Determinants for Dental Visit Behavior among Hong Kong Chinese in a Longitudinal Study

Edward C. M. Lo, BDS, MDS, PhD; Eli Schwarz, DDS, MPH, PhD

Abstract

Objectives: *The aim of this research was to study the major determinants for dental services utilization among middle-aged Hong Kong Chinese in a longitudinal study using an expanded Andersen and Newman model as the theoretical framework.* ***Methods:*** *A random sample of 372 middle-aged Hong Kong Chinese were interviewed and clinically examined in an oral health survey. The findings were explained to the subjects and they were advised to seek care from their own dentist as appropriate.* ***Results:*** *A total of 322 subjects were interviewed over the telephone after 12 months. About half had visited a dentist within the study period. Results of the bivariate analysis showed that proportionally more subjects who had dental benefit coverage, had prevention-oriented attitudes, were regular users of dental services, had received counseling from a dentist, or had more filled teeth at the baseline examination had visited a dentist within the study period. Logistic regression analysis produced a final model consisting of seven factors and three interaction terms that was able to classify 68 percent of the subjects into the correct user category.* ***Conclusion:*** *The expanded Andersen and Newman model was useful as a theoretical framework in studying the dental services utilization behaviors of the Hong Kong adults. [J Public Health Dent 1998;58(3):220-7]*

Key Words: dental services utilization, dental care, Chinese.

It is well established that early diagnosis and appropriate treatment, including preventive and curative measures, can prevent dental diseases from reaching a stage where pain or other symptoms would force a person to seek professional dental care (1) and that adopting a habit of visiting a dentist regularly is one of the common messages in oral health education. However, the dental visit behavior of many people is far from what dental professionals would think desirable. Many studies on people's dental services utilization behaviors have been done, but these were conducted mainly in Western industrialized countries (2,3). Results from previous studies showed that utilization of dental services among Hong Kong adults was low and dental visits were mainly for the relief of acute symptoms or for specific treatments (4). In the latest survey conducted in 1991, 43 percent of the 35–44-year-old Hong Kong adults had visited a dentist within a year and only 23 percent were regular users (5), whereas in the Western industrialized countries a majority of adults would have visited a dentist within a year and a high proportion of them would be regular users (3,6,7).

Most of the published studies on dental services utilization are cross-sectional surveys using questionnaires or interviews (2). A major problem with these studies is that the researchers used information collected at the time of the survey to explain dental visit behaviors that occurred prior to the survey. As pointed out by Davies et al. (8), the underlying hypothesis of most theoretical models is that utilization behavior is influenced by a person's background conditions, need, and intervening factors that exist prior to the behavior. However, it is extremely difficult, if not impossible, to get this temporal relationship right in a cross-sectional survey. Some of the explanatory variables used in the theoretical models, especially the perceived and normative need factors, will change after a person receives dental treatment; thus, it will be invalid to use information about these factors collected at the time of the survey to explain prior dental visit behaviors.

One of the most popular theoretical models used in dental services utilization studies is the one developed by Andersen and Newman (9). This model has been shown by many researchers to be useful (10-12). In essence, this model states that a person's health services utilization is influenced by the person's individual determinants, which also are affected by societal determinants and the health services system. The individual determinants can further be grouped into predisposing, enabling, and need factors. The original model developed by Andersen and Newman did not include health behavior factors. However, results of some recent studies showed that utilization of dental services, especially for preventive reasons, was related to people's oral hygiene habits (13-15) and past dental visit behaviors (16,17). Thus, better explanatory power can be obtained if the model is expanded to include a group of dental health behavior factors.

Taking into consideration the issues mentioned above, a longitudinal prospective study was designed to identify the major determinants for dental services utilization among middle-aged Hong Kong Chinese. The main objectives of the study were to describe the influence of various dental and psychosocial factors on the dental visit behaviors of the study subjects using the Andersen and Newman

Send correspondence and reprint requests to Dr. Lo, Faculty of Dentistry, University of Hong Kong, 34 Hospital Road, Hong Kong. E-mail: hrdplcm@hkucc.hku.hk. Dr Schwarz is also affiliated with the Faculty of Dentistry, UIniversity of Hong Kong. This study was financially supported by the University of Hong Kong. A preliminary report was presented at International Association for Dental Research general meeting in Seattle in 1994. Manuscript received: 10/21/97; returned to authors for revision: 3/10/98; accepted for publication: 9/10/98.

model as the main theoretical framework, and to build a multivariate model to predict the study subjects' dental visit behaviors within the study period using information collected at baseline.

