

RUNNER-UP: BEST PAPER AWARD

Evaluating the Impact of Expanded Practice Dental Hygienists in Oregon: An Outcomes Assessment

Kathryn P. Bell, RDH, MS; Amy E. Coplen, RDH, MS

The Journal of Dental Hygiene Best Paper Award was created to recognize the most outstanding research paper published from the previous year (2015). All original research papers published in 2015 were evaluated by a panel of judges, using specific criteria, to make the final selection. This manuscript first appeared in Volume 89, Issue Number 1 of the February 2015 issue of the Journal of Dental Hygiene.

Abstract

Purpose: Currently the dental hygiene practice model in Oregon includes the Expanded Practice Dental Hygienist (EPDH), which allows dental hygienists with an Expanded Practice Permit (EPP) to provide care to limited access populations without the supervision of a dentist. The number and types of services provided by EPDH practitioners is thus far undocumented. The purpose of this study is to conduct an outcomes assessment of EPDH practitioners in order to quantify the impact, defined by count of services, on the access to care crisis in Oregon.

Methods: A 16 question confidential survey was developed and approved by the Pacific University institutional review board. The mail-based survey was sent to 181 EPDHs in Oregon in November 2011 (all EPDHs except pilot testers and one author). A second mailing was sent to non-respondents. Data were analyzed using descriptive statistics and chi-square analysis in SPSS.

Results: The response rate was 39% (n=71). Approximately 41% (n=29) of the respondents were currently using their EPP to provide care to limited access patients with an additional 21% (n=15) planning to start their own expanded practice. The majority of practicing EPDHs provide care in residential care facilities (n=21) and in school settings (n=13). Of the current practicing EPP holders, 76% practice ≤ 10 hours per week, and 66% make $< \$10,000$ per year. Total services reported in an average month from all responding EPDH practitioners were: 254 adult prophylaxes, 1,003 child prophylaxes, 106 adult fluorides, 901 child fluorides and 1,994 fluoride varnishes, among many other preventive procedures.

Conclusion: To a limited extent, the amount and type of services provided by EPDHs has now been quantified, and EPDHs are making an impact on the access to care crisis in Oregon. Continued outcomes assessment is needed to further quantify the impact of EPDHs.

Keywords: dental hygienists, professional practice, outcome assessment, health services accessibility

This study supports the NDHRA priority area, **Health Services Research:** Investigate how alternative models of dental hygiene care delivery can reduce health care inequities.

INTRODUCTION

Lack of access to dental care has become a public health focus over the past several years in the U.S. and has led to much discussion and change in the profession of dental hygiene.¹ The past 20 years have seen an increase in the amount of decision-making responsibility of the dental hygienist, a reduction in the level of required supervision, and an increase in independent practice among dental hygienists.²⁻⁴ The independent practice of dental hygienists and the mid-level dental provider are concepts that have gained momentum in an attempt to alleviate disparities in access to dental care. The most recent U.S. Department of Health and Human Services report states that there are 4,585 dental health professional shortage areas in which 45 million

people live.⁵ The utilization of dental hygienists working in independent practice is a logical approach to help alleviate this access to care challenge.

As of 2012, 35 states allow dental hygienists to provide patient care in a setting outside of a dental office and without a dentist present.⁶ Alaska and Minnesota both license mid-level providers, who are allowed to provide basic restorative treatment in addition to the catalogue of typical dental hygiene services, also without the supervision of a dentist.⁶ Mid-level dental providers have been recognized internationally for many years,² and 5 states are currently forwarding legislation to create dental hygiene based mid-level provid-

