

Educational and Career Pathways of Dental Hygienists: Comparing Graduates of Associate and Baccalaureate Degree Programs

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Abstract: The purpose of this study was to compare the educational and career pathways of graduates from associate degree (A.S./A.A.) and baccalaureate degree (B.S./B.A.) entry-level dental hygiene (DH) programs. A thirty-item, closed-ended questionnaire was mailed to a random sample of 1,352 dental hygienists who were educated and licensed in California between 1990 and 2000. The response rate was 76 percent. Approximately half of the respondents had a degree prior to entering the DH program, and the elapsed time between degrees was greater for A.S./A.A. graduates ($p=0.05$). More B.S./B.A. graduates had earned or were seeking master's and other more advanced degrees: 11.9 percent versus 4.3 percent. Graduates from both types of programs were involved in professional and community organizations and held leadership positions. Most were currently practicing in the traditional clinical setting, with means of 3.6 and 3.3 days/week for the A.S./A.A. and B.S./B.A. graduates, respectively ($p<0.05$). More B.S./B.A. graduates held DH faculty positions (30.3 percent versus 4.3 percent, $p<0.05$) and other non-DH teaching positions (14.9 percent versus 8.6 percent, $p<0.05$) and had greater involvement with research (8.0 percent versus 3.6 percent, $p<0.05$). The two groups did not differ in regard to other dental and DH-related positions. In conclusion, graduates from B.S./B.A. programs are more likely to have positions in nontraditional settings.

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Entry-level dental hygiene educational programs are currently affiliated with dental schools, four-year colleges and universities, community colleges, and technical and vocational colleges. All entry-level programs have the equivalent of at least seventeen months of a full-time prescribed curriculum. At the completion of the program, students are granted either an associate or a baccalaureate degree, dependent upon the parent institution. Currently, the majority of entry-level programs offer an associate degree.¹ Students graduating from associate degree dental hygiene programs are eligible for dental hygiene licensure and practice and, based on anecdotal evidence,

usually receive the same salary as baccalaureate degree graduates.

The role of baccalaureate dental hygiene education has been continually questioned and analyzed.²⁻⁷ When baccalaureate dental hygiene educators were asked to prioritize statements as to the philosophy or goal of baccalaureate education and the perceived differences between two-year and baccalaureate programs, the educators agreed that one important purpose of a baccalaureate program is "to prepare dental hygienists for responsibilities in various career roles beyond traditional clinical dental hygiene practice."⁸ However, are the baccalaureate degree program graduates realizing this goal? To address

this question, Rowe et al. assessed the professional growth and achievements of graduates of the entry-level baccalaureate program at the University of California, San Francisco (UCSF) from the classes of 1960 to 2000.⁹ Results indicated that many of the graduates had become educators, scholars, and leaders in the dental hygiene field. However, it is unknown whether these achievements were unique to UCSF or whether these parameters are distinguishing characteristics between associate and baccalaureate degree programs.

The purpose of this study was to assess the accomplishments of the graduates from both associate and baccalaureate degree entry-level dental hygiene programs in the state of California and to compare the two groups in regard to their advanced educational and career pathways, participation and leadership in professional and community organizations, and positions in nontraditional settings.

Materials and Methods

This study was approved by the UCSF Institutional Review Board. The study population consisted of all the dental hygienists who received California licenses from 1990 through 2000. The time period was selected to allow time for graduates to pursue a variety of postdegree career pathways. Graduates who were licensed in California but educated outside of California were excluded from this study. A stratified random sample of 1,352 dental hygienists licensed between 1990 and 2000 was generated from a population of 4,202 dental hygienists by a computerized randomization process (R & D Data Corporation). This sample of 1,352 was statistically determined using the software program Enquiry, as the number needed to detect a 10 percent difference between the career pathways of the two groups of graduates (associate and baccalaureate at a 3:1 ratio) at the alpha level of 0.05 and beta level of 0.20 (80 percent power). Mailing addresses of the subjects were also obtained from the R & D Data Corporation.

The five-part, thirty-item closed-ended questionnaire was developed by the study's authors, who incorporated many questions similar to ones utilized in the study of UCSF graduates.⁹ The questionnaire consisted of the following categories: 1) Demographic Characteristics, which included age at graduation, race/ethnicity, name of dental hygiene program, and year of graduation; 2) Additional Education, which included degrees before and after the dental hygiene

educational program; 3) Professional and Community Participation, which included participation and leadership in various organizations; 4) Clinical Dental Hygiene Experience, which included the amount of time spent in private practices and public health clinics; and 5) Non-Private Practice Careers, which included teaching in dental hygiene and other disciplines, participation in research, and other dental/dental hygiene-related positions.

