

Education About Dental Hygienists' Roles in Public Dental Prevention Programs: Dental and Dental Hygiene Students' and Faculty Members' and Dental Hygienists' Perspectives

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Abstract: In 2005, Public Act No. 161 (PA 161) was passed in Michigan, allowing dental hygienists to practice in approved public dental prevention programs to provide services for underserved populations while utilizing a collaborative agreement with a supervising dentist. The aims of this study were to assess how well dental and dental hygiene students and faculty members and practicing dental hygienists have been educated about PA 161, what attitudes and knowledge about the act they have, and how interested they are in additional education about it. University of Michigan dental and dental hygiene students and faculty members, students in other Michigan dental hygiene programs, and dental hygienists in the state were surveyed. Respondents (response rate) were 160 dental students (50%), 63 dental hygiene students (82%), 30 dental faculty members (26%), and 12 dental hygiene faculty members (52%) at the University of Michigan; 143 dental hygiene students in other programs (20%); and 95 members of the Michigan Dental Hygienists' Association (10%). The results showed that the dental students were less educated about PA 161 than the dental hygiene students, and the dental faculty members were less informed than the dental hygiene faculty members and dental hygienists. Responding dental hygiene faculty members and dental hygienists had more positive attitudes about PA 161 than did the students and dental faculty members. Most of the dental hygiene faculty members and dental hygienists knew a person providing services in a PA 161 program. Most dental hygiene students, faculty members, and dental hygienists wanted more education about PA 161. Overall, the better educated about the program the respondents were, the more positive their attitudes, and the more interested they were in learning more.

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The beginnings of the dental hygiene profession in the U.S. date back to the 1800s,¹ and the term “dental hygienist” was officially introduced in 1913.^{2,3} Since the inception of this profession, dental hygiene professionals have considered themselves to have a responsibility for the oral health of the general public.^{3,4} More recently, the challenges for many to access oral health care services⁵ have newly ignited the discussion of how dental hygienists can contribute to improving the oral health of communities at large.^{6,7}

One central question has been which level of supervision dental hygienists should have. Dental

hygienists in all U.S. states are licensed health care providers who must have graduated from one of 334 accredited dental hygiene programs and must have successfully completed a national written licensure examination as well as a state or regional clinical examination.^{8,9} In addition, dental hygienists in 48 states and the District of Columbia are required to participate in continuing education activities as part of the licensure renewal process.¹⁰

Dental hygienists in the U.S. work in various types of settings and, depending on the state practice act, are required to have varying levels of supervision. A direct access model implies that dental hygien-

ists can initiate treatment based on their assessment of patients' needs without specific authorization of a dentist, treat patients without the presence of a dentist, and maintain a provider-patient relationship.¹¹ The direct access model was introduced in the 1980s and is today endorsed by 35 U.S. states.¹² Every state allows some treatments to be provided without the supervision of a dentist; administration of prophylaxis, sealants, and fluoride is included in the majority of the 35 states who use this model.¹² Catlett and Greenlee provided a helpful overview of the dental hygiene supervision changes from 1993 to 2000 and from 2001 to 2011 that describes for each of the 50 U.S. states changes concerning 11 types of services.⁷ Based on this analysis, they concluded that there was a decrease in the needed supervision for these 11 types over that time span.

The American Dental Hygienists' Association (ADHA) describes the benefits of the direct access model by pointing out how it increases care for underserved populations such as children, older adults, or patients living in remote areas.¹² Research by the Health Resources and Services Administration (HRSA)'s National Center for Health Workforce Analysis documented dental hygiene efforts in all 50 U.S. states and their impact on improving access to care for underserved patients.^{13,14} Their findings provided ample evidence for the benefits of involving dental hygienists in direct access models.¹⁵

In Michigan, Public Act No. 161 (PA 161) was passed by the legislature in 2005 to expand the settings for dental hygienists to provide preventive dental hygiene services for underserved populations. Under PA 161, a "dental hygienist may perform dental hygiene services under the supervision of a dentist as part of a program for dentally underserved populations in the state conducted by a local, state, or federal grantee health agency for patients who are not assigned by a dentist."¹⁶ Dental hygienists who want to provide services under PA 161 have to be part of a nonprofit or public program that submits an application to the Michigan Department of Community Health that describes the prevention program. Programs also need a collaborative agreement with a supervising dentist and have to follow reporting requirements. A report on the activities administered by PA 161 found 51 active PA 161 programs in Michigan in 2012.¹⁶ Between October 2011 and October 2012, dental hygienists in PA 161 programs screened 4,235 adults and 28,599 children, provided prophylaxis for 19,855 children and 3,968 adults, and applied fluoride varnish for 27,615 patients.¹⁷