er licensure (Vermont, Kansas, Washington, Connecticut and Maine).⁶

Currently, Oregon does not license or employ a mid-level dental provider. However, Oregon is one state in which dental hygienists are allowed to practice without the supervision of a dentist. Expanded Practice Permit Dental Hygienists (EPDHs) (previously known as Limited Access Permit (LAP) dental hygienists) are allowed to render most services within the typical dental hygiene scope of practice without the supervision of a dentist, in specified settings or for populations who experience lack of access to care (defined in ORS 680.205). EPDHs are required to refer patients to a dentist at least once annually for examination and treatment of active dental disease. An EPDH also has the ability to administer local anesthesia, place temporary restorations and prescribe prophylactic antibiotics and non-steroidal anti-inflammatory drugs, but must have a collaborative agreement with an Oregon-licensed dentist.⁷ There are 2 pathways through which one may qualify for the expanded practice permit (EPP), which is the permit required to become an EPDH. The first pathway requires 2,500 hours of supervised clinical dental hygiene practice, as well as 40 hours of CE courses in either clinical dental hygiene or public health earned since licensure. The second pathway requires 500 hours of clinical practice (either before or after graduation from a dental hygiene program) working with patients defined in ORS 680.205, while under the direct supervision of faculty members of accredited dental or dental hygiene programs.⁸ Despite the need for expanded access to care in Oregon and other states, support for the expansion of the dental hygiene scope of practice and the evolution of the mid-level provider has been mixed among dental hygienists and dentists.⁹⁻¹² One question central to the debate of independent practice in dental hygiene and the advancement of a mid-level provider is the question of need: is there a need to have dental hygienists practicing independently? In other words, what is the actual impact of dental hygienists in independent practice on access to care?

In 2008, Battrell et al conducted a qualitative study to analyze the impact of the LAP legislation in Oregon and to determine the nature of the relationships of dental hygienists and dentists who participated in the model. In addition to providing the history of the development of the LAP model, authors presented results of interviews with participating dentists and dental hygienists. Authors concluded that entrepreneur-

ship, lifelong learning and a commitment to underserved populations were common motivations among study participants and that the relationships between the dental hygienists and dentists were positive. At the time of the study, there were 71 licensed LAP dental hygienists. Authors noted that while the number of licensed practitioners was relatively small, there were a growing number of individuals interested in pursuing this practice modality. This finding has proven true, as the number of practitioners has since more than doubled (at the time of the current study, there were 186 dental hygienists who held an EPP). Authors determined that at the time of the study, there was not enough information to draw conclusions regarding the impact of LAP dental hygienists, and that an appropriate next step was evaluation of outcomes. As a qualitative study, this information provides a foundation for the continued assessment of this practice model, what is now the EPDH.¹³

While some form of unsupervised practice has existed since 1997, the settings and services provided by EPDHs have not been measured. The purpose of this study was to conduct an outcomes assessment of EPDH permit holders to assess the extent to which they are utilizing their permit, the scope of the services they are providing, and the number of patients who are being served.

METHODS AND MATERIALS

A cross-sectional survey of EPDHs was conducted in November 2011. The survey instrument was developed by the authors. The survey instrument and study protocol were reviewed by the Pacific University institutional review board, and the study was approved as exempt. A list of all EPDHs was obtained from the Oregon Board of Dentistry (n=186). A convenience sample of 2% was selected to pilot test the survey instrument. Improvements were made according to feedback from the pilot testers. Surveys were mailed to all EPDHs, with the exception of those who completed the pilot testing, and one of the authors who holds an EPP (n=181). The 16 item survey contained both closed and open-ended questions, as well as one Likert-scale question, that assessed the following areas: demographics, income from EPDH practice, amount and types of services provided, details of EPDH practice, and perceived barriers to practicing as an EPDH. This article focuses on the outcomes assessment sections. Perceived barriers to utilizing an EPP will be addressed in a separate report.

The survey tool was distributed via mail along

Table I: Demographics of Responding EPDHs

	Number of Respondents	Category	n	Percent
Age by Category	70	20 to 30	6	9%
		31 to 40	10	14%
		41 to 50	15	21%
		>50	39	56%
Years held EPP	66	0 to 3	41	62%
		4 to 6	9	14%
		7 to 9	5	8%
		≥10	11	17%
Practicing using EPP	71	41%	–	–
Mean Hours Per Week using EPP	25	9.3 (Std. Dev. 12.47)	–	–
Income from EPP	27	≤10,000	18	67%
		10,001 to 20,000	4	15%
		20,001 to 30,000	3	11%
		30,001 to 40,000	1	4%
		40,001 to 50,000	0	0%
		>50,000	1	4%
Level of Education	67	Certificate	2	3%
		Associate	22	33%
		Bachelors	39	58%
		Masters	4	6%

*Not every respondent answered every question. The number of respondents who answered each question is indicated in the second column. The percentages may not total to 100% due to rounding.

