Aspects of Quality of Dental Hygiene Care in Supervised and Unsupervised Practices

James R. Freed, DDS, MPH; Dorothy A. Perry, RDH, PhD; John E. Kushman, PhD

Abstract

Objective: *The purpose of this study was to assess aspects of the quality of care provided by dental hygienists in a California demonstration project in which hygienists treated patients independent of dentists' supervision.* ***Methods:*** *The structure and process of care were evaluated in nine independent practices using site visits and reviews of 25 records at each practice. The findings were compared to evaluations of six general dentist practices reviewed for a government agency and insurance company during the same time period. Patient satisfaction was assessed by a questionnaire.* ***Results:*** *The structural aspects of the unsupervised hygienist practices were generally acceptable and surpassed the dentist practices in most areas, including infection control. For process, the hygienist practices had high percentages of acceptable care and were significantly better than the dentist practices in several areas, including follow-up to medical findings, updating the medical history at recall, and documenting the evaluation of the periodontal status and soft tissues. Ninety-eight percent of patients expressed satisfaction with their care in hygienist practices.* ***Conclusion:*** *Under the circumstances of the demonstration project and the methods used to assess the quality of care, the study showed that independent dental hygienist practice did not increase the risk to the health and safety of the public. [J Public Health Dent 1997;57(2):68-75]*

Key Words: quality, hygienists, regulation, independent practice, supervision, dental practice.

The 1989 report on allied health services by the Institute of Medicine (IOM) was the first large national study of allied health personnel (1). One goal of that study was to determine how the various occupations should be regulated. The study acknowledged that changes in state laws are not easily achieved because the identity of a profession is largely determined by laws that determine scope of practice. Complicating the picture for regulatory bodies and state legislatures is the lack of published research literature on risk, quality, cost, and accessibility associated with proposed changes. As the IOM report noted, "Rhetoric and political power frequently substitute for evidence and rational decision making ... One of the clearest examples of this problem is the case of dental hygiene services" (1).

The official positions of the American Dental Hygienists' Association (ADHA) and the American Dental Association (ADA) differ dramatically on the question of scope of practice. The ADHA's goal is dental hygienist practice independent of supervision by dentists and it has "worked with individual states to promote self-regulation of dental hygiene education, licensure, and practice" (2). The ADA seeks to have hygienists operate under supervision more limiting than presently exists in many states. In its Comprehensive Policy Statement on Dental Auxiliaries adopted in 1987, the association took the position that a hygienist must work only under direct, indirect, or personal supervision, all of which require the dentist to be present in the dental office or treatment facility (3). States such as California, which permit general supervision—meaning supervision based on instructions given by a dentist, but not requiring the dentist to be present in the treatment facility—were urged to revise their laws.

An argument of organized dentistry is that supervision is necessary to protect the health and safety of the public. According to the ADA policy statement, "Unsupervised practice by dental hygienists reduces the quality of oral health care and seriously increases risks to the patient" (3). Although independent practice is legal in Colorado and in institutional settings in Washington (1), no reports on the quality of care provided by hygienists who practice without supervision in those states are available.

This paper reports on the first study in the United States of the quality of dental hygiene care provided by hygienists who practice without the supervision of dentists. It should be noted at the outset that no study of quality of care can completely define or include all factors that determine quality. This study concentrates on structure and process of care. The only outcome measure is patient satisfaction, and this measure is available only for patients of independent hygienists. A study of 300 general dental practices established that structure and, especially, process are predictive of outcomes for general dentistry as a whole (4). However, there is no such evidence specific to dental hygiene services in any setting.

This study was conducted on a demonstration project of independent dental hygienist practice initiated in California in January 1987. The project was under the auspices of the California Health Manpower Pilot Project Program (HMPP), which was created by the state in 1973 to demonstrate, test, and evaluate the effectiveness of

Send correspondence and reprint requests to Dr. Freed, University of California at Los Angeles, School of Dentistry, 10833 Le Conte Avenue, Los Angeles, CA 90095-1668. Internet: jfreed@ucla.edu. Dr. Perry is assistant professor at the School of Dentistry, University of California, San Francisco. Dr. Kushman is professor of consumer economics at the University of Delaware. Portions of this paper were presented at the International Association for Dental Research meeting, Glasgow, Scotland, July 3, 1992. This study was supported by a grant from the American Dental Hygienists' Association. Manuscript received: 10/13/93; returned to authors for revision: 12/13/93; accepted for publication: 5/29/96.

new or expanded roles for health care personnel before changes in the law are made (5). This report focuses on evaluating aspects of the project to determine whether dental hygiene care rendered without dentists' supervision in those areas measured was at least as good as hygiene care rendered with dentists' supervision.