The questionnaire was pilot-tested on a convenience sample of one dental hygiene educator at UCSF, two dental hygienists with baccalaureate degrees, and three dental hygienists with associate degrees. The questionnaire was then revised accordingly and mailed to the 1,352 randomly selected California-licensed dental hygienists. Along with the questionnaire, a cover letter and a self-addressed, postage-paid envelope for returning the questionnaire were mailed. The questionnaires were kept confidential throughout data entry and analysis by the use of a number code on each envelope.

JMP IN, Version 4 (Duxbury Press site, Thompson Learning Center), was utilized for data entry and data analysis. Distribution tables, frequency distributions, and percentages were used to describe the graduates of the two programs. The t-test was used to determine if there were significant differences at the alpha level of 0.05 between the baccalaureate and associate degree graduates when comparing continuous variables such as age, and the chi-square test was used for categorical variables. The two-tailed Fisher's exact test was used in some instances in which the number of respondents in some categories was less than five.

Results

Of the 1,352 questionnaires mailed to dental hygiene graduates, forty-eight questionnaires did not reach the graduates due to incorrect addresses. After two mailings, 986 questionnaires were returned, achieving a 76 percent response rate. Of the 986 respondents, 250 questionnaires had to be excluded because the respondents either had attended a dental hygiene program outside of California or had not graduated between the years of 1990 and 2000. Thus, the total number of respondents was 736.

Demographic Characteristics

The distribution of respondents' alma maters was representative of the dental hygiene education

programs in the state of California at the time of the survey. Table 1 shows the distribution of respondents by program. Respondents had graduated from each of the seventeen dental hygiene programs operational between the years of 1990 and 2000. Three of these programs grant the baccalaureate degree, and fourteen grant the associate degree. Of the respondents, 534 (72.6 percent) were from associate degree programs, and 202 (27.4 percent) were from baccalaureate degree programs.

The ages at graduation of the respondents ranged from early twenties to late sixties, with a mean of 39.3 years of age at the time of graduation (Table 2). The graduates of baccalaureate degree programs were younger at graduation than the graduates of associate degree programs: 37.2 versus 40.0 years of age at graduation. This finding is significant at the $p < 0.0001$ level.

The graduates were predominantly Caucasian/White (74.9 percent), with a wide gap between this group and the second and third most predominant categories: Hispanic/Latino (9.6 percent) and Asian (9.0 percent) groups (Table 2). Since there were such small numbers of graduates in some of the categories, such as Native American, Pacific Islanders, African American, and Other/Blank, these ethnicities were combined to make the "Other" category. There was a significantly higher percentage of Asian respondents from the baccalaureate programs (16.8 percent) compared to the associate programs (6.0 percent) ($p < 0.0001$).

Additional Education

Part two of the questionnaire assessed the respondents' education prior to entering their dental hygiene program and after graduation (Table 3). Approximately half of the respondents (52.5 percent) had a degree before entering the dental hygiene program. The most prevalent was an associate degree (37.8 percent), the next most frequent was a baccalaureate degree (12.6 percent), and a small percentage held a master's or other type of degree (1.4 percent). A higher but not statistically different percentage was observed between the two groups of respondents, suggesting that more associate degree graduates (54.3 percent) than baccalaureate respondents (46.5 percent) had obtained prior degrees.

The areas of study before starting dental hygiene were mostly related to general education/

Table 1. Numbers of respondents by dental hygiene program

Baccalaureate Degree Programs	Number of Respondents
Loma Linda University	62
University of California, San Francisco	47
University of Southern California	91
Not specified	2
Total	202
Associate Degree Programs	Number of Respondents
Cabrillo College	56
Cerritos College	43
Chabot College	59
Cypress College	27
Diablo Valley College	71
Foothill College	54
Fresno City College	47
Oxnard College	5
Pasadena City College	23
Sacramento City College	65
San Joaquin Valley College	13
Santa Rosa Junior College	1
Taft College	24
West Los Angeles College	43
Not specified	3
Total	534

general science/liberal arts (169 respondents) and dental assisting (forty-six respondents). The two groups of graduates significantly differed in regard to the amount of time that had elapsed between the first degree and their entry into the dental hygiene program, with the elapsed time greater for associate respondents (15.7 years) than for the baccalaureate respondents (13.4 years) ($p = .0482$) (Table 3).

