A Retrospective Comparison of Dental Hygiene Supervision Changes from 2001 to 2011

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Abstract

Purpose: The purpose of this study is to evaluate the extent of change in the professional practice environment for dental hygienists in the 50 states and District of Columbia by comparing the state supervision requirements for dental hygienists during 2001 to 2011 to the previous 7 year period, 1993 to 2000.

Methods: A retrospective comparison evaluation was conducted using the 2 tables entitled "Tasks Permitted and Mandated Supervision of Dental Hygienists by State, 1993, 1998 and 2000" and "Dental Hygiene Practice Act Overview: Permitted Functions and Supervision Levels by State." To score the net change in supervision, a numerical score was assigned to each level of alteration in supervision with a +1 or -1 for each level of change.

Results: With a 95% confidence level, the mean change in dental hygiene supervision from 2001 to 2011 was 6.57 with a standard deviation of 5.70 (p-value=0.002). The mean change of supervision from 1993 to 2000 was 2.61 with a standard deviation of 4.36 (p-value=0.0002). The difference in the mean scores for the periods 1993 to 2000 and 2001 to 2011 was 3.96 (p-value=0.06).

Conclusion: This study shows that the majority of the states are moving toward a decrease in dental hygiene supervision. Study results suggest that the movement appears to be accelerating with more states adopting fewer supervision regulations at a faster rate. Therefore, direction is moving toward more access to dental health care for underserved populations.

Keywords: dental hygiene, access to dental care, supervision level, community partnerships, autonomy

This study supports the NDHRA priority area, **Health Services Research:** Identify how public policies impact the delivery, utilization, and access to oral health care services.

Introduction

Several factors contribute to the poor dental health of low-income populations in the U.S. Some of the most significant factors that contribute to this lack of access to care are a shortage of dentists, poor participation of dentists in public assistance programs and dental hygiene practice acts.[1] The dental hygiene practice act supervision requirements, dictated by state dental boards, limit the dental workforce conditions. In 2006, the dentist-to-population ratio in the U.S. was 5.8 dentists per 10,000 residents.[1] In May 2010, there were over 25% more dental hygienists as general dentists in the U.S.[1] Some states are not utilizing dental hygienists to fill the need in providing dental health care to their underserved populations. In a 2010 survey, 1,824 dental hygienists representing 42 states reported frustrations related to their career growth due to the trend of too many dental hygiene programs, a reduction in benefits and salaries, and a shortage of available dental hygiene positions.[2] The dental hygiene workforce is available; therefore, it needs to be utilized.

In addition to the shortage of dentists in the U.S. and a lack of dental participation in public assistance programs, public policy plays a substantial barrier to dental care. In most states the state dental boards, which are comprised mostly of dentists, oversee the regulation of dental hygienists and in some cases have the ability to determine which dental hygiene procedures may be legally performed by dental hygienists and determine whether dental hygienists are required by law to be directly supervised. Direct supervision limits the conditions and locations in which dental hygienists may provide preventive dental services; direct supervision confines the dental hygienist to a facility where the dentist is physically present. Also, there are state differences in dental procedures that may be performed by dental hygienists. Over the past decade several states have passed legislation to allow more dental procedures to be performed by dental hygienists without the direct supervision of a dentist. Other states have not made any changes in dental hygiene legislation over the past 2 decades.

According to a study conducted in 2004 by The Center for Health Workforce Studies at the University of Albany, along with other previous studies, the expansion of dental hygiene professional practice acts has been shown to improve the access to and utilization of oral health care services along with oral health outcomes.[3-7] The findings of these studies confirm that a decrease in dental hygiene supervision requirements in the U.S. could allow an expansion in professional practice opportunities for dental hygienists. By expanding dental hygiene practice regulation, access to preventive dental care could be made more available in underserved populations, including non-traditional settings such as schools, prisons, nursing homes and private homes, for homebound individuals. Some states, such as Colorado, Washington, Oregon, California and New Mexico, have had more lenient scope of practice and dental supervision laws which has resulted in more access to dental health care for their underserved populations.[3] By allowing dental hygienists to serve individuals in nursing homes, public health clinics and rural areas there is a higher access to dental care with no effect on the number of patients seen in dental offices since these individuals are not accessing care in a private dental office. Mandating dentists' physical presence for the provision of dental hygiene care is unnecessary since there is little possible danger in most dental hygiene services provided.[3] And states that have allowed dental hygienists to provide unsupervised services to more medically compromised individuals in long-term facilities, dental hygiene programs and to homebound patients have determined dental hygienists should be allowed to serve patients who are less medically compromised in all dental settings unsupervised.[3]