The project, named "Health Manpower Pilot Project 139, Dental Hygiene Independent Practice Prototype (HMPP 139)," was sponsored by the Department of Health Sciences at California State University, Northridge (CSUN). Its purpose was "to demonstrate and evaluate the effectiveness of dental hygienists working in practice settings independent of dentists" (6). The program continued until early 1990, when it was closed under a court order resulting from a lawsuit initiated by the California Dental Association (7).

The dental hygienists in the project had to be licensed to practice in California, have at least four years of clinical experience, and complete a didactic and residency training program administered by CSUN. Sixteen hygienists responded to recruitment efforts, met the criteria, completed training, and entered unsupervised practice. A history of the project, including details of the training program, has been published (8).

The hygienists were permitted to perform services allowed under general supervision by the State of California Dental Practice Act (9). Among these services, the ones provided in the practices consisted almost exclusively of preliminary examination including intra- and extraoral examination of soft tissue, charting of lesions and classifying occlusion, scaling, root planing, coronal polishing, intraoral radiographs, topical fluoride application, and patient education.

The dental hygienists in the project were not supervised by dentists. As required by the demonstration project, however, the practices were checked for safety problems by dentists licensed to practice in California. Before the practices could begin, these dentists had to approve facilities and plans for infection control, emergency preparedness, and the record system. The dentists then checked each site twice a year.

Methods

Practice Sites and Record Selection. Nine dental hygienist practices with 15 hygienists were fully established in the demonstration project. The site designation, number of hygienists, practice settings, length of time that the site operated, and the number of patients treated are shown in Table 1. Five sites were solely or primarily office-based. Two (B and C) were based primarily in residences and institutions for the elderly and handicapped. Site D provided care in an office, institutions, and in homes for the homebound. Site H primarily provided in-home care to patients living in rural areas who were generally not homebound. The range of time the practices were in operation for the duration of the project was 1.4 years to 3.1 years; the range of patient visits during the period was from 173 to 2,956.

The original study design was to compare care provided in project practices with that in dental practices located in the same zip codes. Efforts to get comparison dentists' practices, however, were unsuccessful. The reason dentists would not participate is not known; however, a lawsuit by the California Dental Association challenging the project from its inception (10) and a newspaper article reporting that "The dentists who have agreed to take referrals would speak only if their anonymity was guaranteed" (11) indicate a hostile professional environment that may have contributed to nonparticipation. To provide a comparison for the hygienist practices, a group of six California dentist practices that were being reviewed by one of the researchers contemporaneously with the hygienist practices was used. All identifying information on these practices was removed to ensure their anonymity.

This convenience sample of dentists had limitations because the selection of patient records in each dentist's practice was governed by the purpose for which the practice was being reviewed. Two of the dentists' practices were reviewed for an insurance company to see if they should be included in a network of practices for capitation patients. Both of these were group practices. About one-half of the patient records reviewed in these practices were from fee-for-service patients; the other half were capitation patients. The samples for the fee-for-service and capitation patients were random samples from each type of patient in the practice. The insurance company was interested in knowing whether fee-for-service patients and capitation patients received the same services for the same health conditions. The sampling frame also included only patients who had their first visit to the practice from one to three years prior to the review. In one practice 10 patient records were reviewed in each group and in the other 10 fee-for-service and 11 capitation patient records were reviewed.