Of the 120 graduates (16.3 percent of total respondents) who had pursued or were pursuing additional education after graduating from their dental hygiene programs, ninety-five (17.8 percent) were from the associate programs, and twenty-five (12.4 percent) were from the baccalaureate programs (Table 3). Seventy of the associate degree graduates were seeking a baccalaureate degree, while none of the baccalaureate degree graduates sought an additional baccalaureate degree. Approximately 12 percent of the baccalaureate degree graduates had earned or were seeking master's and other more advanced degrees (D.D.S., Ph.D., J.D., etc.), in comparison to 4.3 percent of the associate degree graduates. Only seven graduates in the study were pursuing or had pursued dental hygiene-related degrees. This number was 7.6 percent of the graduates pursuing or having

Table 2. Demographic characteristics of study population

	All (N=736)	A.A./A.S. Degree (N=534)	B.A./B.S. Degree (N=202)	p-value
Age in years (mean \pm S.D.)	39.3 \pm 8.1	40.0 \pm 8.0	37.2 \pm 8.2	<0.0001
Race				<0.0001
Caucasian	551 (74.9%)	417 (78.5%)	134 (66.3%)	
Hispanic	71 (9.6%)	47 (8.9%)	24 (11.9%)	
Asian	66 (9.0%)	32 (6.0%)	34 (16.8%)	
Other (Native Am., Pacific Isl., African Am.)	45 (6.1%)	35 (6.6%)	10 (5.0%)	

Table 3. Additional education of study population

	All (N=736)	A.A./A.S. Degree (N=534)	B.A./B.S. Degree (N=202)	p-value
Degree before DH	384 (52.5%)	290 (54.3%)	94 (46.5%)	0.0597
A.A./A.S.	278 (37.8%)	208 (39.0%)	70 (34.7%)	0.4878
B.A./B.S.	93 (12.6%)	70 (13.1%)	23 (11.4%)	
Other	10 (1.4%)	9 (1.7%)	1 (0.5%)	
Elapsed years between degrees (mean \pm SD)	15.1 \pm 8.5	15.7 \pm 8.7	13.4 \pm 7.7	0.0482
Degree after DH	120 (16.3%)	95 (17.8%)	25 (12.4%)	0.0694
B.A./B.S.	70 (9.5%)	70 (13.1%)	0 (0.0%)	<0.0001
M.A./M.S.	21 (2.9%)	9 (1.7%)	12 (5.9%)	
Other	26 (3.5%)	14 (2.6%)	12 (5.9%)	

pursued baccalaureate and master's degrees (ninety-one respondents). Thirty-one of the 120 respondents who reported efforts to earn another degree indicated that they were currently in pursuit of that degree and listed a future date of graduation.

Participation in Community and Professional Organizations

The third part of the questionnaire targeted involvement of the graduates in community and professional organizations, especially their participation in leadership positions (Table 4). The majority of the graduates (468 respondents; 63.6 percent) were either currently or at one time a member of the major dental hygiene professional organization, the American Dental Hygienists' Association (ADHA). Of this group, eighty-five (18.2 percent) graduates reported currently or at one time having a leadership position in this organization. Of the types of leadership positions listed, Student American Dental

Hygienists' Association (SADHA) representative and secretary were the most frequently selected (twenty-four respondents; 30 percent of the members). The associate and baccalaureate degree graduates did not significantly differ in terms of membership or leadership positions in their professional organizations.

The majority of graduates (704 respondents; 95.7 percent) did not belong to any professional organizations other than the ADHA. Of the thirty-two who were members of additional professional organizations, only four (12.5 percent) graduates had been involved in leadership positions (Table 4). The organization most frequently mentioned by this group was the California Dental Hygiene Educators' Association (seven respondents). No significant difference between the two groups of graduates was seen in regard to either membership or leadership roles in these other professional organizations.