When we consider the benefits of these activities for underserved populations, the question arises of how these services could be expanded throughout the state. A first step would be to ensure that all dentists and dental hygienists are educated about the program and its benefits. The fact that dental hygienists can practice under PA 161 only if they have a collaborative agreement with a supervising dentist points to the importance of ensuring that sufficient numbers of dentists are informed about the program and willing to participate. The aims of this study therefore were to explore how well educated dental and dental hygiene students and faculty members as well as practicing dental hygienists in Michigan are about PA 161, what attitudes they hold about this program, and how interested they are in learning more about it. Relationships among these variables were explored as well.

Methods

The Institutional Review Board for the Behavioral and Health Sciences at the University of Michigan determined that this study was exempt from oversight (#HUM00065648). University of Michigan dental and dental hygiene students and faculty members, students in other Michigan dental hygiene programs, and dental hygienists in the state were surveyed regarding their knowledge and attitudes about PA 161. An a priori power analysis with the program package G*Power 3.1.2 (www.psych.uni-duesseldorf.de/abteilungen/aap/gpower3) was conducted to compute the needed sample size given $\alpha=0.001$, the power=0.95, and a medium to small effect size of $\rho=0.2$, for testing if there were significant relationships among respondents' educational experiences, attitudes, and interests. This analysis showed that a minimum of 543 subjects would be required to have the power to test the one-sided hypotheses that there were significant relationships among these variables. The final sample size of $N=545$ was therefore sufficient to test our hypotheses.

Data from dental and dental hygiene students at the University of Michigan were collected with paper-and-pencil surveys at the end of regularly scheduled classes. The students were informed about the study and asked to voluntarily complete the anonymous surveys and return them in sealed envelopes to the investigators. Dental and dental hygiene faculty members at the University of Michigan received a survey and recruitment cover letter in their mailboxes

and returned the paper surveys in sealed envelopes anonymously to the researchers. Emails were sent to the directors of the other 12 dental hygiene programs in Michigan with a request to forward the recruitment email to their students and faculty members, asking them to respond to web-based surveys via a weblink in the message. The dental hygienists were recruited with the help of leaders of the Michigan Dental Hygienists' Association (MDHA), who forwarded a recruitment email with a web-link to the survey to their members. The web-based version of the survey was provided on the University of Michigan UM Lessons website, which allows collecting anonymous survey data in a secure manner.

The questionnaire consisted of five parts. Part 1 asked for information about the respondents' general background, educational experiences, and practice considerations. Part 2 inquired about sources of information about PA 161 and Part 3 about how familiar respondents were with various aspects of PA 161. Part 4 measured attitudes concerning the program, and Part 5 asked which specific knowledge about the program respondents had and if they wanted more information. The survey was pretested with nine dental hygienists and part-time dental hygiene faculty members. Based on feedback from these respondents, stylistic changes were made.

The following indices were constructed. A sum of informational sources score was computed by assigning one point for each "yes" response to questions asking whether respondents had received information from six sources and totaling those points (range of scores: 0=no sources of information to 6=information received in all six ways). A familiarity index was computed by averaging the responses to the four familiarity questions (range: 1=no familiarity to 3=very familiar; Cronbach's $\alpha=0.929$). An attitude index was computed by averaging responses to the five attitudinal questions (range: 1=strongly disagree to 5=strongly agree/most positive attitude; Cronbach's $\alpha=0.950$). A sum of knowledge score was constructed by adding one point for each "yes" response to two questions concerning whether respondents knew a person in a PA 161 program or knew a program made possible by PA 161 (range: 0=no knowledge to 2=highest level of knowledge).

The data were analyzed with SPSS Version 21 (IBM Corp., Armonk, NY, USA). Descriptive statistics such as percentages and means were computed to provide an overview of the responses. Inferential statistics were used to test whether the answers of

the respondent groups differed (for categorical responses: chi-square tests; for continuous responses: univariate analyses of variance). Pearson correlation coefficients were computed to assess relationships among the continuous variables, and Kendall tau coefficients determined the association between the desire to receive more information and the other variables of interest. A Bonferroni correction was used because numerous statistical tests were being performed simultaneously. To avoid a large number of spurious positives, the alpha value was lowered to $p<0.01$ to account for the number of comparisons being performed.

