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Application of the Dental Hygiene Human Needs Conceptual Model and the Oral Health-Related Quality of Life Model to the dental hygiene curriculum in Japan

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Abstract: This paper reports the incorporation of the Dental Hygiene Human Needs Conceptual Model (DHHN) and the Oral Health-Related Quality of Life Model (OHRQL) into a dental hygiene curriculum in Japan. A simulated patient practice was offered to 67 dental hygiene students. In the practice activity, all students were introduced to the use of an OHRQL assessment tool. A DHHN assessment tool was utilized additionally only by the experimental student group. The statistical analysis of the post-practice survey showed that the OHRQL instrument was more helpful in assessment and problem identification than the DHHN instrument. By contrast, text-based analysis of dental hygiene diagnostic statements showed that the experimental group identified more domains of patients' human needs deficits than the control group. This suggested the possibility that the DHHN model helped them to see patients from broader perspectives. However, it was difficult for students to design care plans attending to the domains of the models. Also, in considerations to the cultural issues, the validity and equivalence of the Japanese versions of both models should be further investigated. Within the limitation of the present study, the results suggested that incorporation of the combination of the DHHN and OHRQL models can be useful in a dental hygiene curriculum, as each tool helps students expand the perspective from which they view client. Further improvements in learning strategies should facilitate the effective utilization of these models.

Key words: dental hygiene education; dental hygiene process; dental hygienists; human needs conceptual model; oral health-related quality of life model

Introduction

Today's dental hygienists are challenged to provide comprehensive and client-centred care. As dental hygiene education programmes in Japan are rapidly shifting up to 3- or 4-year curricula (1), educators are also challenged to teach students clinical and scientific theory in a manner dedicated to the identification of conditions relevant to today's dental hygiene practice.

In North America, the current practice of dental hygiene is focused on the dental hygiene process of care, which is a conceptual framework of five interacting components: assessment, dental hygiene diagnosis, planning, implementation and evaluation (2, 3). The dental hygiene process is one of the competencies for entry into the profession of dental hygiene recognized by the American Dental Education Association (ADEA) (4).

In Japan, clinically successful dental hygienists have been providing client care within frameworks similar to the dental hygiene process. However, systematic education on the process has not been offered previously. When the first 3-year dental hygiene curriculum in Japan was established at Miyagi Advanced Dental Hygienist College in 2001, faculty incorporated the formal instruction of the dental hygiene process of care into the new curriculum (5, 6). As theory-based models have the potential to provide practitioners, educators, students and researchers with a framework for examining the complex relationships between health and disease (7), it is important to introduce dental hygiene theories and models in Japanese dental hygiene education. International faculty development collaboration with the Vancouver Community College, Dental Hygiene Program made it possible for us to introduce dental hygiene theories and models for the purpose of giving students a biopsychosocial perspective on dental hygiene care.

The Oral Health-Related Quality of Life Model (OHRQL) provides a framework for examining the complex interrelationship between health and disease, and its biological, psychological and social consequences (7, 8). The OHRQL Model for Dental Hygiene (7) extends the biomedical perspective to include the patient-centred health-related quality of life domains of symptom status, functional status and oral health perceptions (8).

The Dental Hygiene Human Needs Conceptual Model (DHHN) provides a framework for identifying and understanding the unique needs of the client that can be met through dental hygiene care (9). The DHHN model is based on Maslow's Human Need Theory (10) and Nursing's Human Need Theory (11), and provides a philosophical and pragmatic orientation for the unique practice of dental hygiene. The model includes eight human needs related to oral health and disease (9).

Although these models have been providing dental hygienists with frameworks for decision making and problem solving, their educational relevance across cultures remains to be determined.

The aim of the present study was to present an evaluation of the application of the OHRQL and DHHN models into a dental hygiene curriculum in Japan.

Study population and methods

Faculty development and the Japanese version of the instruments

As a preinstruction faculty development, three faculty members of Miyagi Advanced Dental Hygienist College attended the international faculty collaboration panels at the Vancouver Community College, Dental Hygiene Program, in September 2004 and 2005. They received instructions and exchanged opinions on the use of the dental hygiene models within a dental hygiene curriculum. Subsequent faculty learning sessions using reference textbooks and scientific papers provided opportunities to enhance all faculty understanding of these models.