Four dentists' practices were reviewed for a state agency as part of its

TABLE 1
Description of Practices in Health Manpower Pilot Project 139

Site Designation	No. Hygienists	Practice Setting	Years of Operation	No. Patient Visits
A	1	Office	1.4	272
B	2*	Institutional	3.0	488
C	1	Institutional	2.8	496
D	1	All	3.0	1,206
E	1	Office	3.1	1,144
F	3	Office	3.1	2,956
G	6	Office	3.0	987
H	1†	Home	2.3	173
I	1	Office	1.5	727

*One participant also worked as a solo practitioner in an office setting.
†Also practiced in a group practice.

assessment of state dental plans. Three practices were solo, and one was a group practice. Patients in two practices were covered by a fee-for-service plan. Patients in the other two practices were enrolled in a capitation plan. The protocol for these reviews included only patients with a first visit to the practice between one and three years earlier. The patients were selected at random from lists supplied by the insurance companies. In one practice only three patients had start dates within the one- to three-year span. Records of 15 patients seen earlier were added to the sample; however, only care received during the study period was evaluated. For the practices with capitation plan patients, 14 records were sampled in one and 25 records in the other. The practices with fee-for-service patients provided a sample of 18 records in one practice and 14 records in the other. In total, 112 records were reviewed in the comparison dentist practices.

In the hygienist practices, the investigators randomly selected 25 patient records from all records at each site. In instances where the records were stored by category, such as home, institution, or office, samples were stratified by category and records selected randomly from each stratum in relation to its size so that each record had the same probability of being selected. Payment for all services was on a fee-for-service basis. A total of 225 records were selected for review.

Structure Review. Structure included an evaluation of access, cleanliness, infection control procedures, medical emergency preparedness, radiation safety, information regarding after-hours emergency care, recall system, and patient record system. The information was gathered by observation at the practice site, review of the medical record system, and interview with the hygienist or hygienists and appropriate staff of the dentist practices. The criteria used to evaluate these aspects of structure were developed largely from published guides to quality of care (12-17). The specific criteria used for both types of practices are listed in Table 2. Each category of structure was rated as either acceptable or not acceptable. To be acceptable, all criteria in a category had to be met.

Structure was assessed in seven of the nine hygienist practices and all six dentist practices. Hygienist sites A and B were not evaluated because the project was terminated before their reviews could be completed. Structure was reviewed at only one institution for site C. No visits were made to patients' homes by the evaluators at any site.

Process Review. Review of process of care was done in all of the dental hygienist and dentist practices. This information was based on record review, with an interview with the hygienist, dentist, or office staff, if necessary, to understand the record. No patients were examined. Categories evaluated were medical/dental history, clinical evaluation, radiographs, provision of preventive services, and progress notes.

The medical/dental history evaluation assessed presence of a medical

TABLE 2
Structure: Criteria for Acceptable Rating

Access
1. Appointments must be available for either a new patient examination or follow-up care within 15 working days.
2. Adequate time typically must be scheduled for the provision of treatment. Generally, a minimum of 30 minutes for a child and 45 minutes for an adult must be scheduled for a prophylaxis.

Cleanliness
1. Equipment, treatment rooms, and waiting areas must be clean.

Sterilization/infection control
1. Gloves must always be worn when touching blood, saliva, or mucous membranes.
2. Gloves must not be reused.
3. Countertops and surfaces that may have become contaminated with blood or saliva should be wiped with absorbent toweling to remove extraneous organic material, then disinfected with a suitable chemical germicide.
4. Instruments that normally penetrate soft tissue and/or bone and those that may come into contact with oral tissues must be sterilized after each use.
5. Before sterilization, instruments should be cleaned to remove debris.
6. Instruments must remain in bags following sterilization until used.
7. Heat-sensitive instruments should have 10 hours' exposure to a liquid disinfectant/sterilant.

Medical emergency preparedness
1. Oxygen must be available.
2. Staff must be knowledgeable in how to use oxygen equipment.

Radiation safety
1. There must be an intact lead apron that is consistently used.
2. There must be a thyroid collar that is consistently used.
3. The equipment must be located in a manner that does not expose others to radiation.

After-hours emergency care
1. There must be a system that either will contact a dentist or inform patients who to contact to receive emergency care when the office is closed.

Recall system
1. The system must allow for recall based on need rather than a fixed time.
2. The system must make at least two attempts to contact the patient.