Methods

Sampling and Study Design. The sample population of this study was the 35–44-year-old Chinese subjects who participated in an oral health survey conducted in Hong Kong in 1991. The details of the sampling and subject recruitment procedures have been published (18). Two districts located in Hong Kong Island were selected to be the survey area. A random sample of 576 household addresses in the area was obtained from the government Census and Statistics Department. Home visitors were sent to visit the sampled households to introduce the survey and to invite all 35–44-year-old residents to participate. The household next to the one sampled was approached as a substitute if the household could not be contacted after repeated trials, if no household members were in the age group, or if the eligible members refused to participate. A total of 1,191 households with at least one 35–44-year-old member were approached. An appointment was given to all the eligible household members who agreed to participate, 616 in number. However, only 372 persons turned up at the survey venue. The survey was carried out either in the Prince Philip Dental Hospital or in a community hall near where the subjects lived. When the subjects presented at the survey site, they underwent a structured interview by trained interviewers and a clinical examination by calibrated examiners. After the survey the subjects were assigned to either group 1 or 2 depending on the day they came for the survey.

After the clinical examination, the findings were explained to the group 1 subjects individually by an experienced dentist. The subjects were advised to visit their own dentist for treatments. They also received a written examination result summary sheet and a telephone reminder after six months. The clinical findings of the group 2 subjects were explained to them individually by a final year dental student. The messages given to these subjects were basically the same as those given to the group 1 subjects, except that no written examination result summary sheet and no telephone reminders were given.

A follow-up telephone survey was conducted with all subjects 12 months after the baseline survey. The telephone interviews were conducted by two dental surgery assistants who had received training in interviewing technique. A structured questionnaire was used. Subjects were asked if they had visited a dentist in the past 12 months and, if they had, the time of the visit and the type of treatment received. Those subjects who had not visited a dentist were asked to give their reasons for not doing so. Repeated telephone calls were made at different times of the day and on different days of a week if a subject could not be contacted. Out of the 372 subjects, 322 were interviewed.

Baseline Data. In the baseline survey, dental surgery assistants were recruited as interviewers and training in interviewing technique was provided. A structured questionnaire that had undergone a few rounds of pretesting and amendments before its adoption was used in the interviews. The Andersen and Newman model, expanded to include a group of oral health behavioral factors, was chosen to be the main analytical framework for this study (Figure 1). The predisposing factors measured included sex and education level of the subject. A dental knowledge score was computed for each subject from their answers to two questions on tooth decay and two questions on gum disease (19). Dental anxiety was measured by the four standard questions of Corah's Dental Anxiety Score (20). Dental attitudes were measured by a method developed by Kiyak (10), which was based on the theory of reasoned action (21). According to this theory, an attitude is composed of two dimensions—beliefs and the subject's evaluation of the beliefs. Two separate sets of questions were used to measure attitudes, one set to elucidate beliefs and another set of corresponding questions to elucidate the subject's perceived importance of the beliefs. The subject's belief in traditional Chinese medicine and dental care-seeking attitudes also were measured (22).

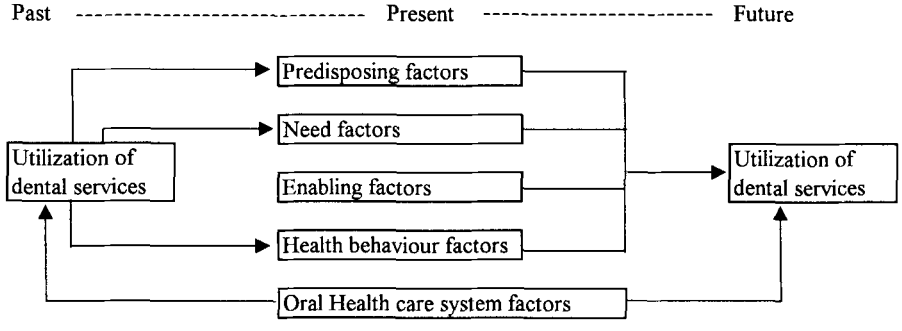
The enabling factors included the subjects' monthly household income, whether they were covered by dental insurance or other dental benefit programs, and their material wealth as measured by the Family Material Possession Index (18).

During the interview, subjects were asked to describe their perceived dental condition using a five-point, Likert-type scale. Their perceived need for treatment was a dichotomous variable determined by the subject's response to the question "Do you think you need any dental treatment at present?" If the answer to the above question was "yes," the subject was asked to list all the treatments they thought they needed.

Dental health behavior factors measured in this study included the subjects' toothbrushing habits, use of interdental cleansing aids, time lapsed since their last dental visit and regularity of dental visits.

