Finland had a special library dedicated to the GD discipline, where students had a wide range of choice. In Norway, one DHS had made its own compendium for the discipline. The other three Norwegian DHSs used different textbooks. Nordenram & Nordström, 2015 Tannpleie for eldre (Oral health care for the elderly) [14] was recommended by all these three Norwegian DHSs. One DHS in Sweden did not use any textbook, only scientific articles and relevant websites. Another Swedish DHS recommended textbooks and chapters in Swedish and English-language textbooks. The third DHS in Sweden used textbooks and articles as the main sources of information.

Eight of the DHSs (one DHS in Denmark, two in Finland, three in Norway and two in Sweden) provided a separate examination in GD. In seven DHSs, the grade of GD examination was recorded in the diploma. This also included one school in Finland, although the school had no separate examination in this discipline. Another DHS in Finland had a separate examination, but did not print the result on the final diploma. One DHS in Norway did not respond to this question. Four DHSs had arranged the examination as a written school and/or online examination (two DHSs in Finland, one in Norway and one in Sweden together with patient case presentations). The other DHSs arranged their examinations as oral defences of a written assignment (one DHS in Denmark and one in Sweden), a portfolio (one DHS in Norway) and a home examination (one DHS in Norway).

DHS teachers (not specified) provided most of the teaching. In addition, dental hygienists with PhD degrees, associate professors, professors, dentists, nurses (two DHSs) and psychologists (one DHS) were reported to teach this discipline.

Importance of the subject and desired improvements

All respondents agreed that GD was important for dental hygienist students, mainly because "the need for dental services among elderly populations has increased" and "there is a need for more multi-professional collaboration in health care", as the respondents expressed it. Several respondents wished to establish wider collaboration with other health care professionals, especially practical training together with nurse students was suggested to make these interested in oral health. Some respondents having a lot of experience of care centres for elderly wished to focus on "new innovative teaching methods for students while in the field". Others wanted to have more clinical work and consultations in the GD curriculum, like screening patients in old people's homes.

Student numbers and patients in focus

The overall intake of students in the dental hygiene program in the coming five years was planned to increase in four DHSs (three in Norway and one in Sweden) and not to change in the other seven DHSs. When asked how much the current teaching at the DHSs focused on different population groups, everyone agreed that it was appropriate in children and working age adults. However, four DHSs reported that there was too little focus on special needs groups while one DHS answered that these groups got too much attention. Two DHSs reported that there was too little focus on the elderly.

DISCUSSION

The response rate of 65% was moderate despite several attempts to re-contact the DHSs. Because many schools did not have DPH and GD as "independent" disciplines it was difficult to find a person or persons willing to collect the required information from several colleagues in the middle of a busy teaching period. However, those who responded had put much effort to their answers and the results give

a useful picture of DPH and GD curricula in the Northern European dental hygiene schools.

All the responding DHSs recognised DPH and GD subjects in their programs. The proportion of DHSs in the Northern European countries that taught GD was in a range of dental schools educating dental students in the rest of the world, which ranged between 0% in Nigeria and 100% in Canada, Greece, Japan and U.S.; 86% among European dental schools [15-21]. The number of dental schools teaching GD has increased in most of countries during the last two decades [22]. While GD curriculum papers are rather popular among dental schools, not much information can be found about DPH discipline. A study published more than a decade ago evaluated DPH workforce in U.S. and found that 68% of dental schools had dental public health academic unit, but concluded that the field had minimal presence in academia [23].

DPH and GD were taught as separate disciplines in majority of DHSs in the Northern European countries. The rest had subjects in these disciplines covered by other courses (Tables 1, 3). A recent study showed that only 37% of European dental schools had GD as a separate discipline [19]. Another study in selected countries in five continents showed that the GD discipline was also taught as a separate discipline or covered in other courses, but the ratio was not specified [21]. More than a half of the responding DHSs in the Northern European countries taught DPH for dental hygiene and dental students together. The rest of DHSs expressed a wish to have this discipline together for dental hygiene and dental students. It must be noted, that not all DHSs have dental students, that is why this might not be possible.

Most of DHSs covered the DPH discipline equally throughout three years. The GD discipline was perceived as more complex and therefore was taught towards the end of the studies. The latter is in line with dental schools for dental students where the GD discipline was also taught during the final years [16, 18, 24, 25].

The contents of the curricula in DPH and GD can be considered ambiguous. Like in dental schools, forms of teaching varied among DHSs [15, 16, 18]. Besides the traditional teaching activities, lectures and seminars, the majority of the DHSs provided online courses, case presentations, problem-based learning, etc. Such additional teaching forms activate higher cognitive ability of students, and are believed to lead to better learning [26]. In addition, teaching activities in groups promote sociocultural learning according to Vygotsky [27].

DPH guidelines for dental and dental hygiene education were recently developed in the U.S. [28]. The approved guidelines' topics and the topics covered at DPH discipline in the Northern European countries were similar, however, U.S. guidelines put more emphasis on policy and advocacy, communication, collaboration, inter professional care, program planning and service learning. This might be due to differences in the health care and oral health care provision systems. In a recently published position paper on graduating European dentists, the competences and learning outcomes in DPH discipline were outlined, which were partially absent in DHSs in the Northern European countries; these included implementing strategies and monitoring interventions [29]. On the other hand, the competences were formulated specifically for dental rather than dental hygiene students, but they were equally relevant for dental hygienists and for dentists. European guidelines of the GD discipline for dental, but not dental hygiene students, have already been presented in 2009 [30]. The aim of any curriculum guidelines emphasises harmonisation of the education in these disciplines. However, it has been suggested that the regional and national differences should be preserved in order to address the need of the public [31]. In order to prepare dental hygienists to be aware of local and international public needs and meet them, the responding DHSs in the Northern European countries recommended textbooks and articles in native languages as well as in English.

The majority of DHSs provided out-reach activities in DPH and GD disciplines (Tables 2, 4). It has been shown that, for dental professionals, it was important to get training outside the school and in those places where they will be working after graduation [30, 32].

Teachers of the DPH and the GD disciplines had various backgrounds, from being a DHS teacher to being a professor. In the U.S. and South America it has been shown a lack of personnel with specific education in teaching these disciplines [18, 23]. In this questionnaire study, we did not ask particularly about the education of teaching personnel. A few DHSs reported that they involved dentists, nurses and psychologists in the teaching of GD. This should be encouraged within other DHSs since the GD is an inter-professional discipline. Teachers with different training would certainly contribute towards better interdisciplinary understanding.

The formalisation of DPH education through a separate examination and the grade printed in the diploma was found in fewer than a half of the responding DHSs (4 and 3, respectively), while the majority of the responding DHSs (8 of 11) had an examination in GD, and seven of them printed the grade obtained on the diploma.

Authorities running the Public Dental Services in the Northern European countries have realized that using dental hygienists in out-reach activities may be

cost effective [1]. As a result, the demand for dental hygienists with knowledge of GD will increase in the future. A great number of the graduating dental hygienists will be working in private practice where e.g. most of the elderly will have their oral health care and they will certainly also benefit from good knowledge in DPH and GD.

CONCLUSION

DPH and GD subjects were seen as important disciplines in Northern European DHSs, as these topics accorded with the demographic changes claimed to represent the main activities of dental hygienists today. Even in the DHSs which did not have these particular disciplines the relevant subjects were covered in other courses.

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