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A predictive study on the role and function of the dental hygienist in Taiwan*

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*A Delphi method study to examine the desired scope of practice for dental hygienists.

Abstract: *Objectives:* The purpose of this study was to achieve a consensus on the work roles and scope of practice of dental hygienists in Taiwan and to rank the results according to their importance. *Methods:* A modified Delphi technique was used to enquire how experts view their role and function as a dental hygienist in Taiwan. Three groups of 105 experts (dentists, officials and scholars) were surveyed. Responses were analysed using qualitative statistics. *Results:* Fifty-one topics, which were included in the categories of the research agenda, were identified through the first phase of the study. The return rate of 87.62% and 68.48% was achieved from the two rounds of surveys. Afterwards, a consensus was reached on 38 out of the 51 topics. In the aspect of service, the most desired roles and functions were those of a friendly receptionist and of an employee effective in scheduling appointments. In the aspect of administration, the most important roles and functions were billing of health insurance, and book keeping on payments, as well as administering materials. In the aspects of technical efficiency, dental hygienists were most frequently seen as serving in four- or six-handed assisting and in infection control. In the area of oral health, an oral health educator and an oral health promoter were viewed as having the most important roles and functions. *Conclusions:* The experts concluded that the role and function of a dental hygienist should shift from a patient treatment orientation to that of an oral health promoter. The role expectations need to change to reflect what hygienists actually learn and do.

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Introduction

Dental hygienists are employed as parts of a dental team in the prevention and management of the two most common and costly oral diseases: dental caries and periodontal disease (1). In a survey of Alberta residents, 68.8% of the respondents believed that visiting a dental hygienist is important for the healthy maintenance of their mouth (2). In some countries, direct compensations from insurance companies make it possible and even advisable for dental hygienists to practise independently to be more accessible to a greater number of patients (3).

The role correlation theory is often discussed in the field of psychology and society. The definition of a role is the expected behaviour associated with a particular status. Thus, a role is a collection of expectations that others have for a person occupying a particular status. Statuses are occupied, and roles are acted or played (4). Nathe (5), Darby and Walsh (6) described the dental hygienist's role and scope of practice as including the following: administration, management, clinical, consultation, education and research. The latter is vital for dental hygienists, like for any other health professional, to make use of research findings to update their clinical practice (7).

Compared with other professionals, dental hygienists frequently have negative attitudes regarding the variety of tasks they find in their work (8). Factors which are associated with their experience of stress during work include muscular and skeletal pains, combining work and private life, highly efficient organization of work, long working hours, working without an assistant, difficult or demanding patients, lack of leisure time, lack of support by practice management and doubts about one's capabilities (9–11). Unlike in many countries, where policies related to work descriptions, working hours, salaries and professional advancement exist, in Taiwan, there are no rules or policies regulating the dental hygiene profession (12).

There are two schools of dental hygiene in Taiwan. After completing the 4-year dental hygiene programme, the graduates can get the bachelor's degree. Most of the graduates continue to study in graduate school, others enter the dental industry and only a few leave for the dental clinic. One common type of role conflict occurs when individuals move into occupations that are not common among people with their ascribed status and level of education. The authors wanted to explore which work roles are acceptable for dental hygienist in clinical setting to decrease their role conflict and subsequent brain drain. The objective of the present study was to investigate the roles and functions of the dental hygienist in Taiwan, as well as the available affective factors.

Materials and methods

Delphi method

The Delphi technique is often used to obtain an informed or refined consensus from experts in specific field (13). The Delphi study is characterized by anonymity, interaction with researcher-controlled feedback after each round of semi-structural questionnaire, and the statistical summary of group responses after each round (14–17). Anonymity prevents individual responses from being correlated with a respondent and allows consensus to be reached among experts without bias, inhibition, or psychological pressure from other experts, a situation that could occur during face-to-face discussions, such as during focused group sessions. Every expert is surveyed the same question in the same round of the study. A semi-structured questionnaire survey is used to obtain the ideas or attitudes of experts on the topic in question and the experts are asked to rank the roles according to the importance the described to them. The experts' opinions are collected as feedback information that guide the direction of the subsequent rounds. Statistical summaries are used to attain consensus from data input. Although there are no hard-and-fast rules to guide the design of a Delphi, we used the process described by Forest (18) as it fits the objectives of this study and the nature of the data the authors wished to gather. The rounds of the study are described in the following sections.