Patient record system
1. The medical history form must be comprehensive and contain questions including heart disease, heart murmur, rheumatic fever, history of bleeding, infectious disease, prosthetic joint, artificial heart valve, pacemaker, radiation treatment, cancer, current medications, hepatitis, diabetes, allergies to medications, pregnancy, currently under a physician's care, high blood pressure, nervous disorders, and asthma.
2. There must be a periodontal evaluation form that permits a recording of the periodontal condition for the complete dentition.
3. The diagnosis and treatment planning forms must have adequate space to enable a recording of the baseline oral findings and treatment plan.

history in the chart, documentation of follow-up for significant findings, use of medical alerts, and update of histories on recall. Clinical evaluation included an assessment of evidence of an evaluation of the periodontal status and the patient's soft tissues. Radiographs were evaluated for technical quality of bitewing and periapical films and frequency. When possible, calculus removal was evaluated from posttreatment radiographs taken at subsequent appointments. Progress notes were assessed to determine if they were legible and chronological.

The criteria used to evaluate these aspects of quality for both types of practices are presented in Table 3. The criteria were based primarily on the sources cited for review of structure (12-17) where these were applicable to record review and on the criteria for frequency of radiographs established by the Food and Drug Administration (18). In addition to these aspects of process, records in the hygienist practices were examined for evidence of a signed informed consent document and referral to a dentist, both of which were required by the project. Each aspect was rated as acceptable, not acceptable, cannot evaluate, or not applicable.

Evaluators. The quality of care was evaluated by one individual in all six dentist practices and four of the hygienist practices. This individual and a second evaluator conducted joint reviews of five hygienist practices. The joint reviews were preceded by standardization sessions composed of discussions of the criteria. In addition, both evaluators reviewed the same five charts at the first site visit to provide an opportunity to resolve any differences and to confirm that criteria were applied consistently. The evaluators worked in the same room when doing the reviews and discussed any questions regarding the classification of the various aspects of care.

Outcome Measure. A patient survey that included questions about satisfaction with treatment was conducted in noninstitutional practices 18 months after the beginning of the demonstration project. Hygienists were instructed to give the questionnaire to the first 150 new patients seen in the practice. A total of 686 questionnaires were distributed since not all practices saw 150 new patients. The dental satisfaction questions were based on those developed by the RAND Corporation (19). Patients were asked to evaluate their satisfaction with treatment on Likert scales rated 1 to 5. They were asked if the hygienists were careful to check everything, if the hygienists were thorough, if fees were too high, if things could

TABLE 3
Process: Criteria for Acceptable Rating

Medical/dental history
1. Information collected: There must be a medical history form present with all questions answered.
2. Follow-up to significant findings: There must be evidence in the record that there has been adequate follow-up to positive answers for significant questions (such as those required in the medical history form) to conclude that it is safe to proceed with dental care.
3. Medical alert: Where medical alerts are indicated for such conditions as allergy to medications or need to premedicate prior to dental care, these should be used.
4. Update on recall: There must be evidence in the record that the medical history was updated at the beginning of each new sequence of treatment.

Clinical evaluation
1. Periodontal evaluation: For adult patients receiving other than emergency care, there must be evidence in the record that there had been an evaluation of the periodontal status for only those patients where there was some evidence of periodontal disease such as radiographic evidence of bone loss, gingival bleeding, or therapeutic treatment such as root planing.
2. Soft tissue evaluation: For patients receiving other than emergency care, there must be evidence in the record that there was an assessment of the soft tissues.

Radiographs
1. Technical quality of bitewings: Bitewing radiographs must permit the interproximal surfaces to be viewed.
2. Technical quality of periapicals: Periapical films must permit apices of the teeth to be viewed.
3. Frequency: The frequency that films are taken must conform to the FDA criteria.

Preventive service quality
1. Calculus removal: There must be evidence on posttreatment (recall) radiographs that all calculus present on preoperative radiographs was removed.

Progress notes
1. Legible: The handwriting must be legible to the reviewer.
2. Chronological: Treatment record notes must be in chronological order.