Results

Survey respondents included 160 of the 320 first- to third-year dental students (response rate 50%) and 63 of the 77 dental hygiene students (response rate 82%) at the University of Michigan. Faculty respondents were 30 of the 116 full-time dental faculty members (response rate 26%) and 12 of the 23 full- and part-time dental hygiene faculty members (response rate 52%) at the university. Among the practicing dental hygienists, participants were 95 of the approximately 1,000 members of the MDHA (response rate 10%).

In addition, 143 of the approximately 710 dental hygiene students enrolled in other dental hygiene programs in this state responded to the web-based survey (response rate 20%). Forty-two dental hygiene faculty members from those programs responded as well. Responses were received from students and faculty in only ten of the other 12 programs in Michigan. It is unclear whether the directors of the other two programs did not forward the emails or if no students and faculty members from those programs responded.

An overview of the respondents' characteristics showed that the vast majority of the dental hygiene students and all dental hygiene faculty members and dental hygienists were female and that 56% of the dental students and 57% of the dental faculty members were male (Table 1). The average age of the faculty members and licensed dental hygienists was 49-50 years, with ages ranging from the 20s to the high 60s. Most respondents were European American in race/ethnicity. While all dental students and dental faculty members were from the University of Michigan School of Dentistry, the dental hygiene students attended ten programs in the state of Michigan. The dental and dental hygiene faculty members and the

Table 1. Overview of respondents' characteristics and numbers by type of survey

Type of Survey/ Characteristic	Dental Students N=160	Dental Hygiene Students N=206	Dental Faculty N=30	Dental Hygiene Faculty N=54	Dental Hygienists N=95
Type of survey (N)					
Paper and pencil	160	63	29	12	0
Web-based	0	143	1	42	95
Gender					
Male	56%	19%	57%	0	0
Female	44%	81%	43%	100%	100%
Age in years					
Mean	24.6	25.0	49	50.4	50.3
SD	3.1	4.5	12.9	12.0	11.9
Range	21-40	18-43	22-67	22-67	24-70
Race/ethnicity					
African American	1%	7%	10%	6%	2%
Asian American	23%	25%	13%	0	4%
European American	69%	60%	57%	74%	79%
Hispanic	2%	4%	10%	0	0
Other	3%	4%	10%	20%	4%
Year in program/year graduated	1st year: 100 2nd year: 22 3rd year: 38	1st year: 99 2nd year: 55 3rd year: 52	Mean:1990 SD: 12.917 1971-2014	Mean:1988 SD: 13.714 1965-2013	Mean:1988 SD: 13.277 1962-2014
Programs attended	University of Michigan	10	12	12	12
Type of employment	Desired	Desired	n/a	n/a	Actual
Solo practice	54%	51%			66%
Group practice	35%	40%			21%
Faculty practice	3%	6%			3%
FQHC	3%	3%			3%
Nonprofit clinic	1%	1%			7%
Other	4%	1%			0

Note: Percentages may not total 100% because of rounding.

licensed dental hygienists had graduated from a total of 12 schools or programs.

Just over half of the responding students in both the dental and dental hygiene programs wanted to work in solo practices, with the next most frequently named choice being to work in group practices. Only 3% reported wanting to work in a dental clinic in a Federally Qualified Health Center (FQHC) and only 1% in a community/nonprofit clinic. Among the practicing dental hygienists, a higher percentage actually worked in a community clinic (7%) or in a dental clinic in an FQHC (3%).

Responses concerning from which sources the respondents had received information about PA 161 showed that only 33% of the dental students and 66% of the dental hygiene students were familiar with this program (Table 2). While the vast majority of the dental hygiene faculty members (94%) and licensed

dental hygienists (92%) were familiar with PA 161, only 57% of the dental faculty members reported familiarity with this program.

Only 45% of the dental students had heard about PA 161 during their education, and 23% had heard about it from their peers. Most dental hygiene students (82%) had received information during their dental hygiene education and 33% from their professional association. The two most common sources of information for the faculty members were their professional associations (dental hygiene faculty 73%, dental faculty 65%) and their colleagues (64%, 62%). In contrast, 89% of the dental hygienists had received information through media and 71% in continuing education courses.