Permission for the use of the OHRQL model (8) was obtained from Ms Keselyak, University of Missouri-Kansas City School of Dentistry, Division of Dental Hygiene. A Japanese version of the OHRQL instrument was developed and used by all students in the inquiry (Table 1). It was based on the instrument proposed by Gadbury-Amyot *et al.* (12), which was designed specifically to assess the domains of symptom status, functional status and oral-health perceptions. The DHHN assessment tool was adapted from a tool used at Vancouver Community College, Dental Hygiene Program.

The translation process involved the forward translation of the DHHN (9) and OHRQL instruments. One dentist and one dental hygiene faculty, fluent in both Japanese and English revised the translation. For the OHRQL model, the Japanese version of the Oral Health Impact Profile (OHIP) (13) was used as a guide for translation, as some of the wording in the questionnaire is similar to the OHRQL instrument (12). A panel of four dental hygiene faculty members completed a copy of the translated questionnaire to identify any errors or potential language difficulties.

Table 1. **Questions in the Oral Health-Related Quality of Life Model instrument (the Japanese version re-translated in English)**

Pain	1 Do you have any pain or discomfort with your teeth? 2 Do you have any pain or discomfort with your gum? 3 Do you have any sore spots in the mouth? 4 Do you have a sore jaw? 5 Do you have a headache due to mouth or jaws?
Dry mouth	1 Is your mouth dry, or your amount of saliva too little? 2 Do you have difficulty swallowing foods? 3 Do you need to sip fluids to aid in swallowing?
Eating/chewing function	1 Do you feel uncomfortable eating some foods because of problems with your teeth, dentures, or mouth? 2 Do your teeth, dentures, or mouth interfere with your ability to eat or chew?
Speech function	1 Do your teeth, dentures, or mouth interfere with your ability to speak? 2 Do others misunderstand your words?
Social function	Because of problems with your teeth, dentures, or mouth, 1 Do you avoid smiling? 2 Are you unable to enjoy leisure activities? 3 Are you unable to enjoy other's company? 4 Are you communicating less with others?
Psychological function	Because of problems with your teeth, dentures, or mouth, 1 Do you feel embarrassed? 2 Do you feel your appearance is negatively affected? 3 Do you feel depressed? 4 Do you find it difficult to relax?
Health perceptions	Compared with others your age, 1 How do you rate your general health? 2 How do you rate the condition of your mouth, teeth, or dentures?

Study population and simulated patient practice

A simulated patient practice was introduced to 67 second year students of Miyagi Advanced Dental Hygienist College in September, 2005. Prior to the practice, they had taken a 'Dental Hygiene Process of Care' course (5) which included topics relating to dental hygiene models, such as the DHHN and OHRQL.

The general instructional objective of the practice activity was to learn the basic knowledge, skills and attitudes for dental hygiene actions that focus on individual client needs. Specific behavioural objectives were set for each stage in the practice activity to make the objective clear to the students.

Simulated patients in this clinical practice were not the standardized patients. They were comprised mainly of students' family members, relatives and friends. A total of 67 patients volunteered for the practice, and one patient was randomly assigned to each student. However, care was taken to avoid assigning patients who had any relationship with the students to prevent unintentional bias. Written informed consent regarding the use of data for educational and research purposes was obtained from patients and students. The purpose and methodology of this study was approved by the institutional ethics committee.

The concept of dental hygiene process of care provided the framework for the clinical practice session. Students were randomly divided into experimental ($n = 34$) and control ($n = 33$) groups. All the students assessed the systemic conditions including physical, medical and pharmacological findings. They also assessed periodontal and oral hygiene status. As a part of biopsychosocial assessment, they utilized the OHRQL instrument.

Only the experimental group utilized both the DHHN and the OHRQL models. The DHHN assessment tool with a checklist of signs and symptoms for each of the eight human needs deficits was used to assist in assessment. Although all the students had learned basics of DHHN and OHRQL models in the Dental Hygiene Process of Care course, no students had any prior experiences of using the assessment tools based on these models in clinical settings.

As this was a 1-day practice session, students developed limited care plans on site. After the care plans were reviewed by instructors, the students implemented dental hygiene interventions consisted mainly of basic oral hygiene instructions and scaling. The results of the implemented care were then evaluated by students and instructors.

Following the simulated patient practice, the two groups of students thoroughly interpreted and analysed the assessment data obtained from their patients during the practice, formulated dental hygiene diagnoses, and developed full dental hygiene care plans on the worksheets.

Evaluation of the process of care

Students' process of care worksheets were evaluated by the instructors using an evaluation sheet with the rating scale (Table 2).