with a cover letter explaining the purpose of the study and consent was implied by returning the survey. The first mailing was conducted in early November 2011, with the second mailing following after 3 weeks. To maintain confidentiality, the surveys were numerically coded, and the principal investigators were the only people with access to the coding file. The coding file was maintained solely to facilitate the second mailing (a second survey was only sent to non-respondents 3 weeks following the initial mailing). Once data collection was completed, the coding file was destroyed. Data entry was completed manually by the principal investigators. For open-ended questions, answers were categorized by each author independently and then reviewed. Any discrepancies in categorization were discussed and adjusted, with both authors in agreement regarding the classification. If at least 3 respondents provided similar responses, an additional category was created. If a response was reported in less than 3 instances, it was categorized as "other." Statistical analysis was completed using SPSS version 20 (IBM) and included descriptive statistics and chi-square analyses. Chi-square analysis using the Freeman-Halton extension of the Fisher exact test was used to determine if statistically significant differences existed among those respondents who reported practicing utilizing the EPP and those who did not, particularly

Table II: Qualifying Populations under ORS 680.205 for Which Responding EP-DHS Provide Care (n=30)

Population Treated by Practicing EPDHs	n
Residential Care Facilities	21
Primary and Secondary Schools	13
Homebound Adults	5
Populations deemed "limited Access" by dental board	5
Community Health Clinics	4
Nursing Homes	3
Foster Homes	2
Age (due to age are unable to receive regular dental hygiene treatment)	1
Correctional Facilities	1
Youth Centers	1
Nursery Schools or Daycares	1
Mental Health Residential Programs	0
Facilities for mentally ill patients or persons with mental retardation	0
Infirmity or disability	0

*Total number greater than number of practicing EP-DHs because respondents could provide more than one response.

Figure 1: Average Annual Income from Practice Using EPP (n=27)

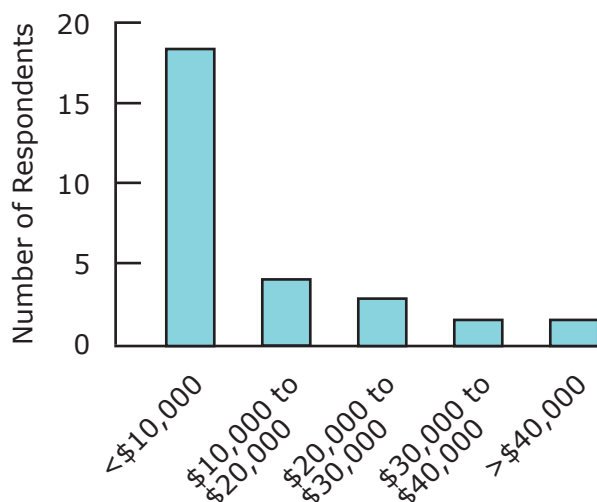


Figure 2: Rate of Reimbursement from Third Party Payers for Services Provided by EPDH (n=23)

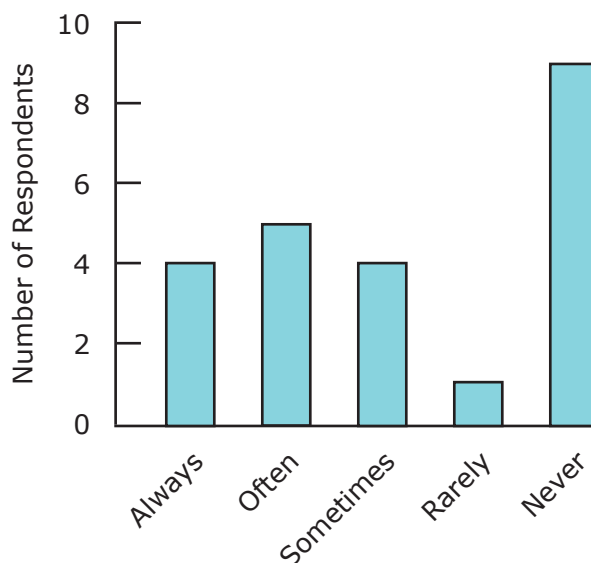


Table III: Total Number of Services Provided as Reported by Responding EPDHs (Time Period of 1 Month)

Procedure	Procedure Code	Number Provided
Adult Prophylaxis	D1110	254
Child Prophylaxis	D1120	1003
Adult Fluoride	D1204	106
Child Fluoride	D1203	901
Fluoride Varnish	D1206	1994
Scaling and Root Planing (SRP) ≥4 teeth/quadrant	D4341	56
SRP 1-3 Teeth/quadrant	D4342	24
Periodontal Maintenance	D4910	83
Full Mouth Debridement	D4355	45
Full Mouth Series of Radiographs (FMX)	D0210	3
4 Bitewing Radiographs (BWX)	D0274	0
2BWX	D0272	0
Panoramic Radiograph (Pano)	D0330	0
Sealants	D1351	885
Soft Denture Reline	D5730, D5731, D5740, D5741	19
Oral Hygiene Instruction (OHI)	D1330	1744
Comprehensive Periodontal Examination	D0180	162

in regards to practitioner age, number of years since graduation, type of dental hygiene degree, and length of time holding the EPP. The level of significance was set at 0.05.