Respondents

The respondents were composed of experts who the authors believed had relevant practical knowledge of the role and function of dental hygienists in dental clinics. They were chosen from three separate groups: industry, government and academia. The industry group included dentists, and heads of dental clinics. The government group included managers of dental affairs in health centres, and of national health insurance offices. The scholars included professors of dentistry, dental hygiene and dental graduate program at the university. Thirty-five members of each group initially agreed to participate in the study. A total of 105 experts participated in this study.

The Delphi instrument

The instrument the authors developed for the present study was based on the list of topics about the dental hygienists' position that were identified from scientific reviews and interviews. Literature reviews (12, 19, 20) and interviews were used

to identify 51 topics for the first questionnaire of the study. These topics were classified into four sections, i.e. service, administration, oral health promotion and technique. Definitions were included in most of the topics to increase clarity.

The first mailed survey had two basic objectives. First of all, the respondents were asked to review the list of roles and functions to confirm that they considered this choice of topics complete and appropriate, and to identify those topics or definitions that they considered too vague. Secondly, the respondents were asked to rate the level of importance of each topic. The topics were scored according to a five-point Likert scale (1 = very unimportant, 2 = unimportant, 3 = minimally important, 4 = moderately important and 5 = very important). To refine the results of the survey instrument from Round 1, the data were compiled again to determine the agreement for the changes in the list or placement of topics. The second questionnaire was to gather descriptive data. Respondents were asked again to rank their agreement with the list of roles and functions they described in Round 1, and to identify the level of importance they ascribed to each role and of a dental hygienist.

Data analysis

Mode and quartile deviation (Q.D.) were used to test the consensus of each topic. The mode is a category among the various categories in the distribution with the largest number of cases. Quartiles are points in a number scale which divide the observations into four equal groups of equal size. Q_1 is that point below which one-fourth of the observations lie. Q_3 is the point below which three-fourth of the observations lie. Q.D. is half of the value of Q_3 minus Q_1 . High consensus is expressed by a value of Q.D. that is lower than 0.6. The value of Q.D. is between 0.6 and 1 for a middle consensus, while a Q.D. value greater than 1 means no consensus (21). When over two-thirds of the topics were attained ($Q.D. \leq 1$), the study has reached a consensus (22).

Results

The first questionnaire was sent to 105 experts from the industry, government and scholars. Ninety-two questionnaires were mailed back for a return rate of 97.14% for the 34 dentists, 88.89% for the 31 officials and 77.14% for the 27 scholars. The second time 63 questionnaires were mailed back and the return rate was 70.59% for the 24 dentists, 70.98% for the 22 officials and 62.96% for the 17 scholars for the second questionnaire. The overall return rate was 68.57%, 62.86% and 48.57% for the industry, government and academics respectively.

Thirty-eight topics (75%) reached consensus, among them 30 topics (58.82%) reached a high consensus, while eight topics (15.69%) reached middle consensus.

Roles and functions in the aspect of service

The aspect of service elicited positive response. Most appreciated that dental hygienists communicate with the patients during their daily work. The most important role and function of a dental hygienist was seen as a friendly receptionist, who is effective in scheduling appointments, a good consultant for dental treatment, an enthusiastic oral health promoter, etc. (Table 1). Only one topic, explanation for private expense, belonged to the middle consensus. All other topics reached a high consensus.