According to the previous Surgeon General David Satcher, oral health is an integral part of general health, and in his 2000 report, Oral Health in America, he stated that dental caries is a "silent epidemic."[4] Most dental conditions may not be life threatening and may be easily treated, but there are some dental conditions that result in pain, loss of teeth, infection, severe disability or even death. Early diagnosis and treatment of dental conditions, such as oral cancer, are important to ensure a good quality of life.[5] Studies have shown how the prevalence of dental caries is historically higher among those who live in poverty and rural areas and in minority groups.[4,6,7] Low-income and minority families experience 80% of all dental conditions, but only account for approximately half of the total number of dental visits in the U.S.[6] In 2005, almost 3 out of 4 shortage areas of dental health professionals were in rural areas where families experience transportation barriers and had reduced access to community water fluoridation.[5] Lacking a dental health care provider is a major risk factor for receiving inadequate preventive dental health care. A 2000 national survey of physicians found that 38% of patients enrolled in Medicaid and 55% of uninsured patients encountered difficulties in making a dental appointment with a dentist.[6]

Public policy has attempted to address the shortages in access to dental health care by providing incentives to dentists who serve low-income populations (thereby increasing the supply of dentists in rural areas), by using medical health care providers to provide dental health care services (such as fluoride varnish treatments) and by encouraging foreign dental school graduates to become licensed dentists in the U.S.[5,8-10] These attempts have resulted in little or no success in an increase in dental health care access. The National Conference of State Legislatures has recommended that each state consider dental hygiene licensing arrangements that will improve access to dental health care for underserved families.[6] A study performed by the National Center for Health Workforce Studies suggests that there is a positive correlation between access to dental health care and the autonomy of dental hygienists.[3]

Methods and Materials

A retrospective comparison evaluation was conducted using the 2 tables. "Tasks Permitted and Mandated Supervision of Dental Hygienists by State, 1993, 1998 and 2000," was developed in a study funded by the National Center for Health Workforce Analysis Bureau of Health Professions Health Resources and Services Administration in April 2004. "Dental Hygiene Practice Act Overview: Permitted Functions and Supervision Levels by State" was developed by the American Dental Hygienists' Association in June 2011 (Tables I, II).[3,11] The scoring instruments were designed by the initial researchers to quantify particular aspects of the legal practice acts and board regulations for dental hygienists within each state which permit greater access to dental hygiene services particularly for underserved populations.[3,11] The comparison of these 2 tables details the net change in the state supervision level required for 11 dental hygiene tasks from 2001 to 2011. The 11 dental hygiene tasks selected were intended by the initial researchers to capture characteristics of professional dental hygiene practices that enable dental hygienists to provide dental services and were based on conditions that are perceived to affect access in a variety of dental hygiene settings.[3,11] In order to score the net change in state dental hygiene supervision, a numerical score, which was

Table I: Change in Supervision Levels for Dental Hygienists by State, 1993 to 2000