The dental hygiene process model (2) was used for the formulation of dental hygiene diagnosis. 'Problems' in diagnostic statements were also examined using text-based approaches to analysis by two instructors and categorized according to eight

Table 2. **The Dental Hygiene Process of Care evaluation sheet (scoring made by the rating scale: 2 = very well, 1 = fair, 0 = poor)**

Steps	Items
Assessment	1 All the necessary data collected
	2 Subjective data and objective data differentiated properly
	3 Information collection and information processing differentiated properly
	4 Interpretation and analysis of data done appropriately
Dental Hygiene Diagnosis	5 The 'Problem' connected to 'Etiology' by the term 'related to'
	6 Diagnosis formulated within the scope of practice of dental hygiene
	7 Diagnosis formulated based on the assessment data
	8 Two parts of the diagnosis do not mean the same thing and in correct order
	9 Diagnosis expressed in terms that can be changed by dental hygiene interventions
	10 Diagnosis written in legally advisable terms and without value judgments
Planning	
Dates and priorities	11 Planning date recorded
	12 Priorities properly set
Goals	13 Goals describe the overall reason for care
	14 Goals specifically expressed
	15 At least one goal set for a dental hygiene diagnostic statement
Dental hygiene interventions	16 Interventions aimed at the etiology
	17 Interventions designed for dental hygienists
	18 Interventions specifically expressed
Expected outcomes	19 Outcomes can be achieved by dental hygiene interventions
	20 The subject is client or part of the client
	21 Specifically expressed and can be objectively measured
	22 Realistic
	23 Time frame properly set

human needs deficits in the DHHN model. The two instructors are responsible for the lectures of the 'Dental Hygiene Process of Care' course.

Post-practice survey

Students evaluated the use of the models by a post-practice survey. Three questions with the rating scale of 1–4 were included to evaluate their experiences with the model utilization. The experimental group evaluated the use of both the OHRQL and the DHHN models. The control group only evaluated the use of the OHRQL model.

For statistical analyses, a software package (InStat version 3.05 for Windows; GraphPad Software, San Diego, CA, USA) was used.

Results

Evaluation of the process of care worksheets

When total scores from assessment to planning phases of students' process of care worksheets were compared, there was no statistically significant difference between the experimental and control groups ($P = 0.5225$, n.s. by Mann–Whitney U-test, data not shown).

Evaluation of dental hygiene diagnostic statements

The most prevalent human needs identified by both experimental and control groups as assessed by their diagnostic statements were 'Skin and Mucous Membrane Integrity of the Head and Neck' and 'Responsibility for Oral Health'. These comprised 67% and 84% of the statements of the experimental and control groups respectively.

The 'problems' in the diagnostic statements by the experimental group were judged to cover seven out of the eight human needs, whereas those by the control group covered only five (Table 3).

Post-practice survey

For Question 1, the percentage of students in the experimental group who answered 'Agree' or 'Strongly Agree' was statis-

Table 3. **The categorization of the students' dental hygiene diagnostic statements by Dental Hygiene Human Needs Conceptual Model**

	No. of statements	
Human needs (HN)	Experimental	Control
HN1 Wholesome facial image	2	0
HN2 Protection from health risks	0	0
HN3 Biologically sound and functional dentition	14	7
HN4 Skin and mucous membrane integrity of the head and neck	32	26
HN5 Freedom from head and neck pain	4	3
HN6 Freedom from anxiety and stress	2	0
HN7 Responsibility for oral health	21	31
HN8 Conceptualization and understanding	2	1

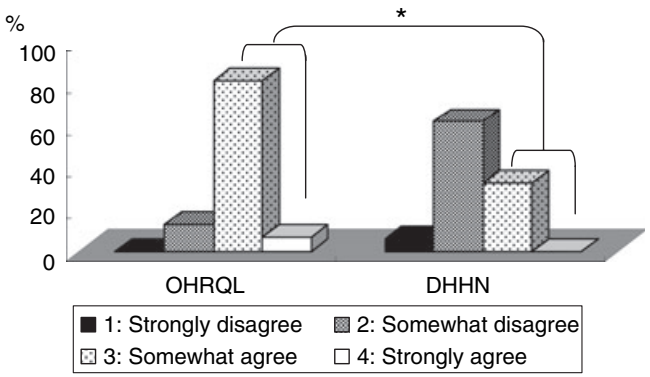

Fig. 1. Post-practice survey of the experimental group ($n = 34$). Q1: Was the instrument helpful in the assessment process? *$P < 0.01$, chi-squared test with Yate's continuity correction.

tically significantly greater for the OHRQL use than for the DHHN use ($P < 0.01$ by chi-squared test), suggesting that the OHRQL instrument was more helpful in the assessment (Fig. 1). For Question 2, a similar result was observed, indicating that the OHRQL instrument was more helpful ($P < 0.01$) in identifying problems or needs of the client (Fig. 2). When compared with Questions 1 or 2, the percentage of students in the experimental group who answered 'Agree' or 'Strongly Agree' was relatively low for Question 3. No statistically significant association was noted between the OHRQL and DHHN use ($P = 0.055$) (Fig. 3).