Roles and functions in the aspect of administration

The experts agreed on 10 topics in this section. The most important topic was billing of the health insurance and keeping books on payments (Table 2). Except for the three topics,

Table 1. Ranking of importance of dental hygiene work roles in service

Rank	Topic	Q.D.	Important score	Mode
1	Friendly receptionist	0.0	4.95	5
2	Effective in scheduling appointments	0.0	4.89	5
3	Good consultant for dental treatment	0.0	4.78	5
4	Enthusiastic oral health promoter	0.5	4.73	5
5	Professional expanding treatment	0.5	4.57	5
6	Kindly dental care	0.5	4.52	5
7	Explanation for private expense	1.0	4.13	5

Table 2. Ranking of the importance of dental hygiene work roles in administration

Rank	Topic	Q.D.	Important score	Mode
1	Billing of the health insurance and keeping books on payment	0.5	4.14	4
2	Medical records management	0.5	4.11	5
3	Dealing with patient complaint	0.4	3.90	5
4	Administration of dental materials	1.0	3.81	4
5	Connection with dental laboratory	1.0	3.79	4
6	Handling of patients' infectious waste	1.0	3.78	3
7	Secretary	0.5	3.33	3
8	Cashier	0.5	3.32	3
9	Accountant	0.5	3.29	3
10	Planning activities	0.5	3.00	3

administration of dental materials, connection with dental laboratory, and handling of patients' infectious waste which reached the middle consensus, all the other topics reached a high consensus. Due to the issue of trust and traditional cultural values, one expert thought that the dentist's wife would be a better cashier than a dental hygienist in his clinic.

Roles and functions in the aspect of oral health promotion

Although there were only four topics in this area which reached consensus, the means of the important scores were over four, while the means of the modes were equal to four. Experts agreed that a dental hygienist could promote dental health. Oral health education was the most important topic in this section (Table 3). But the topic of oral examination did not reach a consensus. The experts believed that the dentist has to do the job of dental check-up.

Roles and functions in the aspect of technique

Seventeen topics reached consensus in this section. The topics were polarized into two groups. Four-or six-handed assisting, infection control, exposure and development of dental radiography, intraoral photography, and taking of impressions were appreciated and their modes were at five (Table 4). Experts agreed that seven topics should not belong to the scope of practice of a dental hygienist. These were the recementation of crown and bridgework, the placement of pit and fissure sealants, the measuring and recording of periodontal pocket depths, treatment planning, scaling and root planing, administration of block anaesthesia and administration of topical anaesthesia. The experts agreed that only dentists should carry out these functions.

Discussion

In most countries, the roles and functions of dental hygienist remain not only in dental clinics, but also in community health care and dental hygiene treatment (23). The hygienist assesses

Table 3. Ranking of importance of dental hygiene work roles in oral health promotion

Rank	Topic	Q.D.	Important score	Mode
1	Oral health educator	0.5	4.73	5
2	Oral health promoter	0.5	4.68	5
3	Instruction for post-operative care	0.4	4.66	5
4	Instruction in caring for denture	0.5	4.54	5

Table 4. Ranking of importance of dental hygiene work roles in technique

Rank	Topic	Q.D.	Important score	Mode
1	Four- or six-handed assisting	0.0	4.79	5
2	Infection control	0.0	4.71	5
3	Exposure and development of dental radiography	0.5	4.5	5
4	Intraoral photography	0.5	4.22	5
5	Taking of impression	0.5	4.16	5
6	Making temporary crown	1.0	3.57	4
7	Retraction of gingival	0.5	3.02	3
8	Administration of topical fluoridation	1.0	2.95	2
9	Deliver bracket system worker	1.0	2.27	2
10	Recementation of crown and bridgework	1.0	2.30	1
11	The placement of pit and fissure sealants	0.5	1.79	1
12	The measuring of periodontal pocket depths	0.5	1.62	1
13	Treatment planning	0.5	1.22	1
14	Scaling and root planing	0.9	1.17	1
15	Administration of block anaesthesia	0.5	1.08	1
16	Administration of topical anaesthesia	0.5	1.03	1

oral health conditions and develops a plan to manage oral diseases. Treatment is then provided. Preventing disease and promoting oral health through the presentation of scientific information on topics, such as fluoridation make this role crucial to the improvement and enhancement of oral health. The dental hygienist is the liaison between the community and the dental profession. In this role, the dental hygienist determines the appropriate programme or activity that will serve the needs of the community. Dental hygienists must also have knowledge and skills to work in legislation, public policy, research and science. As a consumer advocate, the dental hygienist represents individuals or large groups of consumers and informs them of quality services and products. As a researcher, the dental hygienist determines which methods of prevention work best for the people served by the profession. In both private office and in the public health area, the dental hygienist administers and manages programs.