Large percentages of the dental hygiene students reported having heard of the program in formal presentations from instructors (68%) and guest speak-

Table 2. Responses to questions about familiarity with PA 161 and sources of information about it

Item	Dental Students N=160	Dental Hygiene Students N=206	Dental Faculty N=30	Dental Hygiene Faculty N=54	Dental Hygienists N=95
Are you familiar with PA 161? % Yes	33%	66%	57%	94%	92%**
I heard about it during/through:					
Dental/dental hygiene education	45%	82%	22%	30%	25%**
Professional association	19%	33%	65%	73%	47%**
CE course	n/a	n/a	29%	35%	71%**
Colleagues	23%	23%	62%	64%	24%**
Media	5%	11%	9%	6%	89%**
Other ways	15%	18%	4%	23%	37%*
Did you hear in:					
Formal presentation by instructor	32%	68%	13%	47%	33%**
Formal presentation by guest speaker	21%	56%	25%	54%	42%**
Informally through my instructors	17%	44%	16%	44%	22%**
Informally through classmates/other peers	21%	30%	16%	52%	53%**
Another way	9%	14%	38%	33%	65%**
In which program?					
Predoctoral dental program	n/a	n/a	33%	0	0**
Dental hygiene program	n/a	n/a	50%	94%	15%**
Graduate program	n/a	n/a	67%	0	6%**

Note: Respondents on the multiple-choice questions could check all that applied.

* $p \leq 0.01$; ** $p \leq 0.001$

ers (56%) and reported being informally introduced to it by instructors (44%) or peers (30%). In contrast, smaller percentages of the dental students reported having had any of these educational experiences. This pattern was repeated in the responses of the two faculty groups, with the dental hygiene faculty members reporting higher percentages of educational experiences compared to the dental faculty members. The practicing dental hygienists had received most of their information about the program through other ways (65%), such as the Michigan Department of Community Health, colleagues in their professional organization, or their own involvement in a PA 161 program. The second most common response was that they had received information from their peers (53%).

When the respondents were asked how familiar they were with the PA 161 law, with the organizational requirements of PA 161 programs, and with an active PA 161 program, about three out of four dental students and one out of two dental hygiene students were not at all familiar with these issues. While only small percentages of the dental faculty members reported being very familiar with these issues, about four out of five dental hygiene faculty

members and dental hygienists were somewhat or very familiar with these issues (Table 3).

The responses to the five items measuring attitudes about the PA 161 program showed that the five respondent groups differed significantly in their responses (Table 4). Post hoc pairwise comparisons showed that the dental hygiene faculty members had more positive attitudes than both student groups and the dental faculty members concerning all five statements. The dental hygienists were as positive as the dental hygiene faculty members in their responses to the first, fourth, and fifth statements (“PA161 Public Dental Prevention Programs assist in providing care for the underserved”; “I would like to see more PA161 programs in our state”; and “I like the possibilities that PA161 offers for patient care”). Compared to the dental hygiene faculty members, the responding dental hygienists were less positive in their responses to the second and third statements (“PA161 Public Dental Prevention Programs should be increased” and “Services provided under this law make a difference for underserved patients in our state”). Overall, the dental hygiene faculty members were more positive than all other groups,

Table 3. Respondents' degree of familiarity with PA 161-related issues

Item	Dental Students N=160	Dental Hygiene Students N=206	Dental Faculty N=30	Dental Hygiene Faculty N=54	Dental Hygienists N=95
Familiar with the PA 161 law passed in 2005:					
1. Not at all familiar	72%	46%	41%	11%	16%*
2. Somewhat familiar	25%	50%	45%	48%	48%
3. Very familiar	4%	4%	14%	41%	36%
Familiar with differences in the Public Health Code between assignment of procedures to a dental hygienist and remote supervision of patient care:					
1. Not at all familiar	75%	47%	35%	19%	23%*
2. Somewhat familiar	21%	47%	48%	43%	45%
3. Very familiar	4%	6%	17%	38%	32%
Familiar with an active PA161 Public Dental Prevention Program that offers dental hygiene service to the underserved:					
1. Not at all familiar	75%	45%	41%	7%	16%*
2. Somewhat familiar	21%	45%	41%	44%	48%
3. Very familiar	4%	9%	17%	48%	36%
Familiar with the fact that PA161 is managed by the Michigan Department of Community Health Oral Health Program:					
1. Not at all familiar	77%	47%	48%	19%	17%*
2. Somewhat familiar	20%	45%	28%	40%	41%
3. Very familiar	4%	7%	24%	40%	42%

Note: Question was worded as "How familiar are you with the following issues?"