State	X-Rays	Coronal Polish	Apply Fluoride	Apply Sealants	Perio. Dressings	Removal of Sutures	Monitor N2O	Admin N2O	Admin Block Local	Place Amalgam	Sub-gingival Scaling	Net Change
AL	0	0	0	0	0	0	0	-1	0	0	0	-1
AK	1	0	0	0	0	0	1	1	0	0	0	3
AZ	0	0	0	0	1	2	1	1	1	1	0	7
AR	1	1	1	0	1	1	1	1	1	0	1	9
CA	3	0	2	0	0	0	1	0	0	0	2	8
CO	0	0	0	0	0	0	0	1	0	0	0	1
CT	0	0	0	0	0	-3	0	0	0	0	0	-3
DE	0	0	0	0	0	0	3	3	3	3	0	12
DC	0	0	0	0	0	0	0	0	0	0	0	0
FL	0	0	0	0	-2	0	0	0	0	1	0	-1
GA	0	0	0	0	0	0	0	0	0	1	0	1
HI	0	0	0	0	0	0	0	0	1	1	0	2
ID	0	0	0	0	-1	0	1	1	0	0	0	1
IL	0	0	0	0	1	0	1	0	0	1	0	3
IN	0	0	0	0	0	0	-1	0	0	0	0	-1
IA	0	0	0	0	0	0	0	0	1	0	1	2
KS	0	0	0	0	0	0	0	0	0	0	0	0
KY	0	-1	-1	-1	0	0	0	0	0	0	-1	-4
LA	-1	0	-1	-1	0	-1	1	0	1	0	0	-2
ME	0	0	0	0	1	0	-1	2	2	-1	0	3
MD	-1	0	2	0	0	1	0	0	0	0	0	2
MA	0	0	0	0	0	0	-1	0	0	0	0	-1
MI	0	0	0	0	0	0	1	0	0	0	1	2
MN	0	0	0	0	0	0	0	1	1	0	0	2
MS	0	0	0	0	0	0	0	0	0	0	0	0
MO	1	1	1	1	0	-1	0	0	0	1	1	5
MT	0	0	0	0	0	0	2	3	1	0	0	6

Key:	
0	No Change
+1 to +21	Degree of Decrease in Supervision Requirements
-1 to -21	Degree of Increase in Supervision Requirements

developed by the National Center for Health Workforce Analysis Bureau of Health Professions Health Resources, was assigned to each state's supervision level in each year as follows:

- 0 - Direct Supervision
- 1 - Indirect Supervision
- 2 - General Supervision
- 3 - No Supervision

After each numerical value was assigned to each supervision level for each year, the level of supervision numbers for the 11 dental hygiene tasks in the year 2001 were subtracted from the level of supervision numbers in that same dental hygiene task for the year 2011. This occured for each of the 50 states and the District of Columbia.[3]

Each dental hygiene preventive service and extended occupational task was totaled to calculate a mean change for each task, a net change for each state and a net change for each task. Then, a total mean change and a total net change was calculated for all 50 states and the District of Columbia from 2001 to 2011 to evaluate the degree of supervision requirement changes that has occurred during that decade for the entire U.S.[3]

This review of documents provides a longitudinal description of the level of required supervision for

Table I: Change in Supervision Levels for Dental Hygienists by State, 1993 to 2000 (continued)

State	X-Rays	Coronal Polish	Apply Fluoride	Apply Sealants	Perio. Dressings	Removal of Sutures	Monitor N2O	Admin N2O	Admin Block Local	Place Amalgam	Sub-gingival Scaling	Net Change
NE	0	0	0	0	0	0	1	0	2	1	0	4
NV	2	2	1	2	2	1	0	0	0	0	2	12
NH	0	0	0	1	1	0	0	0	0	0	0	2
NJ	0	0	0	0	0	0	0	0	0	0	0	0
NM	0	0	0	0	4	4	0	2	1	0	0	11
NY	0	0	0	0	-1	0	0	0	0	0	0	-1
NC	0	0	0	1	2	0	0	0	0	2	0	5
ND	0	0	0	0	0	0	0	0	0	0	0	0
OH	1	1	1	1	0	0	0	0	0	0	1	5
OK	2	2	2	2	2	2	0	0	0	0	2	14
OR	0	0	0	0	0	0	2	0	0	0	0	2
PA	2	2	2	2	0	0	0	0	0	0	2	10
RI	1	1	1	1	1	2	0	0	0	-1	1	7
SC	-1	-1	-1	-2	-1	0	1	0	0	0	-1	-6
SD	0	0	2	0	1	1	3	0	0	0	0	7
TN	0	0	0	0	0	0	0	0	0	0	0	0
TX	0	0	0	0	0	0	0	1	0	0	0	1
UT	0	0	0	0	0	0	2	1	0	0	0	3
VT	0	0	0	0	0	0	1	0	1	0	0	2
VA	0	0	0	0	0	0	-1	0	0	-1	0	-2
WA	1	0	0	0	0	0	0	0	0	0	0	1
WV	0	0	0	0	1	0	0	0	0	0	0	1
WI	0	0	0	0	0	0	2	0	1	0	0	3
WY	-1	-1	0	0	0	0	0	0	-1	0	-1	-4
Mean Change	0.22	0.14	0.24	0.14	0.25	0.18	0.41	0.33	0.31	0.18	0.22	2.61
Net Change	11	7	12	7	13	9	21	17	16	9	11	115