Two hundred and twenty (29.9 percent) graduates reported being or at one time having been involved in community activities and organizations

such as churches (23.7 percent), parent-teacher associations (13.4 percent), Girl/Boy Scouts (7.5 percent), and dental sealant clinics (6.5 percent). Of these 220 graduates who were involved, eighty-eight (40.0 percent) reported having leadership positions. Some of the most frequently named leadership positions were committee chairperson/supervisor (27.3 percent), den leader (20.8 percent), and president (18.2 percent). The associate and baccalaureate graduates' involvement and leadership positions in their community did not differ significantly from each other (Table 4).

Clinical Dental Hygiene Experience

Part four of the questionnaire assessed the graduates' activities in the traditional clinical setting. Of the 736 respondents, the majority (677 respondents; 92.0 percent) were currently practicing dental hygiene in a clinical setting, with no significant difference between the two groups (Table 5). These dental hygienists worked a mean \pm S.D. of 3.5 \pm 1.2

days per week, indicating that most hygienists do not work full-time in clinical practices. However, there was a significant difference between the associate and baccalaureate graduates regarding the mean number of days per week they worked in a clinical setting, in that the baccalaureate degree graduates spent less time in a clinical setting (3.3 versus 3.6 days per week) ($p=0.0032$). No significant differences were found between the baccalaureate and associate graduates in regard to the mean number of offices at which each graduate worked and the proportions who worked at a public health clinic.

Non-Private Practice Careers

The fifth section of the questionnaire focused on the positions held by the dental hygiene graduates in non-private practice (nontraditional) settings, such as teaching, research, and other dental/dental hygiene-related positions.

Dental Hygiene Faculty Positions. Eighty-four out of 736 (11.4 percent) graduates have or at

Table 4. Professional and community participation of study population

	All (N=736)	A.A./A.S. Degree (N=534)	B.A./B.S. Degree (N=202)	p-value
ADHA Member	468 (63.6%)	350 (65.5%)	118 (58.4%)	.3625
Leader	85 (18.2%*)	67 (19.1%*)	18 (15.3%*)	.3483
Other Professional Org. Member	32 (4.4%)	22 (4.1%)	10 (5.0%)	.6298
Leader	4 (12.5%*)	3 (13.6%*)	1 (10.0%*)	.6659**
Community Org. Member	220 (29.9%)	158 (29.6%)	62 (30.8%)	.7404
Leader	88 (40.0%*)	64 (40.5%*)	24 (38.7%*)	.7657

*Percentage calculated by dividing by number of members.

**The two-tail Fisher's exact test was used for this p-value.

Table 5. Clinical dental hygiene experience of study population

	All (N=736)	A.A./A.S. Degree (N=534)	B.A./B.S. Degree (N=202)	p-value
Number Currently Practicing Dental Hygiene	677 (92.0%)	489 (91.6%)	188 (93.1%)	0.4988
Days Per Week Practicing (mean \pm SD)	3.5 \pm 1.2	3.6 \pm 1.1	3.3 \pm 1.3	0.0032
Number of Offices (mean \pm SD)	1.6 \pm 0.7	1.6 \pm 0.8	1.5 \pm 0.7	0.5796
Number of Public Health Clinic Practices	11 (1.5%)	9 (1.7%)	2 (1.0%)	0.7360*

*The two-tail Fisher's exact test was used for this p-value.

one time had a dental hygiene faculty position (Table 6). The vast majority of these eighty-four graduates (seventy-three respondents; 87.0 percent) reported being clinical instructors/faculty. Other positions included mock board examiner (2.5 percent), assistant professor (3.6 percent), and consulting dental hygienist (1.2 percent). The percentage of baccalaureate graduates who held faculty positions (sixty-one; 30.3 percent) was significantly greater than the percentage of associate graduates (twenty-three; 4.3 percent) ($p<0.0001$).

Of the eighty-four graduates who held dental hygiene faculty positions, seven had full-time positions, seventy-five had part-time positions, and two did not answer. Educators from baccalaureate degree programs had more part-time/volunteer positions: 97 percent compared to 77 percent of the educators from associate degree programs ($p<0.001$).

Other Teaching Positions. Seventy-six (10.3 percent) of the respondents are or at one point had been involved in other teaching activities (Table 6). Of these, twenty-eight (41.8 percent) taught in a grammar school, twelve (17.9 percent) in a dental program, and nine (13.4 percent) in a dental assisting program. The remainder taught in a wide variety of programs/institutions, such as churches, preschools, and Head Start programs. For example, eleven respondents named positions such as giving oral hygiene instructions in elementary schools, and thirty-eight respondents specified preschool. The two groups were significantly different, with the baccalaureate degree graduates holding more of these teaching positions (14.9 percent versus 8.6 percent)

($p=0.0153$). While there were more part-time (82 percent) than full-time (18 percent) respondents in these positions, no significant difference was found between baccalaureate and associate respondents.