*p≤0.001

Table 4. Mean attitudinal responses concerning PA 161

Statement	Dental Students N=160	Dental Hygiene Students N=206	Dental Faculty N=30	Dental Hygiene Faculty N=54	Dental Hygienists N=95
PA161 Public Dental Prevention Programs assist in providing care for the underserved.	3.45	3.83	3.68	4.57	4.19*
PA161 Public Dental Prevention Programs should be increased.	3.08	3.59	3.61	4.54	4.16*
Services provided under this law make a difference for underserved patients in our state.	3.23	3.72	3.61	4.50	4.25*
I would like to see more PA161 programs in our state.	3.04	3.61	3.54	4.46	4.15*
I like the possibilities that PA161 offers for patient care.	3.20	3.73	3.86	4.50	4.27*

Note: Response options were 1=strongly disagree, 2=disagree, 3=neutral, 4=agree, and 5=strongly agree.

*p≤0.001

and the dental students were less positive than all other groups.

Responses to the questions about what the respondents knew about the PA 161 program mirrored those attitudinal responses to some degree (Table 5). Again, high percentages of the dental hygiene faculty members and dental hygienists agreed that they knew a person who provided services in a PA 161 program or a program that was established due to PA 161.

The dental students again had the lowest percentage of "yes" responses to those two questions, with the dental hygiene students and dental faculty members having intermediate percentages of "yes" responses.

Responses to the next two questions (Table 5) have to be considered separately for the dental and dental hygiene students vs. the respondents in the other groups. For the dental and dental hygiene students, these questions inquired if they knew a dental hygien-

Table 5. Responses related to knowledge about PA 161 and respondents' interest in this program

Question	Dental Students N=160	Dental Hygiene Students N=206	Dental Faculty N=30	Dental Hygiene Faculty N=54	Dental Hygienists N=95
Do you know:					
A person who provides services under PA161? % yes	3%	17%	39%	70%	51%
Of a program that is possible because of PA161? % yes	6%	20%	26%	67%	50%
Do you know/are you or have you been [†]					
A dental hygienist in a PA161 program? % yes	3%	44%	5%	27%	17%
A supervising dentist in a PA161 program? % yes	32%	23%	15%	0	0
How much do you disagree/agree with the following statement?					
I know what PA161 is all about.* Mean	2.02	2.89	2.79	3.76	3.47*
Interest					
Are you interested in more information about PA161 programs? % yes	44%	56%	48%	64%	54%
I would like to participate in a PA161 program.* Mean	2.72	3.26	3.14	3.65	3.43*

[†]For dental and dental hygiene students, the two questions were formulated as "Do you know..." For dental and dental hygiene faculty members and dental hygienists, the questions were formulated as "Are you currently or have you been..."

*Response options were 1=strongly disagree, 2=disagree, 3=neutral, 4=agree, and 5=strongly agree.

*p≤0.001

ist or a supervising dentist in a PA 161 program. While 44% of the dental hygiene students knew a dental hygienist in a PA 161 program, only 3% of the dental students knew one. Concerning knowing a supervising dentist, the responses were reversed: 32% of the dental students but only 23% of the dental hygiene students knew a supervising dentist. For the faculty members and dental hygienists, these two questions inquired whether they had been in the past or were currently actively involved in a PA 161 program. While 27% of the dental hygiene faculty members reported involvement, only 15% of the dental faculty members indicated past or current involvement.

The five groups of respondents differed significantly in their responses to the questions about how much they knew what PA 161 is all about and how much they would like to participate in a PA 161 program (Table 5). Post hoc pairwise comparisons showed that the dental students had less positive responses than the other four groups of respondents, while the dental hygiene faculty members had more positive responses than the students and the dental faculty members and equally positive responses as the dental hygienists. Nearly half of the dental students and faculty members and the majority of the dental hygienists agreed that they wanted to have more information about PA 161. However, the dental students were least likely to want to participate in a PA 161 program, while the respondents in the other

groups were on average at least neutral if not slightly positive about potential participation.