After the interview, the subjects were clinically examined by calibrated examiners. The procedures, instruments and diagnostic criteria used basically followed those recommended by the World Health Organization (23). The teeth of the subjects were not

FIGURE 1
Temporal Relationship Between Dental Services Utilization in the Past and Future, and Various Influencing Factors



cleaned or dried before the examination; however, food debris obscuring the inspection of teeth and gums was removed by a probe. No radiographs were taken. The conditions recorded included the number of decayed, missing, and filled teeth; periodontal status; and normative need for various treatments.

Data Analysis. Data collected in the baseline and follow-up surveys were analyzed by the software SPSS. Data analysis began with the tabulation of results from the follow-up survey. Then the study subjects were classified into two groups: those who had visited a dentist within the study period and those who had not. Bivariate analyses were performed using dental visit as the dependent variable and the independent variables were the predisposing, enabling, need, and behavioral variables described above and the counselor (Table 1). Chi-square tests and T-tests were used to test for the statistical significance of the relationships. A *P*-value smaller than .05 was regarded as statistically significant.

A multivariate analysis was used to assess the relative importance of the independent variables and to identify the main variables influencing the use of dental services within the study period. A logistic regression analysis was chosen and the dependent variable was use of dental services within the study period (1=yes; 0=no). The removal or entry of variables was based on the significance level of the Wald statistic at the level of .05. The analysis was performed in three stages. In the first stage, all 33 independent variables were used except perceived need for any treatment and DMFT because these two variables were simply the summation of other variables and were redundant in the model-building process. Due to missing cases in some variables—e.g., income and attitude—only 271 out of 322 possible cases were used in this stage. The main purpose of this stage of analysis was to identify variables that could be removed in the second stage of analysis and to examine if categories in some variables should be combined.

In the second stage of the multivariate analysis, the model included variables that were statistically significant in the first stage and those that had no missing cases. The reason for doing so was to allow as many cases as possible to be included and yet to retain all possibly significant independent variables in the logistic regression model-building process. In this stage, all 322 cases and 25 independent variables were used. After these two stages of analysis, a logistic regression model encompassing all available cases and the main effects of all independent variables was produced.

In the third stage, the effects of interactions between the remaining variables were considered. In this stage, variables remaining in the resultant model in the second stage were first entered into a logistic regression

TABLE 1.
List of Independent Factors Used in Study and Coding System

Variable	Categorization
Predisposing	
Sex	Man (1); woman (0)
Education	Primary; lower sec.; upper sec.; postsecondary
Dental knowledge score	0–12 (poor–good)
Dental anxiety score	4–20 (not afraid–phobic)
Dental attitude score	0–500 (poor–good)
Beliefs component	0–100 (weak–strong)
Importance	1–5 (not important–very important)
Chinese health beliefs	Weak; moderate; strong
Dental care-seeking attitude	Problem-oriented (1); prevention-oriented (0)
Enabling	
Household income	1–7 (low–high)
Family material possession (FMPI)	0–100 (poor–wealthy)
Access to dental program	Yes (1); no (0)
Need	
Perceived dental health condition	1–5 (good–poor)
Perceived need for treatment	Yes (1); no (0)
Perceived need for check-up	Yes (1); no (0)
Perceived need for prosthesis	Yes (1); no (0)
Perceived need for periodontal care	Yes (1); no (0)
Perceived need for fillings (FILLNEED)	Yes (1); no (0)
Perceived need for extraction	Yes (1); no (0)
Number of decayed teeth at baseline (DT)	—
Number of missing teeth at baseline (MT)	—
Number of filled teeth at baseline (FT)	—
Number of DMFT at baseline	—
Presence of deep periodonal pocket	Yes (1); no (0)
Normative need for fillings	Yes (1); no (0)
Normative need for extraction	Yes (1); no (0)
Normative need for prosthesis	Yes (1); no (0)
Number of teeth in need of treatment	—
Health behaviors	
Toothbrushing (BRUSH)	Once a day (0); twice or more a day (1)
Use of toothpick	Yes (1); no (0)
Use of dental floss	Yes (1); no (0)
Type of services user at baseline (USE)	Regular or recent user (1); irregular user (0)
Health care system	
Counselor (COUNSEL)	Dentist (1); dental student (0)

TABLE 2
Percent Distribution of Subjects According to Counselor Group and Whether They Had Visited Dentist or Not Within Study Period

Visit Dentist Within Study Period	Group 1 (n=158)	Group 2 (n=164)	Total (n=322)
Yes, within 3 mos. from baseline	22	18	20
Yes, 4–6 mos. from baseline	10	6	8
Yes, 7–9 mos. from baseline	14	12	13
Yes, 10–12 mos. from baseline	11	9	10
Yes (total)	57	45	51