RESULTS

Responses were collected from 71 EPDHs, yielding a 39% response rate. The majority of responding EPDHs (56%, n=39) are 51 years of

Table IV: Average Number of Services Provided Per Month as Reported by Individual Responding EPDHs

Procedure	Mean (Standard Deviation)	Maximum
Adult Prophylaxis (n=25)	7.72 (11.2)	50
Child Prophylaxis (n=26)	37.00 (116.2)	500
Adult Fluoride Treatment (n=25)	2.8 (6.4)	30
Child Fluoride Treatment (n=25)	28.2 (106.1)	500
Fluoride Varnish (n=25)	75 (206.8)	1000
Scaling and Root Planing >4 teeth per quadrant (n=25)	1.3 (3.6)	15
Scaling and Root Planing 1 to 3 teeth per quadrant (n=25)	0.7 (2.1)	10
Full Mouth Debridement (n=25)	1.3 (4.1)	10
FMX (n=25)	0.1 (0.4)	2
4 BWX (n=25)	0 (0)	0
2 BWX (n=25)	0 (0)	0
Panoramic Radiograph (n=25)	0 (0)	0
Periapical Radiograph (n=25)	0.9 (4.0)	20
Sealant (n=25)	35.4 (103.4)	500
Soft Denture Reline (n=24)	0.1 (0.4)	2
Oral Hygiene Instruction (n=26)	60.2 (121.8)	500
Comprehensive Periodontal Examination (n=25)	5.0 (10.1)	50

age or older, and most (66%, n=41) have held their EPP for 3 years or less. Respondent demographics are presented in Table I. Forty-one percent (n=29) of respondents report that they are currently practicing using their EPP. An additional 20% (n=15) indicated that they had plans to begin using their EPP in the future. The mean number of hours per week spent practicing using the EPP was 9.3 (SD=12.47). Respondents who were currently practicing utilizing their EPP were asked to indicate in what manner their patient population qualified under ORS 680.205 as having limited access to care. The most frequently identified populations were patients in residential care facilities (n=21) and primary and secondary schools (n=13). A complete listing of participants' qualifying patient populations is presented in Table II.

Sixty-six percent (n=18) of practicing EPDHs reported making less than \$10,000 per year from their EPP practice (Figure 1). The majority of practicing EPDHs (70%, n=19) own and use portable equipment. Forty-one percent (n=12) of practicing EPDHs advertise for their services, and 36% (n=10) have reported difficulty in obtaining needed supplies.

Table V: Reported Hours per Week Spent in EPDH Practice

Hours per Week in EPDH Practice	Respondents (n=25)	
	n	Percent
≤5	12	48
6 to 10	7	28
11 to 20	2	8
21 to 30	0	0
31 to 40	4	16
>40	0	0

Respondents who were currently practicing using the EPP were asked to indicate how often they had been successful in obtaining reimbursement from Oregon Health Plan (OHP) or other insurance plans. Thirty-nine percent (n=9) of those who answered responded that they had never been successful (Figure 2). Respondents were also asked to indicate the number of services they provided in an average month in their role as an EPDH. Child prophylaxes, child fluoride, fluoride varnish and sealants were the most frequently reported services among practicing EPDHs. The sum total of average monthly services provided

by all respondents is presented in Table III. The average number of services provided per month by individual responding EPDHs is presented in Table IV. Most practicing EPDHs reported working ≤ 10 hours per week. Table V displays the average number of hours per week worked as reported by practicing EPDHs. The largest proportion of practicing EPDHs who answered the question (48%, $n=12$) indicated that they worked ≤ 5 hours per week, followed by 28% ($n=7$) who indicated that they worked 6 to 10 hours per week.