Table 6 provides an overview of the relationships among respondents' age, students' year in their program, the number of informational sources, familiarity with and attitudes about this program, knowledge, and interest. The students' year in their programs did not significantly correlate with the number of informational sources. However, the longer they were in their programs, the more positive their attitudes, and the more knowledge they had about PA 161. In addition, the more information the respondents had, the more familiar they were with the program. The more positive their attitudes, the more knowledge they had, and the higher their interest. The respondents' level of familiarity was correlated with their knowledge, attitudes, and interest in participating in a PA 161 program. Their attitudes were positively related to their level of knowledge and interest.

Discussion

The Michigan PA 161 program is a direct access model that designates public or nonprofit agencies to administer a public dental prevention program that allows licensed dental hygienists to perform dental hygiene services under the supervision of a

Table 6. Relationships between respondents' age and level of education, sum of sources of information and types of education, and average familiarity and attitudes, knowledge, and interest concerning PA 161

	Students: Year in Program	Sum of Info Sources ^a	Familiarity Index ^b	Attitude Index ^c	Sum of Knowledge ^d	Single Item: Knowledge ^e	Interest to Know ^f	Interest to Participate ^g
Age	0.19***	0.30***	0.48***	0.33***	0.47***	0.38***	0.07	0.08
Students: year in program	–	0.04	0.11*	0.17***	0.22***	0.15**	0.10	0.04
Sum of info sources		–	0.52***	0.21***	0.39***	0.39***	0.31***	0.20***
Familiarity index: alpha=0.929			–	0.36***	0.65***	0.70***	0.19**	0.27***
Attitude index: alpha=0.950				–	0.40***	0.41***	0.35***	0.56***
Sum of knowledge					–	0.53***	0.07	0.45***
Single item: knowledge						–	0.08	0.30***
Interest to know							–	0.36***

Note: Pearson correlation coefficients were computed to determine relationships between variables.

*p<0.05; **p<0.01; ***p<0.001

^aThe “Sum of Informational Sources” score was computed by adding one point for each “yes” response to questions of whether the respondent had received information about PA 161 from six different sources (see Table 2 for wording of questions). Scores ranged from 0=no sources of information to 6=information received in all six ways.

^bThe “Familiarity Index” score was computed by averaging the responses to the four familiarity questions (see Table 3 for wording of questions). Response options ranged from 1=strongly disagree (most negative attitude) to 5=strongly agree (most positive attitude).

^cThe “Attitude Index” score was computed by averaging the responses to the five attitudinal questions (see Table 4 for wording of questions.) Response options ranged from 1=strongly disagree (most negative attitude) to 5=strongly agree (most positive attitude).

^dThe “Sum of Knowledge” score was computed by adding one point for each “yes” response to the two knowledge questions (see Table 5 for wording of questions). Scores ranged from 0=no knowledge to 2=highest level of knowledge.

^eThe “Single Item: Knowledge” score was measured with responses to the statement “I know what PA161 is all about.” Response options were on a five-point scale from 1=disagree strongly to 5=agree strongly.

^f“Interest to Know” was assessed with a single item: “Are you interested in more information about the PA 161 program?” Correlations with this variable were determined with contingency coefficients. To compute the contingency coefficient for this variable and the variable “Age,” “Age” was categorized by quartiles of responses into four groups (18-22 years; 23-25 years; 26-40 years; 41-70 years). To compute the contingency coefficient for this variable and the average attitude scores, the average attitude scores were categorized by quartiles of responses into four groups (<3; 3-3.5; 3.51-4.17; >4.17).

^g“Interest to Participate” was measured with responses to the statement “I would like to participate in a PA161 program.” Response options were on a five-point scale from 1=disagree strongly to 5=agree strongly.

dentist as part of a program for dentally underserved populations that is conducted by a local, state, or federal grantee health agency for patients who are not assigned by a dentist.¹⁶ Each year since its inception, this program has provided extensive and much needed care for underserved patients in Michigan.¹⁷ One question is whether dentists and dental hygienists in the state are educated about this program and its benefits for underserved patients. This study addressed this question by exploring whether future dental care providers—namely, dental and dental hygiene students—had received the education needed to inform them sufficiently about this program and thus potentially become engaged in PA 161 programs after graduation.

The results showed that the majority of these dental students lacked education about this program and its specific aspects and that only a very small

group of students knew a person who provides services in a PA 161 program or knew of a PA 161 program. While the majority of the dental hygiene students were well aware of and more familiar with PA 161, only one in five of those students knew a person working in such a program or an actual program. This finding is mirrored by the fact that lower percentages of dental faculty members than dental hygiene faculty members were knowledgeable about this program.