Research. Thirty-five (4.8 percent) graduates indicated that they were or at one time had been involved with research (Table 6). Fourteen responded that they were involved as an assistant, eighteen were independent investigators, and three were conducting research in conjunction with their responsibilities as a dental hygiene faculty member. Most respondents did not specify their position. Of the thirty-one graduates who responded to a question about the setting in which they conducted their research, three (9.7 percent) were in the corporate sector, and seventeen (54.8 percent) were in an academic setting such as a dental/dental hygiene school/university. Eleven specified "other." These locations were medical facilities, high schools, center for advanced dentistry/dental studies, private offices, and at home (via the Internet). The baccalaureate degree respondents (8 percent) had significantly greater involvement in research than did the associate degree responders (3.6 percent) ($p=0.0173$).

Dental/Dental Hygiene-Related Positions. The graduates were asked in the questionnaire whether they currently hold or had ever held a position related to a dental discipline/field other than dental hygiene clinical practice, teaching, or research. Of the 731 graduates who answered this question, sixty-eight graduates (9.3 percent) responded positively, and the two groups did not differ significantly (Table 6). Many of the positions held were clinical

Table 6. Non-private practice careers of study population

	All (N=736)	A.A./A.S. Degree (N=534)	B.A./B.S. Degree (N=202)	p-value
Faculty Positions in DH Programs	84 (11.4%)	23 (4.3%)	61 (30.3%)	<0.0001
Full-Time	7* (9.0%**)	5 (23.0%**)	2 (3.0%**)	>0.5000
Part-Time/Volunteer	75* (91.0%**)	17 (77.0%**)	58 (97.0%**)	<0.0010
Non-DH Teaching Positions	76 (10.3%)	46 (8.6%)	30 (14.9%)	0.0153
Full-Time	13 (18.0%†)	8 (18.0%†)	5 (17.0%†)	>0.5000
Part-Time	61 (82.0%†)	36 (82.0%†)	25 (83.0%†)	>0.2000
Research	35 (4.8%)	19 (3.6%)	16 (8.0%)	0.0173
Dental/DH-Related Position	68 (9.3%)	51 (9.6%)	17 (8.5%)	0.6439

*Two graduates did not specify full- or part-time.

**Percentage based on number in faculty positions.

†Percentage based on number in non-DH teaching positions.

positions, such as examiners for dental hygiene licensure exams, assistants in orthodontic clinics, dental assistants, and dental hygienist volunteers. Respondents reported that they often held these non-dental hygiene clinical positions in hospitals or public health dental clinics. Other positions had no clinical functions. Some graduates acted as consultants, dental health educators, OSHA counselors, TMJ treatment coordinators, continuing education instructors, and Healthy Smiles Program volunteers. Others were involved in sales/marketing, insurance claims and benefits services, and employment services.

Discussion

This study compared various parameters of the graduates of baccalaureate and associate degree programs and found some significant differences regarding their demographic characteristics and educational and career pathways.

Demographic Characteristics

A greater number of respondents graduated from an associate than a baccalaureate program. This finding was expected based on the numbers of dental hygiene educational programs granting each degree: fourteen (associate) versus three (baccalaureate). The uneven distribution of the numbers of respondents per institution was reflective of the numbers of students per class, as well as the numbers of years that the program was operating between the years of 1990 and 2000. For example, the University of Southern California has had a long-standing program and in the past has graduated as many as fifty students per year, more than twice the number of graduates per class in other programs. Furthermore, some programs, such as the one at Santa Rosa Junior College, were relatively new at the time of the study and thus did not have a large number of graduates.

The respondents' mean age at graduation (39.3 years) is significantly higher than the mean age of dental hygiene graduates, as reported in 1987 (24.2 years for baccalaureate degree graduates and 25.0 years for associate degree graduates).¹⁰ This age difference reflects a possible trend in the past ten years of mature women going back to school or of both men and women changing careers later in life. Because the respondents from associate programs were significantly older than the ones from baccalaureate programs, it appears that individuals who decide to pursue dental hygiene in their late thirties or early

forties seem to be less interested in obtaining a baccalaureate degree. They may already have a degree in another area of study, or they may be specifically focused on a career in clinical practice. Accordingly, younger individuals may be more interested in a baccalaureate degree in order to have the option of pursuing additional education and non-private practice careers.