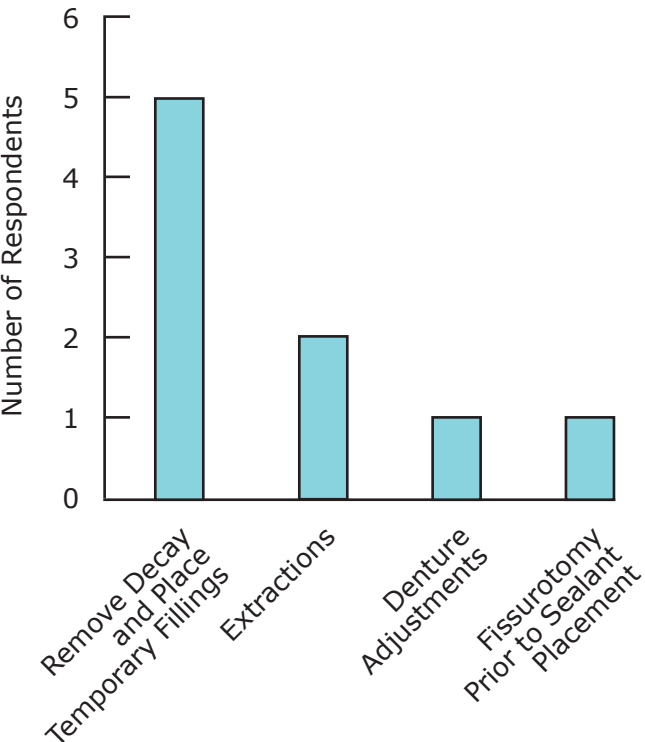
One of the open-ended survey questions asked practicing EPDHs to report the most commonly seen oral care needs that they were unable to meet, but would be able to meet if the scope of practice were expanded. Responses included temporary restorations, extractions (adult and pediatric), fissurotomy prior to sealants, and denture adjustments (Figure 3).

Bivariate analysis using the Chi-square test with the Freeman-Halton extension of the Fisher exact test was conducted to see if there were any statistically significant differences among those currently practicing using an EPP and those who were not. Areas analyzed included age, number of years since graduation, education level and number of years holding the EPP. No statistically significant differences were found.

DISCUSSION

This is the first time that the amount of services provided by the EPDH workforce in Oregon has been quantified. The most frequently identified patient population served was “residential care facilities” with primary and secondary schools following behind it. Despite this result, child prophylaxis (D1120), child fluoride (D1203), fluoride varnish (D1206) and sealants (D1351) were the most numerous of the reported services, with relatively lower numbers of adult prophylaxes (D1110) and quadrants of scaling and root planing reported. These findings suggest that Oregon EPDHs have the most success providing care for pediatric patients. The apparent discrepancy between the most frequently served population (residential care facilities) and the most frequently provided services may be due to the nature of the survey questions. The question regarding patient populations was open ended, so the results lack some definition in this area. For example, were the reported “residential facilities” those in which pediatric patients reside, for the elderly or infirm, for patients with mental or physical disabilities, or a combination of all of these? Or is it perhaps that treating children in

Figure 3: Reported Additional Patient Care Needs Outside of EPDH Scope of Practice ($n=9$)



schools simply provides EPDHs with large numbers of patients resulting in relatively large numbers of these types of services? Is it easier for practicing EPDHs to get established working in the school system than it is to obtain the acceptance and cooperation needed to work in medical or other facilities? Is it potentially easier to be reimbursed for pediatric services? Due to this uncertainty, it appears that the most reliable measure of impact is the type of service provided, not the population served.

The prevalence of pediatric services in the results of this study represents a potential departure from the existing literature. Kushman et al conducted a study to evaluate practice characteristics of independently practicing dental hygienists in California who were participating in the California Health Manpower Pilot Project 139 (HMPP 139) which ran from 1987 to 1990. Their results indicated that the practices were primarily centered on preventive care measures (prophylaxes, fluoride applications, sealants and exams), but authors did not delineate between pediatric and adult services.¹⁴ Astroth and Cross-Poline reported that among dental hygienists in independent practice in Colorado, more preventive services were provided for adults than for pediatric patients.¹⁵ The independent practice models in Colorado and in California under the HMPP 139

differ from the Oregon practice model in that Oregon's model limits the settings and populations that may be served. This may account for the differences seen in the types of care provided. The California HMPP 139 facilitated an experimental environment in which independent practice dental hygiene could be evaluated. Dental hygienists were permitted to set up businesses to provide dental hygiene care independently, and could provide all services allowed under general supervision. No stipulations were made about populations that could receive care.¹⁶ In Colorado, dental hygienists are permitted to practice independently as well as own and operate their own business or practice.¹⁵