Key:	
0	No Change
+1 to +21	Degree of Decrease in Supervision Requirements
-1 to -21	Degree of Increase in Supervision Requirements

the fundamental dental hygiene preventive services and some extended occupational tasks for each of the 50 states and the District of Columbia from 2001 to 2011. In some states, negative change occurred, suggesting that the level of supervision increased. Each score can be interpreted using the following method:[3]

- 0 - No Change
- +1 to +21 - Degree of Decrease in Supervision Requirements
- -1 to -21 - Degree of Increase in Supervision Requirements

To evaluate how much change has occurred in the level of supervision for the dental hygiene profession between the years 2001 to 2011 compared to the years 1993 to 2000, a bivariate analysis t-test was performed utilizing the OpenEpi program.[12] The greatest threat to the validity of this study includes improper measurement errors which would affect reliability. Therefore, data entry was verified twice by the author. Using an ordinal scale of supervision level (0, 1, 2, 3) for each dental hygiene task, a mean score was given for each time frame by totaling all state ordinal scale scores and dividing them by 51.

Table II: Change in Supervision Levels for Dental Hygienists by State, 2001 to 2011

State	X-Rays	Coronal Polish	Apply Fluoride	Apply Sealants	Perio. Dressings	Removal of Sutures	Monitor N2O	Admin N2O	Admin Block Local	Place Amalgam	Sub-gingival Scaling	Net Change
AL	0	0	0	0	0	0	0	0	0	-1	0	-1
AK	0	1	1	1	0	1	0	0	2	1	2	9
AZ	1	1	1	1	-1	-1	-1	-1	-1	-1	0	-2
AR	1	1	1	2	0	0	-1	-1	0	0	-1	2
CA	0	1	1	1	1	1	0	0	0	1	1	7
CO	1	0	0	0	0	0	0	0	2	0	-1	2
CT	1	1	1	1	1	2	0	0	1	0	1	9
DE	0	0	0	0	0	0	-2	-2	-2	-1	0	-7
DC	0	0	0	2	0	0	0	1	1	0	0	4
FL	2	2	1	2	2	0	0	0	0	-1	0	8
GA	0	0	0	0	0	0	0	0	0	0	0	0
HI	1	1	1	1	1	1	0	0	0	-1	1	6
ID	0	0	0	0	0	0	-2	-2	1	1	0	-2
IL	2	2	2	2	0	2	1	1	1	-1	2	14
IN	1	1	1	0	0	0	0	0	1	0	0	4
IA	1	1	1	1	1	1	0	0	0	0	1	7
KS	2	3	3	2	2	2	2	2	0	0	2	20
KY	2	2	3	3	2	2	0	1	1	0	2	18
LA	1	1	1	1	0	0	0	1	1	0	0	6
ME	0	1	1	1	-1	1	0	0	-1	1	1	4
MD	2	1	1	1	1	1	0	0	1	0	1	9
MA	1	1	1	1	1	1	0	0	1	-1	1	7
MI	1	1	1	1	1	1	1	1	1	1	1	11
MN	1	1	1	1	0	0	0	2	2	1	1	10
MS	0	0	1	0	0	0	0	0	0	0	0	1
MO	2	3	3	3	2	2	0	0	0	0	2	17
MT	1	1	1	1	0	0	0	0	-1	-1	1	3

Key:	
0	No Change
+1 to +21	Degree of Decrease in Supervision Requirements
-1 to -21	Degree of Increase in Supervision Requirements

Results

With a 95% confidence interval, the mean change in dental hygiene supervision from 2001 to 2011 was 6.57, with a standard deviation of 5.70 (p-value=0.002). The positive value of 6.57 indicates that the 11 dental hygiene tasks across the 50 states saw an average movement toward less required supervision for dental hygienists. A similar trend toward reduced average supervision requirements was observed between 1993 and 2000 (however, this trend was nominally smaller due to a shorter time frame). The mean change of dental hygiene supervision from 1993 to 2000 was 2.61,with a standard deviation of 4.36 (p-value=0.0002). The difference in 2 means between the period 1993 to 2000 and the period 2001 to 2011 is 3.96 (p-value=0.06).