TABLE 4
Number of Health Manpower Pilot Project 139 Practices and Comparison Dentist Practices Rated as Acceptable and Not Acceptable by Structure of Care Elements

	Hygienist Practices (n=7)		Dentist Practices (n=6)	
Care Elements	Acceptable	Not Acceptable	Acceptable	Not Acceptable
Access	7	0	4	2
Record system	7	0	2	4
Infection control	7	0	2	4
Cleanliness	7	0	6	0
Medical emergency preparedness	6	1	5	1
Radiation safety*	4	2	3	3
Afer-hours information	5	2	6	0
Recall system	7	0	6	0

*Site C did not take any radiographs.

have been better, and to rate their overall satisfaction with care. Self-addressed, stamped envelopes were provided for patients to return the questionnaires directly to the investigators.

Statistical Analysis. Fisher's exact test was used to compare data from the process evaluation in the hygienist and dentist practices. The alpha level was set at .05.

Results

Structure. The findings for structure for the hygienist and dentist practices are shown in Table 4. Access to care in the seven hygienist practices was acceptable. Access to care in two of the six dentist practices was rated not acceptable. In one dentist practice, there was a six-week waiting period before patients could be seen for hygiene care. In another, all treatment visits including hygiene care were scheduled every 15 minutes. This method of scheduling did not permit adequate time for hygiene care or forced patients into multiple visits.

Record systems in all the hygienist practices were acceptable. The record systems in four of the six comparison practices were not acceptable. These practices had deficiencies in the medical history form, which included lack of questions for HIV infection, prosthetic joint replacement, history of cancer, and history of radiation treatment. One dentist practice did not have a periodontal record form.

Infection control procedures in all of the hygienist practices were acceptable. In four of the dentist practices, infection control was not acceptable. All four practices used liquid chemical agents for high-level disinfection/sterilization of instruments that were either inappropriate or were used for an inadequate length of time, based on the recommendations of the manufacturers. In three dentist practices, instruments were heat sterilized, but not sealed in bags. Overall office cleanliness was acceptable in every practice reviewed.

Medical emergency preparedness was not adequate in one of the hygienist practices. The emergency oxygen in the practice was incorporated into the nitrous oxide system used by the dentist from whom the hygienist rented space. The chair used by the hygienist did not have the system. Because no mobile oxygen tank was available, a patient would have to be moved in the event that oxygen was required. In addition, the hygienist was unfamiliar with operating the system. A mask was available that could be used to pump air, but this arrangement was considered inadequate. One of the six comparison dentist practices had unacceptable emergency preparedness because the oxygen tank was empty.

Radiation safety in two of the six hygienist practices that took radiographs was not acceptable because cervical radiation safety collars were not used. Three of the six dental offices were not acceptable for the same reason.

Informing patients of the availability of after-hours emergency care was rated not acceptable in two of the hygienist practices. One lacked a referral telephone number on the telephone answering machine message and the other used an answering service that was not available 24 hours per day. All of the dentist practices had acceptable methods of informing patients regarding after-hours emergency care.

The recall systems in all dentist and dental hygienist practices were considered acceptable. Patients were contacted at least twice through mail or telephone systems.

Process. The findings for process are shown in Table 5. Some aspects of care were not rated because they were not applicable. For instance, a rating for quality of radiographs was not applicable if they were not taken. It was not possible to evaluate some other items. For example, the medical history was rated "cannot evaluate" where the medical history for patients in nursing homes was available to the hygienist at treatment, but not to the investigators. As a result, most rows do not total 225 for the hygienist practices or 112 for the dentist practices.

A completed medical history form was found in 96.8 percent of the hygienist patient records and in 97.3 percent of the records in the dentist practices. Medical alerts were appropriately used in 81.1 percent of the hygienist records and 63.2 percent in the dentist records. These differences were not statistically significant.

TABLE 5
Number of Health Manpower Pilot Project 139 Practices and Comparison Dentist Practices Rated as Acceptable and Not Acceptable by Process of Care Elements

	Hygienist Practices			Dentist Practices		
Care Elements	# Accept.	# Not Accept.	% Accept.	# Accept.	# Not Accept.	% Accept.
Medical/dental history						
Information collected	214	7	96.8	107	3	97.3
Medical alert	60	14	81.1	12	7	63.2
Follow-up to findings*	56	17	76.7	3	15	16.7
Update on recall*	96	9	91.4	22	30	42.3
Clinical evaluation						
Perio status†	162	24	87.1	29	18	61.7
Soft tissue*	195	23	89.4	29	68	29.9
Radiographs						
Technical quality						
BW‡	34	4	89.5	58	27	68.2
PA	16	0	100.0	94	8	92.2
Frequency	18	1	94.7	26	7	78.8
Preventive service quality						
Calculus removal†	20	1	95.2	3	4	42.9
Progress notes						
Legible	219	4	98.2	111	1	99.1
Chronological	218	2	99.1	109	0	100.0

*$P<.001$.
†$P<.01$.
‡$P<.05$.