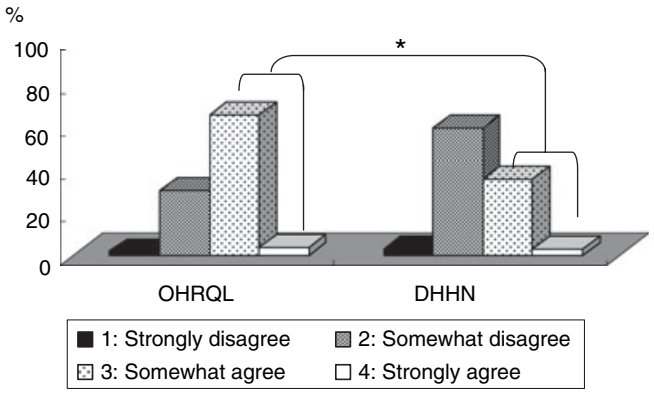

Fig. 2. Post-practice survey of the experimental group ($n = 34$). Q2: Was the instrument helpful in identifying problems or needs of the client? *$P < 0.01$, chi-squared test with Yate's continuity correction.

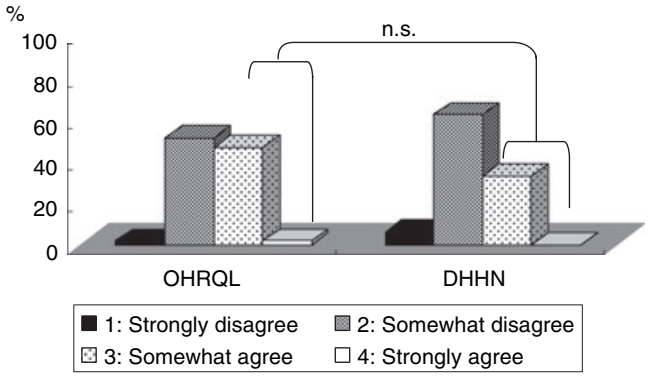

Fig. 3. Post-practice survey of the experimental group ($n = 34$). Q3: Was it possible to design a dental hygiene care plan attending to the domains of the model? n.s.: $P = 0.055$, chi-squared test with Yate's continuity correction.

Regarding the OHRQL use, results of the control group were similar to those of the experimental group.

Discussion

In the present study, no statistically significant difference in the total scores of the process of care worksheets was observed between the experimental and the control groups. The experimental group, however, identified more domains of DHHN as judged by the faculty analysis of students' dental hygiene diagnostic statements (Table 3). This may suggest that the DHHN instrument helped students to see clients from broader perspectives. In the clinical practice activity, it was not possible to assign the same patients to both experimental and control groups because of the ethical and curricular reasons. Thus, it is possible that patients of the experimental groups simply had human needs deficits that were attributed to more domains of the model. In a future study, an effort should be made to compare the same variables.

According to the post-practice survey, most of the comments on the use of the OHRQL instrument were favourable. In the assessment, especially information collection phase, students of the experimental group felt that the OHRQL instrument was more helpful than the DHHN instrument as shown by the post-practice survey (Fig. 1). They also indicated that the OHRQL instrument helped them identifying the patients' problems or needs within the scope of dental hygiene practice (Fig. 2). These findings were consistent with the study by Keselyak and Gadbury-Amyot (8), which reported that the areas most affected by incorporation of the OHRQL model into the curriculum were patient interviewing, data collection, dental hygiene care plans and goal setting.

One of the common themes identified from the comments in the post-practice survey was that it was difficult for the students to fully understand the domains of the DHHN because of the unfamiliar wording of some domains. Although they had already been exposed to basic knowledge on the model in lectures, its concept may not have been fully understood. Instruments need to be developed that are relevant and meaningful for people from many cultures and language, and for those instruments to be useful, appropriate procedures

need to be followed in their development and testing (14). The original DHHN model seems to meet the guidelines (14) for developing new instruments that may be later translated. However, validity for each domain of the Japanese version of instrument should be further investigated.