When comparing the desired roles and functions of dental hygienists in Taiwan with the professional roles dental hygienists occupy in other countries, the study shows that experts thought that dental hygienists should be allowed much less responsibility within a much smaller scope of practice, which virtually excludes clinical care. Because of no rules or policies regulating the dental hygiene profession in Taiwan, some experts are worried that dental hygienists would become illegal

dentists. They were afraid this might infringe on the safety and the rights of patients.

In a survey of dental hygienists from the Netherlands, 80% of the respondents reported that the patients, especially those with advanced periodontal diseases, were treated under their care (3). In the present study, the experts believed that the dental hygienist have to assist the dentist and that they should not work independently during treatment procedures (Table 4). This is most likely the reason why graduates from dental hygiene school rarely worked at dental clinics. There are still a lot of areas to be developed for dental hygienists to apply their skills to benefit patients in Taiwan. The boundary of dental hygiene works needs to be built and the license of dental hygiene needs to be pushed to get more people taking part in dental hygiene. Authors suggest that the government could make some rules as quickly as possible for legalizing dental hygiene works.

A study among Swedish dental hygienists about work commitment shows that the work is regulated in way to make the job more attractive. Workplace benefits such as peer recognition of their professional qualifications, quality of clinical processes and time for reading research articles and participation in projects strengthened their commitment to their work. Furthermore, they are granted more than 10 sick days annually (24). It is important to identify the scope of practice for dental hygienists to specify their work roles in contrast to those of the other dental staffs. Because of limited time and resources, the authors were unable to specify further the roles of dental hygienists in comparison with other dental staffs. This study only outlines the present problematic situation for dental hygienists in Taiwan. Further studies need to explore which kind of legislation might appease the concerns of the experts and protect the rights of dental hygienists to apply their expertise.

Other studies show that companies of oral health products seek out the expertise of dental hygienists (25). Motivating, educating, assisting patients and communicating with people were the most enjoyable aspects of practice reported by dental hygienists in South Africa (26). In public health, the role of the dental hygienist is varied. The potential scope for dental hygienists in Australia is examined in the light of broader issues related to changes in disease patterns, service deliveries and the treatment of patients with special needs. Prevention and treatment of oral diseases by the dental hygienist in schools, institutions, nursing houses, hospitals and residential facilities are discussed with emphasis on such issues as legislation, productivity and quality assurance. Implications for future training of dental hygienists are presented and recommendations are made for increasing their utilization in the public health (1). Only

4.6% of the Iowa dental hygienists routinely asked their patients about tobacco use. Thirteen per cent routinely encouraged smokers to stop and 20% routinely advised smokeless tobacco users to stop (27). A dental hygienist visits and offers oral care and rehabilitation to home patients as part of the care plan with home care nurses (28, 29). In Table 3, the importance score of each category reaches a high consensus in the aspect of oral health promotion. In Taiwan, dental hygienists have the potential to develop their career in the community health care field and engage in the healthy community building strategy.

Dental hygienists' cooperation with the other members of the dental team and their free entry under the conditions set by the government and the insurance companies are major concerns (30). In Taiwan, almost all dental clinics belong to dentists. The dentist is the manager. Some administrative works are carried out by the dentist's wife. It is not surprising that the experts thought the roles of dental hygienist were deviated to general affairs in the aspect of administration (Table 2).

In the future of oral health and dentistry, the dental and the dental hygiene profession will continue to serve patients in a collaborative team approach (31). The authors suggest the dental hygiene schools hold more meetings for dentists and dental clinic staff to exchange their ideas. Graduates from dental hygiene schools should be encouraged to engage in clinical work and conditions should be created to make this career path more rewarding.

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