There was evidence in the patient records that important positive findings in the medical history had been adequately followed up with additional information either from the patient or the patient's physician in 76.7 percent of the hygienist records compared to 16.7 percent for the dentist records. Notation that the medical record was updated at recall was present in 91.4 percent of the cases in the hygienist practices and 42.3 percent in the dentist practices. Both of these differences were statistically significant ($P<.001$).

The hygienists recorded evidence of patient periodontal status in 87.1 percent of the cases compared to 61.7 percent for the dentist practices ($P<.01$). Documentation of soft tissue evaluation was present in 89.4 percent of the hygienist records and in 29.9 percent of the dentist records ($P<.001$).

Radiographs were taken relatively infrequently in the hygienist practices. Thirty-eight sets of bitewing radiographs were evaluated and 16 periapical films. The technical quality of bitewing radiographs differed by provider type ($P<.05$), with 89.5 percent of the hygienist cases rated acceptable compared to 68.2 percent of the dentist practices. The technical quality of periapical films was acceptable in 100 percent of cases for hygienists and 92.2 percent for dentist practices. The intervals at which films were taken were rated acceptable in 94.7 percent of the applicable cases for the hygienist practices and 78.8 percent for the dentist practices. Neither of these differences was statistically significant.

It was possible to evaluate calculus removal with radiographs taken after treatment in 21 cases in the hygienist practices and seven cases in the dentist practices. In all but one hygienist case, calculus seen on the original radiographs was no longer visible in posttreatment radiographs (95.2% acceptable). In the dentist practices, three of the seven cases (42.9%) were acceptable. This difference was statistically significant ($P<.01$).

Progress notes were legible and chronological in almost all cases for both types of practices. The informed consent was present in 97.2 percent of the hygienist cases and there was evidence in 87.1 percent of the records that the patient either had a dentist or was referred to one.

Patient Satisfaction. Patient satisfaction was measured by posttreatment survey only in the hygienist practices. Of the 686 patient questionnaires known to have been distributed, 375 were returned, a 54.7 percent response rate. An additional seven responses were included from a practice where the number of questionnaires distributed was not recorded. Seventy-six percent of patients strongly agreed with the statement "I am satisfied with my dental hygiene treatment." Another 22 percent agreed, totaling 98 percent who expressed satisfaction with their care. Three patients (0.8%) were dissatisfied with hygiene care. There were 89.3 percent who disagreed with the statement that there were things that could have been done better, 3.7 percent who agreed, and 7 percent who were not sure. When asked if the hygienist was very careful to check everything when examining patients, 77 percent strongly agreed, 19 percent agreed, 1.8 percent disagreed, and 1.2 percent were not sure. Over 93 percent of respondents disagreed with the statement that the hygienist was not as thorough as she should have been; 3.4 percent agreed. With respect to fees, 7.8 percent agreed with the statement that the fees were too high, 74.5 percent disagreed, and the remainder were not sure.

Discussion

As the IOM study highlighted, the impact on quality of proposed modifications in laws regulating scope of practice or supervision is rarely clear to state decision makers (1). The purpose of the California Health Manpower Pilot Project Program was to provide information to the members of the legislature regarding possible changes in state laws that regulate the health professions. This demonstration project concerned the provision of dental hygiene services by dental hygienists without supervision by dentists. Such an approach could possibly affect accessibility, cost, and quality of dental hygiene care.

Assessing the quality of care is difficult because "The risks and benefits of change are often hypothetical, difficult to measure, and subject to large differences in overall judgment" (1). For example, there are no recognized standards for overall acceptable performance, so it was not possible for this study to measure whether or not the hygienist practices or the dentist practices met overall standards.