Some states, such as Virginia, Kansas and Missouri, have made substantial change in supervision regulations in the past 10 years. Other states such as Alabama, Georgia, Mississippi and North Carolina have made little or no progression in changing dental hygiene regulations from 1993 to the present date. There has been an overall change in more tasks permitted for dental hygienists, in regards to supervision, over the past 10 years. Numerically, a change toward less supervision requirement occurred in 45 of the 51 jurisdic-

Table II: Change in Supervision Levels for Dental Hygienists by State, 2001 to 2011 (continued)

State	X-Rays	Coronal Polish	Apply Fluoride	Apply Sealants	Perio. Dressings	Removal of Sutures	Monitor N2O	Admin N2O	Admin Block Local	Place Amalgam	Sub-gingival Scaling	Net Change
NE	2	3	3	3	2	0	0	0	0	-1	2	14
NV	1	1	1	1	1	1	1	1	1	0	1	10
NH	0	1	1	1	0	0	1	1	1	1	1	8
NJ	1	1	1	1	0	0	1	1	1	-1	1	7
NM	1	1	1	0	0	0	0	0	1	1	0	5
NY	0	0	0	0	1	0	1	1	1	1	0	5
NC	1	1	1	0	0	1	0	0	0	-1	1	4
ND	0	0	0	0	0	0	0	0	1	1	0	2
OH	1	2	2	2	2	0	0	1	1	0	1	12
OK	2	2	2	2	2	0	0	0	0	0	2	12
OR	1	1	1	1	1	1	0	-1	0	1	1	7
PA	1	1	0	1	0	0	0	0	1	0	1	5
RI	1	1	1	1	-2	-2	0	0	1	0	1	2
SC	2	2	2	2	0	0	0	0	1	0	1	10
SD	1	1	1	1	0	0	0	1	0	0	1	6
TN	1	1	1	1	0	-1	0	1	1	0	1	6
TX	1	1	1	1	1	1	0	0	0	0	1	7
UT	0	0	0	0	0	0	0	-1	-1	0	0	-2
VT	1	1	1	1	0	0	0	0	0	-1	1	4
VA	2	3	3	3	2	2	1	1	1	0	3	21
WA	1	1	1	1	0	0	0	0	0	0	1	5
WV	2	3	3	2	0	0	0	0	1	0	2	13
WI	0	1	0	0	0	-1	0	0	0	0	1	1
WY	1	1	0	2	0	1	0	0	0	0	1	6
Mean Change	0.94	1.12	1.08	1.1	0.45	0.37	0.06	0.18	0.45	-0.02	0.84	6.57
Net Change	48	57	55	56	23	19	3	9	23	-1	43	335

Key:	
0	No Change
+1 to +21	Degree of Decrease in Supervision Requirements
-1 to -21	Degree of Increase in Supervision Requirements

tions, and a change toward more supervision requirement occurred over the past 10 years in only 5 jurisdictions. There are still some states that require direct supervision in all settings: Alabama, Georgia, Mississippi and North Carolina. There are now 35 states that allow direct access, where the dentist does not need to examine or authorize the dental hygiene services in public health settings outside of the dental office.[11] An additional 3 states do not require a dentist to examine the patient prior to dental hygiene services in public health settings outside of the dental office: Indiana, New York and South Carolina.[11]

In regards to a reduction of supervision for individual dental hygiene tasks, the largest mean changes occurred in coronal polishing (1.12), the application of sealants (1.1), the application of fluoride treatments (1.08), taking radiographs (0.094) and performing scaling and root planing (0.84). The only dental hygiene task that now requires more supervision in 2011 than in 2001 is placing an amalgam filling, with a mean score of -0.02, which is a restorative service and traditionally outside the scope of practice for dental hygienists as defined by state dental boards. With the higher number of dental hygiene graduates over the number of dental school graduates, it would seem logical to utilize these dental care providers to provide scaling and root planings, apply seal-

ants and fluoride treatments, take radiographs, and provide oral hygiene instructions, nutritional counseling and tobacco cessation counseling to the underserved American population.