TABLE 3
Reasons for Not Having Visited Dentist within Study Period (Multiple Response Analysis; n=158)

Reason for No Dental Visit	n	%
Nothing wrong	72	46
Too busy	57	36
Did not want to spend money on teeth	16	10
Dental problems were not serious	15	9
My teeth were good and thus no need	11	7
Afraid of or did not like dentist	10	6
Could not find a good dentist	6	4
Other reasons	5	3

TABLE 4
List of Independent Factors That Had Significant Influence on Subjects' Dental Visit Behavior within Study Period

		Dental Visit within Study Period		
Factors	n	Yes	No	P-value
Predisposing				
Care seeking				
Prevention-oriented	62	66%	34%	.008
Problem-oriented	254	47%	53%	
Mean dental attitude score				
Beliefs	302	76.1	76.5	ns
Importance	314	4.2	4.0	.028
Enabling factor: access to dental program				
Yes	44	66%	34%	.032
No	278	49%	51%	
Behavioral factors				
Toothbrushing				
Once/day	81	36%	64%	.002
Twice/more daily	241	56%	44%	
Type of user at baseline				
Regular/recent	147	63%	37%	<.001
Irregular	175	41%	59%	
Health care system (counselor)				
Dentist	158	57%	43%	.034
Dental student	164	45%	55%	
Need factor				
No. of filled teeth at baseline	322	3.9	2.3	<.001
No. of DMFT at baseline	322	9.3	7.6	.004

model, then all possible second-order interaction terms were entered. A backward stepwise selection process was employed to construct a final model. This process stopped when no more terms could be removed from or entered into the final model. Lastly, odds ratios and 95 percent confidence intervals were calculated for all variables remaining in the final logistic regression model under all relevant combinations (24).

Results

Among the 372 subjects surveyed at the baseline, 322 (87% of the original sample) were interviewed at the 12-month follow-up. The main reason for sample loss was that subjects had moved during the study period and could not be contacted.

About half of the study subjects had visited a dentist within 12 months from the baseline survey, more from group 1 than from group 2. When the study period was divided into four equal three-month intervals, we found that more dental visits took place in the first three months after the baseline survey than in the other periods (Table 2). Proportionally more subjects in group 1 than in group 2 had visited a dentist (P=.03). The majority of subjects who had visited a dentist during the study period (70%) went to a private dental clinic. The Prince Philip Dental Hospital was the next common choice (11%), followed by government dental clinics (6%) and organization dental clinics (5%). The other sources of dental care were not frequent.

The reasons given by the 158 subjects who had not visited a dentist are shown in Table 3. Each subject could give more than one reason; thus, the answers add up to more than 100 percent. The two main reasons were "no perceived problems" and "being too busy."

No statistically significant relationships were found between visiting a dentist within the study period and most of the factors studied. Those with a significant relationship are shown in Table 4. Among the predisposing factors, it was found that although the mean overall dental attitude scores and the dental belief component scores of the dental services users and nonusers were similar, there was a statistically significant difference in the importance component of their dental attitude scores. Subjects who had vis-

ited a dentist within the study period had a higher score, which indicated that the subjects' dental visit behavior was related to their perceived importance of dental health, but not to their general beliefs in the efficacy of dental health behaviors.

Whether the subjects had visited a dentist was not related to their monthly household income; however, proportionally more subjects who had access to a dental benefit program had made a dental visit during the study period. Furthermore, there were no statistically significant relationships between having made a dental visit within the study period and most of the subjects' need factors in the bivariate analysis. The differences in the mean number of decayed teeth and missing teeth at the baseline survey between the dental services users and nonusers were not statistically significant. However, the users had a higher mean number of filled teeth and a higher DMFT index at baseline.

Proportionally more subjects who brushed their teeth twice or more daily had visited a dentist within the study period than those who only brushed once a day. Also, a higher percent of regular or recent (within a year) dental users at baseline had visited a dentist within the study period.

Table 5 shows the final logistic regression model when both the main effects and interactions of the various factors are taken into account. Seven variables and three interaction terms remained in the final model. The amount of variation explained was 14 percent. The sensitivity of the model was 71 percent, the specificity was 64 percent and, overall, 68 percent of the subjects could be correctly classified by this model. The main effects of three variables—namely, number of decayed teeth (DT), toothbrushing habit (BRUSH), and type of dental service user (USE)—were statistically nonsignificant. This indicates that the effects of these three variables mainly acted through interactions with some other variables in the model.

The odds ratios of the variables remaining in the final model under different conditions are tabulated in Table 6 together with their 95 percent confidence intervals. If an odds ratio of one was included in the confidence interval, then the effect of the variable under that particular condition was not significant at the 5 percent level.