In the absence of established standards, the alternative was to compare care provided in unsupervised practices with that in available supervised practices. This comparison addressed the question of whether or not dental hygienists practicing independent of dentists' supervision posed an increased risk to the health and safety of the public in those areas evaluated.

In this study, it was not possible to identify a control group of dentist practices located near the hygienist practices. The lack of dentists willing to participate in the study as originally designed required the use of secondary data on dentist practices. These dentist practices were reviewed for other purposes, but provided a basis for comparison to the hygienist practices. While we were fortunate to have some comparison data on supervised hygiene services, caution should be used in interpreting comparisons and statistical tests. There was no recording whether hygiene services in the dentists' practices were performed by hygienists or dentists. In precise terms, therefore, this study compared hygiene care, not hygienists' care, provided in supervised settings to care provided in unsupervised settings.

An issue in any experimental setting with human subjects is performance bias, the Hawthorne effect. The dentists in the comparison practices were aware that they would be reviewed as required by a state agency or were willing to undergo voluntary review by an insurance company. The hygienists knew they would be visited periodically by dentists who would check the basic safety of their practices. Thus, it would appear that the possibility of practicing to a different standard than would normally be the case, though unavoidable and unmeasurable, would be in the same direction for both groups. Thus, the potential for a Hawthorne effect was present in the study; however, it is not clear if it affected either type of practice, or if so, how much.

Other research into the quality of care in dentist practices indicates that the deficiencies in the dentist practices in this study may be typical. One report of six capitation and five fee-for-service practices, serving a dual-choice dental plan, rated the process of care acceptable in only one of 11 prac-

tices (20). Another study of 300 practices in 14 states reviewed five dental records in each practice. In only 39 percent of the practices had the medical history been updated in any of the five cases, and in only 29 percent of the practices was there a soft tissue examination recorded in any of the five cases. In 34 percent of the practices, the periodontal status was not recorded in any of the five records reviewed (21). Results for dentist practices in this study are in keeping with these accumulated findings.

The medical history deserves special attention. Documentation of follow-up of important findings on the medical history showed the greatest disparity between the two forms of practice. Hygienists' follow-up in unsupervised practices was acceptable in 76.7 percent of the cases compared to 16.7 percent for the dentist practices. Update of medical condition on recall was acceptable in 91.4 percent of the cases in the hygienist practices compared to 42.3 percent for the dentist practices. In these two important areas, the hygienists' practices performed better than dentists' practices.

A closer examination of specific unacceptable cases found that among the cases in which the documentation of the medical history in the hygienist practices was inadequate, three indicated a lack of documentation that patients had taken the required antibiotics for dental treatment. Two of these were in institutional settings where patients had both a dental record and a medical record. The investigators did not have access to the medical records to confirm that the appropriate medication had been prescribed by the medical staff. In both of these cases, there was documentation in the record for some, but not all, of the hygiene visits. In the case that occurred in an office-based setting, there was documentation of antibiotic premedication in four of five visits for the same individual.

It was not possible to compare hygienist and dentist practices for appropriateness of premedication because there were no patient records indicating the need for antibiotic premedication in the dentist practices. The low follow-up of positive medical findings and failure to update medical histories on recall in the dentist practices were of concern and could have concealed the need for premedication. One report of a hospital study included dentist documentation of premedication. This study found that among those patients who had cardiovascular conditions, 22 of 57 (38%) showed no evidence of documentation to confirm the proper use of prophylactic antibiotics. Of the 40 patients most likely to require antibiotic prophylaxis, there was no documentation for 10 (25%) (Griffin TJ. Quality assurance—blueprint for the future. Paper presented at the American Dental Association 131st Annual Session, Oct 13–18, 1990:32.) Reiterating, the deficiency in both the unsupervised hygienist practices and in the supervised hospital setting was the absence of documented premedication. We could not determine if antibiotics were used or not, only that their use was not documented.