Discussion

The results of this study suggest that the majority of the states are moving toward a decrease in dental hygiene supervision in order to provide oral health care in public health settings such as schools, prisons, nursing homes and private homes, for homebound individuals. The mean change between 1993 to 2000 and 2001 to 2011 may suggest that the movement is accelerating with more states adopting fewer supervision regulations at a faster rate. For the majority of states, there is a movement toward increased access to dental health care for the underserved American population.

Only 690 dental hygienists were employed in underserved settings, and the vast majority of dental hygienists, 180,240, were employed in a traditional urban setting in May 2011.[3] Therefore, the 2004 National Center for Health Workforce study's findings that show there is a positive correlation between access to dental health care and the autonomy of dental hygienists needs to be further investigated over time as more dental hygienists are allowed to practice with less dentist supervision.[3] If these findings are confirmed by further examination and studies, then expanding the dental hygiene professional practice acts would be an appropriate strategy for states seeking to expand their access to dental services.[3]

Conclusion

This study examined the difference in the mean change of required supervision levels of dental hygienists for 2 different time frames. The required supervision level is decreasing over time. There is some evidence that the pace of relaxed supervision may be accelerating, with more states adopting fewer supervision regulations at a faster rate, since the p-value was over 0.05 (p-value=0.06). It is recommended to explore these findings further to determine if the amount of difference is statistically significant.

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References

1. Bureau of labor statistics: General dentists, all other specialist dentists and dental hygienists. United States Department of Labor [Internet]. 2010 [cited 2011 Nov 11]. Available from: http://www.bls.gov/oes/current/oes292021.htm

2. Hartley M. The mood out there. *RDH*. 2011;31:36-51.

3. The professional practice environment of dental hygienists in the fifty states and the District of Columbia, 2001. National Center for Health Workforce Analysis Bureau of Health Professions Health Resources and Services Administration [Internet]. 2004 [cited 2011 Nov 11]. Available from: http://bhpr.hrsa.gov/healthworkforce/reports/dentalhygiene50statesdc.pdf

4. DiMarco MA, Ludington SM, Menke EM. Access to and utilization of oral health care by homeless children/families. *J Health Care Poor Underserved*. 2010;21(2):67-81.

5. Allison, RA, Manski, RJ. The supply of dentists and access to care in rural Kansas. *J Rural Health*. 2007;23(3):198-206.

6. Martin AB, Probst J, Wang J, Hale N. Effect of having a personal healthcare provider on access to dental care among children. *J Pub Health Manag Pract*. 2009;15(3):191-199.

7. Stevens GD, Seid M, Kai-Ya T, West-Wright C, Cousineau MR. Access to care for California children: 2001 vs. 2005. *Pub Health Reports*. 2009;24:682-691.

8. Bazargan N, Chi DL, Milgrom P. Exploring the potential for foreign-trained dentists to address workforce shortages and improve access to dental care for vulnerable populations in the United States: A case study from Washington State. *BMC Health Serv Res*. 2010;10:336.

9. Castañeda H, Carrion IV, Kline N, Tyson DM. False hope: Effects of social class and health policy on oral health inequalities for migrant farmworker families. *Soc Sci Med*. 2010;71(11):2028-2037.

10. Okunseri C, Szabo A, Garcia RI, Jackson S, Pajewski NM. Provisions of fluoride varnish treatment by medical and dental care providers: Variation by race/ethnicity and levels of urban influence. *J Public Health Dent*. 2011;70(3):211-219.

11. Dental hygiene practice act overview: Permitted functions and supervision levels by state. American Dental Hygienists' Association [Internet]. 2011 [cited 2011 Nov 11]. Available from: http://www.adha.org/governmental_affairs/downloads/fiftyone.pdf

12. Dean AG, Sullivan KM, Soe MM. OpenEpi: Open source epidemiologic statistics for public health, Version 2.3.1. OpenEpi [Internet]. 2011 [cited 2011 Nov 11]. Available from: http://www.openepi.com/OE2.3/Menu/OpenEpiMenu.htm