These findings raise the question of how information about PA 161 programs could be distributed to all dental and dental hygiene faculty members in Michigan to ensure they can inform future dental providers about this program. A positive factor that could be valuable in this context is the fact that a recent survey of deans of 44 of the then-58 U.S. dental schools found that these leaders were rather posi-

tive concerning expanding the scope of practice of dental hygienists and even dental assistants.¹⁸ These results provided evidence that the deans were aware that such increased services would improve access to care for underserved patients and agreed that the quality of patient care provided by these professionals would not be a problem. These findings are very encouraging because they indicate positive attitudes that could translate into proactive leadership efforts, for example, in regard to faculty development. A second consideration is that increasing numbers of dental and dental hygiene students participate in community-based education.¹⁹ This type of education is uniquely positioned to introduce students to programs covered by PA 161 and thus allow them to gain a clearer understanding of the contributions such a program can make to increasing care for underserved populations.

In addition, this survey assessed attitudes concerning the PA 161 program. The data showed that attitudes differed significantly as a function of whether the respondents were in the dental vs. dental hygiene field and whether they were students, faculty members, or practicing clinicians. Again, dental students and faculty members had the least positive attitudes, while dental hygiene faculty members and dental hygienists were very positive concerning PA 161. The fact that the respondents' familiarity and degree of education were positively correlated with their attitudes is not surprising because it is consistent with the findings from earlier studies. This previous research investigated the role of education of dental students,^{20,21} general dentists,^{22,23} endodontists and endodontic residents and faculty members,²⁴ periodontists,²⁵ and orthodontists and orthodontic residents²⁶ about their professional attitudes and behavior related to providing care for underserved populations. These studies consistently found that the better these providers were educated in classroom, clinical, or community-based settings about providing care for underserved patients, the more positive their attitudes, and the more likely they were to provide services for vulnerable populations.

No research so far has explored the direct effects of community-based dental and dental hygiene education in a PA 161 program on the participants' attitudes and behavior. Such research could be helpful in gaining a better understanding of how future dental providers in Michigan can be optimally educated to provide care for underserved populations and the potential for programs covered by PA 161 and the possibilities of engaging in them. Ultimately, having

dental hygienists provide preventive oral health care services is likely to result in long-term savings by reducing the need for more costly dental procedures.²⁷

This study had three limitations. First, the findings pertain only to Michigan and may not be generalizable to other states with different policies and historical situations. Second, while the state of Michigan has two dental schools, data were collected from only the public school. However, data were collected from students in ten of the 13 dental hygiene programs in this state and from faculty members and dental hygienists who had graduated from all 13 programs. It is unclear if students and faculty members at the second dental school would have responded similarly to their peers from the public school. Finally, the response rates were not optimal. For example, while the MDHA forwarded the recruitment email to approximately 1,000 members, only 95 responded. It should be noted that response rates for surveys were reported in 2007 to have declined,²⁸ a decrease also reported for electronic surveys.²⁹ A study of practicing dentists published in 2012 found that response rates were better for postal mail surveys (28%) than for web-based surveys (11%).³⁰

Conclusion

Based on our findings in this study, the following conclusions can be drawn. The dental students and faculty members who participated in the study lacked education about the PA 161 program, with less than half of the students having learned about it during their dental education. While the majority of the dental hygiene students had received information in their educational program, most of the dental hygiene faculty members had been informed about PA 161 through professional associations and colleagues, and most of the dental hygienists relied on information from CE courses and media. Increased educational efforts are needed in dental programs. Most of the dental students, fewer than half of the dental hygiene students and dental faculty members, and only a minority of the dental hygiene faculty members and dental hygienists were unfamiliar with various aspects of this program. The dental hygiene faculty members and dental hygienists had positive attitudes about this program and were likely to know a person who provides services in a PA 161 program or knew a PA 161 program, while the dental students were largely neutral in their attitudes and did not know anyone who participated in a PA 161 program.

Less than half of the dental students and faculty members were interested in learning more about PA 161, while the majority of dental hygiene students and faculty members and dental hygienists were interested in learning more. Overall, the more familiar the respondents were with the PA 161 program, the more positive their attitudes, and the more they wanted to participate in this program. Informational/educational interventions aimed at raising awareness and knowledge about this program are needed.

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