The practice act in Oregon permits EPDHs to serve many populations that have been deemed "underserved." As presented in Table II, there are many populations that EPDHs are permitted to serve, but no respondents indicated that they work with these communities (e.g., patients with mental illness or in clinics operated or staffed by nurse practitioners, physician assistants, or midwives). This may indicate that barriers exist in gaining access to these types of clinics, or that current permit holders are unaware that some of these populations qualify to be served by EPDHs. Even though significant services are being provided by Oregon EPDHs, the current findings indicate that current EPP-holders in Oregon may not be practicing to the full extent of their permitted abilities, which potentially lessens their impact.

There is considerable room for growth for independent practice in dental hygiene in Oregon. Coplen and Bell investigated perceived barriers to pursuing independent practice among EPDHs in Oregon.¹⁷ With the majority of practicing EPDHs indicating that they work less than 10 hours per week, many more individuals could be served if EPDHs practiced in this manner full time. Many of the respondents hold an EPP but do not utilize it to practice in this realm. Permit holders face several barriers, and among non-practicing EPDHs, the most commonly reported reasons for not pursuing EPDH practice were "currently working in a different setting" and "lack of business knowledge." Insurance reimbursement and inability to make a living wage were two of the reported barriers among practicing and non-practicing EPDHs, and likely also contribute to this low utilization of the EPP.¹⁷ To clarify, if EPDHs are unable to attain reimbursement from third party payers, patients typically pay for services out of pocket. Since the completion of this study, new legisla-

tion passed in Oregon that requires any services that would be paid to a dentist through insurance plans must also be paid to an EPDH providing the same services. This has the potential to increase the ability of EPDHs to make a living wage. In addition, practicing EPDHs cited difficulty in obtaining a collaborative agreement or cooperative facility in which to practice.¹⁷ Some practicing EPDHs report difficulty obtaining supplies. This difficulty comes from several areas: some items (for example an emergency medical kit) require a DEA number to be purchased (this is a number assigned to medical providers by the Drug Enforcement Administration that is required for prescription writing), some vendors are reluctant to sell to people who are not an established dental office and some items are prohibitively expensive if they are not purchased in bulk (however, if they are purchased in too large a quantity, they expire before they can be used). To address this last difficulty, some EPDHs will place orders as a group, and then subdivide the bulk items.

Coordinated Care Organizations (CCOs) are a relatively new addition to the health care system in Oregon. In June 2011, House Bill 3650 was signed into law, creating the framework for a state-wide system of health care networks that cover patients under the OHP which is the state Medicaid plan. CCOs are designed to address physical, mental and dental health with the intent that patients will have a better safety net to help ensure better overall health outcomes.¹⁸ The full implementation of dental care organizations into the CCO framework has yet to occur. Once dental care is fully integrated into CCOs, it may be easier for EPDHs to work in a full time capacity and in different settings since dental care is required within the CCOs. It seems that an EPDH would be a logical fit for this new health care model. Hypothetically, the integration of EPDHs into these organizations would spread the dental safety net even farther.

The question of the need for a mid-level provider in Oregon cannot adequately be addressed by this survey alone. One may argue that while EPDHs are providing services to many people, there are still many more patients in need of care, particularly restorative care, which could be provided by a mid-level dental provider. Oregon is currently undergoing a shift in its health care system as CCOs are being integrated, with the full implementation of dental care yet to come. Currently there are 15 CCOs operating in Oregon.¹⁸ Would a mid-level dental provider be more effective in filling the access to care gap that

exists in Oregon, particularly if they were easily integrated into CCOs? The addition of basic restorative services to the traditional catalogue of dental hygiene services would allow for more dental needs to be met. If a mid-level provider model became the most effective way to provide dental care through CCOs in Oregon, EPDHs may no longer be necessary. However, the ease of integration of a mid-level provider into CCOs, or even in independent practice in Oregon, may be difficult to foresee at this point in time. With the implementation of the health insurance exchanges of the Affordable Care Act (ACA), this question may remain difficult to answer. The ACA requires each state to establish a health insurance "marketplace" or "exchange," which is an online marketplace where individuals can purchase health insurance. Participating insurance coverage providers will make their plans available on the exchanges for public consumption.¹⁹ As the dental insurance plans are made available through the exchanges, the dental coverage playing field will shift, and it is likely that there will be changes in the number of patients who are served by OHP. There may be a change in the number of children who are eligible for guaranteed dental services. Adult dental care is not included in Oregon's Essential Health Benefits benchmark plan,²⁰ therefore adults who qualify for Medicaid and others with lower incomes will still face financial difficulties in obtaining dental health care. It may be difficult to determine whether there is a need for a mid-level dental provider until the implementation of the ACA has happened and CCOs are well established. The effect of the ACA on the success of EPDHs will remain unknown until implementation has occurred.