TABLE 5
Result of Logistic Regression Analysis on Having Made a Dental Visit within Study Period

Variable	Beta	SE	*P*-value
SEX	0.98	0.35	<.01
USE	–0.06	0.69	.93
BRUSH	0.93	0.50	.06
COUNSEL	1.51	0.53	<.01
FILLNEED	0.87	0.35	.01
FT	0.13	0.04	<.01
DT	–0.22	0.12	.06
SEX by USE	–1.13	0.52	.03
USE by BRUSH	1.48	0.68	.03
COUNSEL by BRUSH	–1.26	0.60	.04

Chi-square=15.4, df=3, $P<.01$, sensitivity=71%, specificity=64%, $R^2=0.14$.

TABLE 6
Odds Ratio of Variables Remaining in Final Logistic Regression Model Taking into Account Interactions Between Variables

Variable	Condition	Odds Ratio	95% CI
FILLNEED	—	2.40	1.20, 4.77
FT*	—	1.13	1.05, 1.23
DT*	—	0.80	1.64, 1.01
SEX	USE=0	2.68	1.34, 5.27
	USE=1	0.87	0.41, 1.85
COUNSEL	BRUSH=0	4.54	1.60, 12.8
	BRUSH=1	1.28	0.74, 2.24
USE	SEX=0, BRUSH=0	0.94	0.24, 3.67
	SEX=0, BRUSH=1	4.13	2.06, 8.25
	SEX=1, BRUSH=0	0.30	0.08, 1.09
	SEX=1, BRUSH=1	1.34	0.59, 3.03
BRUSH	COUNSEL=0, USE=0	2.54	0.95, 6.83
	COUNSEL=0, USE=1	11.15	2.92, 42.5
	COUNSEL=1, USE=0	0.72	0.30, 1.74
	COUNSEL=1, USE=1	3.15	0.94, 10.5

*For these continuous variables, the odds ratios refer to the effect of a unit change in the variable on the odds of use of dental services.

Due to interactions between the variables, the effects of the variables varied under different combinations of conditions. For each of the variables SEX, COUNSEL, USE, and BRUSH, the effect was statistically significant under one condition only. When controlling for the effects of other variables, men had a higher probability than women of having made a dental visit within the study period only if they were irregular users at baseline. Otherwise, the effect of being a man was not significant. The effect of the counselor was only significant for subjects who brushed their teeth once daily. The odds of having made a dental visit within the study period would increase 4.5 times if they had received counseling from the dentist instead of from the dental student. The effect of being a regular or recent dental services user at the baseline was significant only if the subject was a woman who brushed twice daily. Lastly, toothbrushing habit had a statistically significant effect on dental services utilization only for subjects who received

counseling from the dental student and who were also regular dental services users at baseline.

Discussion

The conduct of the present study and the data analysis followed a well-designed theoretical model. The expanded Andersen and Newman model was found to be useful and appropriate as at least one factor from each of the five groups—namely, predisposing, enabling, need, health behavior, and health care system factors—had a statistically significant effect on the dental visit behavior of the subjects within the study period. Even when confounding effects of the different variables were accounted for in the multivariate analysis, a similar finding was obtained.

Most of the published studies on dental services utilization were cross-sectional surveys using questionnaires or interviews. This study is one of the few using a longitudinal study design, which helps to overcome some of the major pitfalls of cross-sectional studies in the interpretation of results (8). Although it would be ideal not to exert any influence on the study subjects through their participation in the study and be able to observe their "natural" behaviors, this is not always possible. As it was considered unethical not to inform the subjects of their oral health status after they had undergone a clinical examination, this information was given to the subjects together with advice on the dental care they required. This information would probably influence the subjects' decisions to seek professional dental care.

In this research the study period was chosen to be 12 months because having at least one dental visit within a year is a common definition of dental services utilization (4). Although a longer time period for follow-up may be considered, some problems will arise. In this study it was assumed that the baseline information about a subject would not change within the study period and thus could be used to explain the subject's dental visit behavior. This assumption may not be valid if the study period was too long because the subject's economic status, perceived need, and oral health status could have changed. Another consideration is the high mobility of Hong Kong people who frequently move their homes for various reasons. The drop-out rate of the subjects could be quite high due to subject movement if the study period was too long. A drop-out rate of 11 percent after one year in this study is acceptable.