The percentages of Hispanics (9.6 percent) and Asians (9.0 percent) in this study more closely reflect the population of California than the ethnic/racial distribution of dental hygiene programs nationwide. The ethnic/racial distribution of the enrollment of all United States dental hygiene programs in 1998 was 3 percent black, 4.7 percent Hispanic, 0.5 percent Native American, and 4.7 percent Asian.¹¹ A 2001 national survey of ethnic and racial minority students in dental hygiene programs reported the following distribution of students: 2.6 percent black, 4.2 percent Hispanic, 0.4 percent Native American, and 3.3 percent Asian and Pacific Islander.¹² Nationwide, the percentage of minority dental hygiene students is disproportionately lower than the racial and ethnic demographic profile of the United States. According to the 2000 U.S. census, 12.3 percent of the U.S. population was black/African American, 12.5 percent Hispanic/Latino, 3.7 percent Asian/Pacific Islander, and less than 1 percent Native American/Alaska Native.¹³ Recruiting a more racially/ethnically diverse group of students in the future may likely benefit minority groups in the population. A study by Mertz and Grumbach showed that minority dentists are more likely to practice in communities with larger proportions of minority residents.¹⁴ Minority dental hygienists may also play a role in delivering dental hygiene care to underserved minority communities. It is not known if dentists from minority populations are more or less likely to hire hygienists from minority populations, thus increasing their likelihood of practicing in underserved areas. Questions about employers and practice locations were not part of this survey.

The lack of diversity in gender is another issue that should be addressed. Gender was not queried in this study, but Rowe et al. found that males comprised only 0.9 percent of their respondents⁹ and Haden et al. reported 3 percent males of the total enrollment of dental hygiene programs in 1998.¹²

Additional Education

The observations that the baccalaureate program graduates had less time between earning their

previous degree and starting the dental hygiene program and were on the average younger than graduates of the associate programs at the time of graduation may indicate that the baccalaureate graduates had been more focused on the goal of becoming a dental hygienist. Based on our experience, baccalaureate graduates' associate degrees may have resulted from fulfilling prerequisites for a dental hygiene entry-level baccalaureate program. However, the prior degrees of the associate degree graduates may have been in a completely different field of study as these graduates had prepared for a different career pathway. It may be that, with time, these individuals became less satisfied with job opportunities in their initial fields and sought dental hygiene as a second career.

The degree that most of the associate graduates obtained after their dental hygiene program was a baccalaureate degree, which would be required before any further education. Seventy-three percent of Arkansas students currently seeking an associate degree indicated plans to complete a baccalaureate degree in the future.¹⁵ A possible explanation for the finding of a greater number of baccalaureate degree graduates achieving high-level degrees in this study is the desire at the outset and the opportunity to continue with advanced education. At the University of Washington in 1986, 61 percent of the traditional baccalaureate students had intentions for further education in the near future.¹⁶ Graduate education does not always immediately follow a baccalaureate degree. The majority of master's dental hygiene degree students at the University of North Carolina practiced clinical dental hygiene an average of five years before returning to graduate school.¹⁷

The 11.9 percent of baccalaureate graduates completing additional education is slightly lower than the percentage found by Rowe et al.⁹ for the UCSF graduates of the same decade (17 percent). This difference may be due to the fact that, in the current study, the baccalaureate pool was heavily weighted by University of Southern California graduates and, in our opinion, UCSF faculty may have encouraged students to pursue advanced education to a greater extent.

Involvement in Professional and Community Organizations

Both types of dental hygiene programs are instilling in their graduates the importance of involvement in the ADHA. The 1990s UCSF graduates had similar percentages of involvement: 61 percent

ADHA membership and 13 percent assuming leadership positions.⁹ In response to the phrase "active in dental hygiene professional organizations," Kraemer found that 32.2 percent of the baccalaureate degree and 28.6 percent of the associate degree graduates responded positively.¹⁰ Ninety-seven percent of master's degree graduates from the University of North Carolina were ADHA members, but very few held office.¹⁷ This latter finding was probably related to the fact that 66 percent of them were in academic careers and probably participated more in educational organizations, such as the American Dental Education Association.