Another theme was that the students were confused by the use of both models during the practice session. Each model has elements that are similar, as both models are based on the biopsychosocial approach (7, 9). Introduction of these models was fairly recent in our curriculum, hence its implementation in practice and teaching is still in the incipient stage. In a study of Japanese undergraduate nursing education (15), it has been shown that most schools are using more than one nursing theory, and advantages and disadvantages of introducing multiple theories into a curriculum have been discussed. It concluded that whether a single theory should be utilized or not needs to be determined by further studies. Another study (16) identified a need for the development and use of many theories for nursing and argued that there is a logical need for a 'meta-model' which will guide the use of multiple theories. The results of the present study suggested a need for improvement of learning strategies in introducing multiple dental hygiene theories into undergraduate dental hygiene education.

In our view, the DHHN assessment tool can be better utilized as an information processing tool used after the practice sessions, rather than as an information collection tool used during the practice sessions. It gives 'dental hygiene perspective' in information processing that leads to the formulation of dental hygiene diagnoses within the process of care.

Darby and Walsh introduced the use of DHHN model as a framework not only in assessment and diagnosis, but also in care planning, implementation and evaluation phases of the dental hygiene process (9). The results of the present study suggest the use of DHHN model as an evaluation tool for the educators. By using this model, it was possible for our faculty to evaluate how broadly students tried to assess and identify their patients' human needs. Instructors were then able to effectively assist students develop their perspectives on unfamiliar domains. This type of educational approach should assist students develop attitudes toward client-centred, humanistic and holistic care.

Approximately half of the students felt that they could not quite design the care plan attending to the domains of the models (Fig. 3). One reason for this may be that the second year students did not have enough clinical experiences at this stage, so their knowledge on repertoire of dental hygiene interventions was limited. Therefore, careful evaluation of the effects of the model utilization on students' full care plans, and instructions regarding specific intervention options and goal-settings for each domain of the model are needed in future.

The students also realized that the use of the models gave clients an opportunity to reflect on their conditions and express their desires to the students. Faculty felt that the model utilization facilitated a dialogue between students and clients. Keselyak *et al.* (8) reported that the greatest impact of the model to be improved communication skills and enhanced student–patient rapport. The results of the present study also confirmed this educational effect. This is an added advantage to introducing students to biopsychosocial paradigm. There was, however, also a concern raised about the privacy with the OHRQL instrument use. Even though all the simulated patients participated in the present practice activity understood the objectives of the practice and fully cooperated, some students indicated that clients may feel uncomfortable in answering personal questions in real clinical settings.

Moreover, in some cases, the students and instructors found that the OHRQL expressed by clients were much different from those speculated from their signs and symptoms. In addition to the general difficulty in assessing OHRQL, there may be cultural issues with the use of this OHRQL instrument. It has been shown that the way East Asians think and perceive themselves is different from Westerners (17). Disclosure of health-related information may be more acceptable in some cultures, but participants in other cultures may be hesitant to disclose the information (18). Although the OHRQL model is thought to provide an appropriate framework for the integration of cultural and linguistic competence (7), use of any instruments beyond the samples with which they were initially tested presents considerable challenges (18, 19). Therefore, the validity and conceptual equivalence of the Japanese instrument must be further tested.

Theoretical models define the practice of a profession according to a specific perspective. The models function as frameworks upon which a discipline can build a body of knowledge, which ultimately defines the professional standards and processes of care unique to the discipline (3, 20, 21). The DHHN and OHRQL models share a common goal: to describe a process of care that is unique and distinct for dental hygiene (22). It is necessary for dental hygiene to test models of dental hygiene practice informed by different theories (23), and introduction of dental hygiene models into a curriculum is an important step forward in this direction.

In the present investigation, the study population was relatively small, but still significant results were demonstrated with

the careful use of the statistical methods (i.e. use of the non-parametric procedures). However, it would be of interest to study the use of these models in a larger study population.

Within the limitation of the present study, the results suggest that incorporation of the DHHN and OHRQL models can be a useful part of a dental hygiene curriculum, as each model helps students expand the perspective from which they view clients. The validity and equivalence of the Japanese versions of both instruments should be further tested in terms of the cultural context. Also improvements in learning strategies are needed to facilitate the effective utilization of these models.

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