The 35–44-year-old age group was chosen as the study population because they are mature adults, are economically independent, and possess a wide range of dental problems and health care needs. None of the subjects in this study were assessed by dentists to be in an oral health condition that did not require any dental treatments (25). This treatment status was mainly because all of the subjects had at least some dental calculus and signs of gingival inflammation despite the finding that more than half of them claimed to brush their teeth at least twice daily. Subjects were informed of the findings and advised to seek appropriate dental care services. Half of them had visited a dentist within the study period—a utilization rate higher than in the year before the baseline survey, during which only 36 percent of the subjects had made a dental visit. This finding shows that having an oral examination and receiving advice from a counselor had a positive influence on the subjects' dental services utilization. However, self-selection bias among the study subjects may exist; i.e., the subjects may already have a higher tendency to visit a dentist during the study period than in the year prior to the baseline examination because they chose to participate in the survey. Thus, further studies are required to assess whether utilization of dental services among Hong Kong adults would increase if the dental profession were to provide an oral health screening and advice service or campaign.

In the bivariate analysis, only eight out of the 33 variables investigated had a statistically significant relationship with the subjects' use of dental services within the study period. This finding is consistent with past Hong Kong studies in which few variables were found to have a significant effect on utilization of dental services (4,5,26). Although most of the predisposing factors studied did not have a statistically significant influence on the subjects' utilization of dental services, having a prevention-oriented dental attitude and a higher perceived importance of dental care were found to have positive associations with dental services utilization. This relationship was also found in other studies (10,13-15). However, the practical implication of this finding for designing oral health promotion programs is limited because it is not easy to change people's dental attitudes.

Being covered by a dental benefit program was an important enabling factor in this study. This finding was in agreement with previous Hong Kong studies (26,27). At present only a small proportion of the large companies and institutions in Hong Kong provide dental benefits to their employees (27). This situation may partly explain why dental services utilization among Hong Kong adults was low compared to developed countries where dental programs are prevalent. There seems to be much room to improve the population's utilization of dental services by expanding dental third party payment schemes in Hong Kong.

This study was one of the few measuring the baseline treatment need of a sample population and then following the subjects longitudinally to find out the influences of these variables on dental services utilization. In this study, the subjects' use of dental services within the study period was found to be unrelated to most of their perceived treatment needs at the baseline except the perceived need for fillings. This finding is in agreement with another longitudinal study by Eddie in Scotland (28). From these results, it seems that having a perceived need for dental care is not sufficient to evoke a dental visit and many people visit a dentist without perceiving any specific treatment need, e.g., for a check-up or for preventive purposes.

Furthermore, no statistically significant associations were found between the subjects' dental visit behavior and their number of decayed teeth, number of missing teeth and various normative treatment needs found at the baseline examination. The low prevalences of the different kinds of normative treatment need, except scaling, in these study subjects (25) may partly account for this lack of relationship. The only baseline clinical finding that had a statistically significant association with the subjects' dental services utilization, which was positive, was their number of filled teeth. This finding is in agreement with the longitudinal study by Eddie

(28) and with a number of cross-sectional studies that found people who used dental services more often had more filled teeth (7,29,30). Subjects with many fillings were those who visited dentists frequently for restorative treatments. Thus, the number of filled teeth can be taken as an indicator for past dental services utilization. These subjects probably had few barriers against and a positive attitude toward utilizing dental services.

Results of this study showed that people tended to maintain their frequency of dental visits. Having made a dental visit within the study period was related to whether the subject was a regular or recent dental services user at the baseline. This finding is in agreement with many other studies (2,12,14,16,17). People's past dental services utilization behavior is probably one of the most important predictors of their future utilization behavior. Taking into account the lack of association between the subjects' dental services utilization and the need factors, it seems that once the subjects established a certain pattern of dental visit behavior, they would maintain that pattern irrespective of their oral health status and perceived need for treatments. Furthermore, it has been shown that the dental visit patterns of adults are positively related to their childhood dental visit behaviors (31,32). These findings provide important pieces of information for oral health educators and planners, for if they can facilitate and encourage children and adolescents to adopt a regular dental visit habit, then this habit will probably be maintained throughout adulthood.

This study was not specially designed to investigate the effect of counselor's communication skills on and ways to improve patient's compliance. Nevertheless, a higher utilization of dental services within the study period was found among subjects who were counseled by the dentist compared to subjects counseled by the dental student. Effect of the counselor was still significant when effects of other factors were controlled for in the logistic regression analysis. Since the two counselors followed the same guideline in giving advice, the different outcome was probably due to a difference in either the quality of the counseling process or attributes associated with the counselors. This finding was in agreement with many compliance studies in medicine that found that the character of the person giving advice and the doctor-patient interaction would affect patients' recall of messages and compliance (33,34). Thus, it is very important to have good counselors in oral health education activities that aim at influencing people's behavior. As the success of oral health education programs will depend to a large extent on the persons who carry out the activities, special attention should be paid to providing appropriate training.