Respondents were highly involved in their churches and in their children's education and activities. This involvement in the community may be more reflective of the general personality of those who choose dental hygiene careers, rather than the type of dental hygiene education one receives. This is confirmed by Kraemer's study, which, using Gordon's survey of interpersonal values, reported that the highest variable for both associate degree and baccalaureate degree graduates was benevolence, i.e., doing things for other people, sharing with others, helping the unfortunate, and being generous.¹⁰

Clinical Dental Hygiene Experience

When the observation that baccalaureate graduates reported working significantly fewer days than associate graduates is viewed in conjunction with other data provided by the respondents, the finding suggests that baccalaureate graduates may spend more time in non-private practice settings, such as teaching and research, and pursuing advanced education.

Also, the baccalaureate graduates were significantly younger at the time of graduation than the graduates of associate degree programs, so they may be spending more time at home with family commitments. It is possible that the associate degree graduate, being older at the time of graduation, has less extensive family commitments and needs or desires the financial advantages of working more days per week. Questions were not asked about personal and family activities and responsibilities, so these comments are speculative.

The low percentage of graduates employed in public health may be due to the shortage of public health positions in California. Since this study included graduates from only ten years after gradu-

ation, the few available public health positions may be filled by more senior dental hygienists. Also, the salary offered in these positions is usually lower than private practice, and in our opinion, recent graduates may be focused on relieving their financial debts from educational expenses.

Non-Private Practice Careers

As described by Rigolizzo and Forrest, an important purpose of baccalaureate dental hygiene education is preparation of the dental hygienist for responsibilities and careers in various career roles beyond traditional clinical hygiene practice.⁸

Dental Hygiene Faculty Positions. The vast majority of the respondents who held a dental hygiene faculty position were part-time clinical instructors. Based on our experience, this may be due to the lack of available full-time faculty positions or an economic issue due to the large disparity in salaries between private practice and educational institutions. Another alternative is that the full-time faculty are older, having graduated before the year 1990, and not captured in this population. Ages for full-time faculty at Canadian dental hygiene programs have been reported to be much higher than part-time faculty: 47 percent were more than forty-nine years old, while only 19 percent of part-time faculty were in that range.¹⁸

The higher percentage of baccalaureate graduates (30.3 percent) than associate degree graduates (4.3 percent) in dental hygiene faculty positions is not surprising. Associate programs focus primarily on preparing dental hygienists for clinical practice, and their crowded professional curricula afford minimal opportunities to instruct students in educational theory and research methods. Furthermore, the graduates of baccalaureate programs leave their dental hygiene programs with a baccalaureate degree, so they are immediately qualified for faculty positions, which generally require this degree. These baccalaureate graduates may be more interested in broadening their horizons by dividing their time between clinical dental hygiene and faculty positions. The percentages of dental hygienists who are functioning in some capacity as educators in this study (30.3 percent) and the percentages of educators found by Rowe et al. for the same decade (30.5 percent) are similar.⁹ This is an indication that graduates of baccalaureate dental hygiene programs in California assume positions as educators as well as clinicians. This is an important finding at a time when shortage of dental hygiene educators is an ongoing issue.

In a 2002 survey of allied dental programs accredited by the Commission on Dental Accreditation, Nunn et al. found that 36 percent of the 188 responding dental hygiene programs currently had unfilled faculty vacancies.¹⁹ Various factors contribute to this existing faculty shortage. The growing number of associate degree dental hygiene programs and the requisite low student/faculty ratio create a high demand for faculty. The high demand is compounded by the aging of the current faculty, which will create a greater need in the future. In the Nunn et al. survey, 68 percent of the responding institutions indicated that within five years they would need to replace current full-time faculty, mostly due to retirement.¹⁹ The mean age of the full-time faculty members in dental hygiene education was reported to be forty-six years in 2003.¹⁹

Since graduates of baccalaureate programs are more often the individuals who are educating dental hygiene students, the elimination of these programs is detrimental to the future of dental hygiene education. The number of associate degree programs, all needing educators, is increasing at the same time as the number of entry-level baccalaureate programs providing educators is decreasing. In the past twenty years, many baccalaureate programs have closed,⁵ and at present baccalaureate degree programs represent less than 12 percent of all the dental hygiene programs.¹ It is a concern that, in the near future, there will not be enough qualified dental hygiene educators.