Documentation of soft tissue assessment and periodontal condition was significantly better in the hygienist practices. The hygienist practices documented soft tissue evaluation in 89.4 percent of the cases compared to 29.9 percent for dentist practices. The evaluation criteria required some evidence of periodontal disease before a case was rated not acceptable, so records with no periodontal assessment but no other evidence of periodontal disease were classified as "cannot evaluate." For this reason, only 42 percent of the patient records in the dentist practices could be evaluated as either acceptable or not acceptable for the documentation of the periodontal condition. Given that assessment and recording of the periodontal condition are essential aspects of a periodontal evaluation, it might have been preferable for the criteria to require negative as well as positive findings to be documented. Under these more strict criteria, the dentist practices would likely have had a lower percent of acceptable cases for periodontal evaluation since the cases with no documentation and no other evidence of disease would have been rated not acceptable rather than cannot evaluate.

No study can examine all factors affecting the quality of care, and no regulations can ensure complete safety to the public. Under these circumstances, how should decision-makers approach the question of regulation and quality of care? The IOM study recommended that "Flexibility in licensure statutes should be maintained to the greatest extent possible without undue risk of harm to the public ... Achieving this goal might mean allowing for overlapping scopes of practice for some licensed occupations" (1).

This study was the first attempt to evaluate and compare dental hygiene services provided in unsupervised practice settings to those provided in supervised practices. Under the circumstances of the project, which required that all practices be reviewed regularly and that all patients be referred for dentist evaluation, the adequacy of dental care without dentists' supervision was at least as good as hygiene care provided with dentists' supervision. Given the methods used in this study, the evidence indicates that independent dental hygienist practice did not increase the risk to the health and safety of the public or pose an undue risk of harm to the public.

References

1. Institute of Medicine. Allied health services: avoiding crises. Washington, DC: National Academy Press, 1989.
2. Gurenlian JR. Report of the president. J Dent Hyg 1991;65:160-4.
3. American Dental Association. Reports and resolutions. Chicago, IL: ADA, 1987: 103-4.
4. Crall JJ, Morris AL. Relationships among structure, process, and outcome scores derived from evaluations of 300 general dental practices. J Dent Educ 1988;52:643-6.
5. Lee A. Health manpower pilot projects annual report. Sacramento, CA: Office of Statewide Health Planning and Development, 1988.
6. Lee A. Health manpower pilot projects annual report. Sacramento, CA: Office of Statewide Health Planning and Development, 1987.
7. Lee A. Health manpower pilot projects annual report. Sacramento, CA: Office of Statewide Health Planning and Development, 1990.
8. Perry DA, Freed JR, Kushman JE. The California demonstration project in independent practice. J Dent Hyg 1994;68: 137-42.
9. California Department of Consumer Affairs, Board of Dental Examiners. Dental Practice Act with Rules and Regulations. Sacramento, CA, 1990.
10. Lee A. Health manpower pilot projects annual report. Sacramento, CA: Office of Statewide Health Planning and Development, 1989.
11. Revkin A. Hygienists go it alone over outcry by dentists. Los Angeles Times 1987 Apr 13:Metro 6.
12. California Dental Association. Guidelines for the assessment of clinical quality and professional performance. Los Angeles, CA: CDA, 1977.
13. Friedman JW. A guide for the evaluation of dental care. Los Angeles, CA: School

of Public Health, University of California, 1972.
14. State of California Department of Corporations. Knox-Keene dental guidelines, Sacramento, CA, Dec 1985.
15. Schoen MH, Freed JR, Gershen JA, Marcus M. Guidelines for criteria and standards of acceptable quality general dental practice. J Dent Educ 1989;53:662-9.
16. Morris AL. Evaluator's manual for the evaluation of general dental practice. Chapel Hill, NC: Dental Foundation of North Carolina, 1988.
17. Centers for Disease Control. Recommended infection control practices for dentistry. MMWR Morbid Mortal Week Rep 1986;35:237-42.
18. US Public Health Service, Food and Drug Administration. The selection of patients for x-ray examinations: dental radiographic examinations. HHS pub no FDA 88-8273. Rockville, MD: FDA, Oct 1987.
19. Davies AR, Ware JE. Development of a dental satisfaction questionnaire for the Health Insurance Experiment. R-2712-HHS Santa Monica, CA: RAND Corporation, Apr 1982
20. Atchison KA, Schoen MH. A comparison of quality in a dual-choice dental plan: capitation versus fee-for-service. J Public Health Dent 1990;50:186-93.
21. Morris AL, Bohannan HM. Assessment of private dental practice: implications for dental education. J Dent Educ 1987; 51:661-7.