Findings from this longitudinal study contribute to the understanding of the dental visit behaviors of Hong Kong adults; nevertheless, the inference of the results to other population groups in different oral health care settings has to be approached cautiously. The model developed by Andersen and Newman (9) and expanded to include a group of dental health behavior factors was found to be useful as a theoretical framework in studying the dental services utilization behaviors of the Hong Kong adults. In this study each group of factors had at least one variable that was found to have a statistically significant influence on the dental visit behaviors of the study subjects.

References

1. World Health Organization. Prevention methods and programs for oral diseases. Geneva: World Health Organization, 1984; Technical Report Series 713.
2. Gift HC. Utilization of professional dental services. In: Cohen LK, Bryant PS, eds. Social sciences and dentistry—a critical bibliography. Vol II. London: Quintessence, 1984:202-66.
3. Petersen PE, Holst D. Utilization of dental health services. In: Cohen LK, Gift HC, eds. Disease prevention and oral health promotion. Copenhagen: Munksgaard, 1995:342-86.
4. Lind OP, Evans RW, Corbet EF, Holmgren CJ, Lim LP, Mak K. Hong Kong survey of adult oral health. Part 2: Oral health related perceptions, knowledge and behavior. Community Dent Health 1987;4:351-66.
5. Schwarz E, Lo ECM. Use of dental services by the middle-aged and the elderly in Hong Kong. Community Dent Oral Epidemiol 1994;22:374-80.
6. Miller AJ, Brunelle JA, Carlos JP, Brown LJ, Löe H. Oral health of United States adults. Bethesda, MD: National Institute of Dental Research, US Department of Health and Human Services, 1987; NIH pub no 87-2868.
7. Todd JE, Lader D. Adult oral health 1988—United Kingdom. London: Her Majesty's Stationery Office, 1991.
8. Davies AR, Bailit HL, Holtby S. Oral health status in the United States: will improved health lead to decreased demand for dental services? J Dent Educ 1985;49:427-31.
9. Andersen R, Newman JF. Societal and individual determinants of medical care utilization in the United States. Milbank Mem Fund Q 1973;51:95-125.
10. Kiyak HA. Explaining patterns of dental service utilization among the elderly. J Dent Educ 1986;50:679-87.
11. Newman JF, Gift HC. Regular pattern of preventive dental services—a measure of access. Soc Sci Med 1992;35:997-1001.
12. Tennstedt SL, Brambilla DL, Jette AM, McGuire SM. Understanding dental service use by older adults: sociobehavioral factors vs need. J Public Health Dent 1994;54:211-19.
13. Ronis DL, Lang WP, Farghaly MM, Passow E. Toothbrushing, flossing, and preventive dental visits by Detroit-area residents in relation to demographic and socioeconomic factors. J Public Health Dent 1993;53:138-45.
14. Payne BJ, Locker D. Preventive oral health behaviors in a multi-cultural population: the North York Oral Health Promotion Survey. J Can Dent Assoc 1994;60:129-39.
15. Chen MS, Stone DB. Toothbrushing, flossing, and dental visits in relation to socioeconomic characteristics of white American families. Community Dent Oral Epidemiol 1983;11:325-32.
16. Grytten J. Supplier inducement—its relative effect on demand and utilization. Community Dent Oral Epidemiol 1992; 20:6-9.
17. Maizels J, Maizels A, Sheiham A. Dental disease and health behavior: the development of an interactional model. Community Dent Health 1991;8:311-21.
18. Schwarz E, Lo ECM, Corbet EF, Holmgren CJ, Lim LP, Davies WIR. The Hong Kong Adult Oral Health Survey—1991: background, study population and methods. Community Dent Oral Epidemiol 1994;22:351-7.
19. Schwarz E, Lo ECM. Dental health knowledge and attitudes among the middle-aged and the elderly in Hong Kong. Community Dent Oral Epidemiol 1994;22:358-63.
20. Corah NL. Development of a dental anxiety scale. J Dent Res 1969;48:596.
21. Ajzen I, Fishbein M. Understanding attitudes and predicting social behavior. Englewood Cliffs, NJ: Prentice-Hall, 1980.
22. Lim LP, Schwarz E, Lo ECM. Chinese health beliefs and oral health practices among the middle-aged and the elderly in Hong Kong. Community Dent Oral Epidemiol 1994;22:364-8.
23. World Health Organization. Oral health surveys; basic methods. 3rd ed. Geneva: World Health Organization, 1987.
24. Hosmer DW, Lemeshow S. Applied logistic regression. New York: John Wiley & Sons, 1989.
25. Lo ECM, Corbet EF, Holmgren CJ. Oral health care needs among the middle-aged and the elderly in Hong Kong. Community Dent Oral Epidemiol 1994;22:403-7.