Other Teaching Positions. The question of holding other types of teaching positions was interpreted by most respondents as meaning any type of teaching or instructional activity—for example, giving oral hygiene instructions in elementary schools. This explains the high response to part-time positions. The intent of the question was to determine employment in a higher education institution. Few respondents reported teaching in a dental or dental assisting program, which was also observed by Rowe et al.⁹: only 5.1 percent were teaching in dental assisting programs.

Research. Because the questionnaire queried the involvement, rather than employment, of graduates in research, it appears that some graduates responded with a broad interpretation of research participation. Many of the respondents who reported they were involved in research did not indicate a specific position, and home (the Internet) was selected as a setting by 4.3 percent of respondents. The three graduates who indicated conducting research in con-

junction with their responsibilities as a dental hygiene faculty member were the same respondents who indicated working in an academic setting. Based on our experience, it is likely that the other respondents who selected working in academic settings may be assisting in clinical research.

The observation that baccalaureate degree respondents had significantly greater involvement in research than associate degree responders may be related to the content of these graduates' educational programs. Responses from a survey investigating the use of evidence-based philosophies in dental hygiene education demonstrated greater emphasis on research as a component of the curriculum in baccalaureate programs than in non-baccalaureate programs.²⁰ Furthermore, since the baccalaureate dental hygiene programs are within four-year institutions, these graduates may have had more exposure to research and be more knowledgeable and involved in this area. The majority of positive respondents reported conducting research in an academic setting within dental/dental hygiene schools and universities, which supports this view.

These results showed a higher percentage (8.0 percent) of subjects with baccalaureate degrees who reported they were involved in research than Rowe et al. found for UCSF graduates (3.8 percent).⁹ The difference may be due to the UCSF study asking if they were "employed in a position that involves research," while our study queried "involvement in research."

Dental/Dental Hygiene-Related Positions.

Few respondents indicated that they were employed in a position related to the dental and dental hygiene field, but not in private practice, teaching, or research. These positions included both clinical and administrative functions. By title, most of these positions appeared to be part-time. The respondents indicated that the training and experience needed for these positions were primarily on-the-job training and dental hygiene license. Some of these positions outside of practice, teaching, or research required computer, sales, and marketing backgrounds.

The lack of significant difference between associate and baccalaureate graduates regarding the percentage of graduates employed in these dentally related positions is logical when one considers the training or experience required for the position. On-the-job training and dental hygiene license could apply equally to each type of graduate. The baccalaureate degree may not offer any advantage. Also, 39 percent of respondents indicated that they

were uncertain of the highest degree required for the position.

Limitations of the Study

A major limitation of this study was the smaller sample size than statistically determined as the number needed to detect a 10 percent difference between the career pathways of the two groups of graduates. This resulted from various unforeseen factors—one being that we did not anticipate the large number of California-licensed dental hygienists who were educated outside of California. The inclusion/exclusion criteria for study subjects were established prior to the collection of the data. We chose to include only graduates of California dental hygiene programs because we were more familiar with the curriculum and requirements for admission of these programs.

The number of subjects was 736, smaller than the targeted number of 1,352, influencing the power to detect small differences. Due to the smaller sample size obtained, some differences between the two types of programs may not have been statistically detected.

Conclusions

This study compared various characteristics of graduates of the two types of entry-level dental hygiene programs (associate and baccalaureate) and found some significant differences between their advanced education and career pathways.

The major conclusion of this study is that graduates of baccalaureate educational programs are more likely than graduates of associate degree programs to be involved in non-private practice positions, such as teaching and research. Thirty percent of baccalaureate graduates, compared to 4 percent of associate graduates, held positions as dental hygiene educators. This finding is noteworthy at a time when the shortage of dental hygiene educators is an ongoing concern. Respondents from baccalaureate programs were also more likely to participate in other teaching or instructional activities and research. Accordingly, they practiced clinical dental hygiene significantly fewer days per week. From these findings, one can draw two alternative conclusions. First, the baccalaureate educational program itself is preparing students for careers extending beyond private practice. The additional time in the curriculum for coursework and experiences in areas other than the learning of clinical dental hygiene skills gives students opportunities to

increase their depth and breadth of knowledge. An alternative suggestion is selection bias: those who select the baccalaureate program already desire the option of pursuing additional education and non-private practice careers. Future studies should focus on identifying reasons why students choose to attend one type of dental hygiene program rather than the other and when and how subsequent career decisions are made.

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