26. Mak KKY, Lind OP, Evans RW. Utilization of the Government Dental Service by Chinese civil servants in Hong Kong. Community Dent Oral Epidemiol 1990; 18:190-3.
27. So FHC, Schwarz E. Demand for and utilization of dental services among Hong Kong employees with and without dental benefit coverage. Community Dent Oral Epidemiol 1996;24:201-6.
28. Eddie S. Frequency of attendance in the General Dental Service in Scotland—a comparison with claimed attendance. Br Dent J 1984;157:267-70.
29. Maizels J, Maizels A, Sheiham A. Dental disease and health behavior: the development of an interactional model. Community Dent Health 1991;8:311-21.
30. Sheiham A, Maizels J, Cushing A, Holmes J. Dental attendance and dental status. Community Dent Oral Epidemiol 1985;13:304-9.
31. Schuurs AHB, Duivenvoorden HJ, Thoden van Velzen SK, Verhage F. Dental anxiety, the parental family and regularity of dental attendance. Community Dent Oral Epidemiol 1984;12:89-95.
32. Lissau I, Holst D, Friis-Hasché E. Use of dental services among Danish youths: role of the social environment, the individual and the delivery system. Community Dent Oral Epidemiol 1989;17:109-16.
33. Hall JA, Roter DL, Katz NR. Meta-analysis of correlates of provider behavior in medical encounters. Med Care 1988;26: 657-75.
34. Heszen Klemens I, Lapinska E. Doctor-patient interaction, patients' health behavior and effects of treatment. Soc Sci Med 1984;19:9-18.

UNIVERSITY OF IOWA MS PROGRAM IN DENTAL PUBLIC HEALTH

The University of Iowa College of Dentistry's Department of Preventive and Community Dentistry invites applications for its two-year MS degree program in dental public health for the academic year beginning August 1999. The program is accredited by the American Dental Association; dentists who complete the program meet the educational requirements for board certification by the American Board of Dental Public Health (no additional residency program is required). Dental hygienists also are invited to apply (although ineligible for board certification).

Courses are in the areas of literature review, research design, biostatistics, epidemiology, statistical computing, health care organization, prevention, administration, financing, health behavior and promotion, teaching methods, and field training. A thesis involving original research is required. Limited financial assistance may be available for the first year of training in the form of a 25 percent research assistantship that confers in-state tuition eligibility. More extensive support may be possible for the second year through a dental public health specialty training grant from the Bureau of Health Professions of the Health Resources and Services Administration of the US Department of Health and Human Services. Possible training grant support for the second year could include an annual stipend of $27,000–$31,000, full tuition and fees, books, and professional travel to meetings such as those of the American Association of Public Health Dentistry, American Public Health Association, and International Association for Dental Research.

For additional information contact Dr. Steven Levy, Graduate Program Director, N330 DSB, College of Dentistry, University of Iowa, Iowa City, IA 52242. Tel: (319) 335-7185; Fax: (319) 335-7187; E-mail: steven-levy@uiowa.edu.

CONFERENCE ON SPECIAL CARE ISSUES IN DENTISTRY

The 11th Annual Conference on Special Care Issues in Dentistry will be held in Chicago at the Westin Michigan Avenue on March 26–28, 1999. The conference is expected to attract over 300 researchers, clinicians, institutional dental directors, pre- and postdoctoral dental students, dental society staff, and other individuals interested in special care issues.

The conference begins with a keynote address by Dr. David Satcher, US surgeon general. His presentation will focus on the future of oral health care delivery within the context of the surgeon general's Report on Oral Health. Topics for the afternoon session will include the Max Bramer lecture on treating the psychiatric patient and the Steven Gordon lecture on geriatric dentistry.

On Saturday, March 27, a full-day session is planned on managing the cancer patient. Half-day sessions include a workshop on aspiration pneumonia in institutionalized patients and treatment options in the Alzheimer's patient.

Sunday, March 28, will consist of three half-day workshops. Included is a 12-hour participation course in special patient care cosponsored by the Academy of General Dentistry. This course is approved for candidates applying for mastership status with the AGD. Additional concurrent courses will include a session on implementing the new AEGD and GPR training standards and a fascinating talk on distraction osteogenesis.

For more information and/or a copy of the program, please write to the Federation of Special Care Organizations in Dentistry, Dr. John Rutkauskas, 211 E. Chicago Ave., Suite 948, Chicago, IL 60611, or call the national office at (312) 440-2660.