Some limitations were inherent in the current study. The response rate was lower than anticipated, but respectable when compared to typical response rates of mail-based surveys (26 to 49%).²¹ Due to the response rate, results may not be generalizable to the entire population of EPDHs, but only to the participants. A larger response rate would have provided more information and improved generalizability. While the survey contained questions specifically designed for EPDHs who were not currently practicing in that role, authors believe that recipients who weren't currently using their EPP may not have declined because they thought the survey did not apply. If these recipients did not read far enough through the survey, they would not have seen the directions to skip the bulk of the survey and answer only a few questions. Clearer instructions in the cover letter may have proven beneficial in

increasing the response rate. Another limitation was found with the question regarding whether or not the permit holder was currently practicing using the permit. The only options included in the survey instrument were "yes" and "no," and there was no follow up to ask if the participant had plans to begin using it in the future. Several respondents indicated in the open response section at the end of the survey that even though they were not currently using their EPP, they had plans to do so. Had an option been included to capture this subset, authors may have a better idea of anticipated future usage rates. A third limitation to this study was that authors were not able to establish survey performance reliability. The survey has been administered only one time, so test-retest reliability could not be determined. In order to keep the survey to a minimal length, no redundant questions were included to evaluate internal reliability. To facilitate data entry and consistency of information, every survey mailed was identical, so no alternate-form reliability was established.

Plans for future research include continued outcomes assessment of EPDHs to monitor the amount of services that are being provided. In addition, authors plan to poll program directors in states that allow independent practice to determine whether or not programs include specific curricular innovations to help prepare students for independent practice.

CONCLUSION

To a limited extent, the services provided by EPDHs have now been quantified. While less than half of respondents indicated that they were currently practicing using the EPP, practicing EPDHs reported providing significant numbers of services to underserved populations in Oregon, which demonstrates that the provider model is effective. Most of the services provided were pediatric services, which indicates that EPDHs have had the most success in accessing and serving this group of patients. However, there is considerable room for growth as demonstrated by the low number of average hours worked per week by EPDHs. In addition, there are as yet many eligible populations who are not routinely being served by EPDHs. Continual outcomes assessment is needed to determine future need for independent practice dental hygienists and the need for the implementation of mid-level dental providers in Oregon, specifically after the full implementation of CCOs and the ACA.

Kathryn P. Bell, RDH, MS, is an Assistant Pro-

fessor, School of Dental Health Science, Pacific University, Hillsboro. Amy E. Coplen, RDH, EPDH, MS, is an Assistant Professor, School of Dental Health Science, Pacific University, Hillsboro.

ACKNOWLEDGMENTS

The authors would like to thank Dr. Ceib Phillips and Dr. John Hayes for their contributions of statistical expertise.

REFERENCES

1. Oral Health in America: a report of the surgeon general-executive summary. U.S. Department of Health and Human Services, National Institute of Dental and Craniofacial Research, National Institutes of Health. 2000.
2. Gatermann-Strobel B, Perno Goldie M. Independent dental hygiene practice worldwide: A report of two meetings. *Int J Dent Hyg*. 2005;3(3):145-154.
3. Johnson PM. Dental hygiene regulation: A global perspective. *Int J Dent Hyg*. 2008;6(3):221-228.
4. Wing P, Langelier MH, Continelli TA, Battrell A. A dental hygiene professional practice index (DHPPI) and access to oral health status and service use in the united states. *J Dent Hyg*. 2005;79(2):10.
5. Shortage Designation: Health Professional Shortage Areas & Medically Underserved Areas/Populations. U.S. Department of Health and Human Services Health Resources and Services Administration. 2012.
6. The Benefits of Dental Hygiene-based Oral Health Provider Models. American Dental Hygienists' Association [Internet]. 2012 [cited 2015 February 10]. Available from: http://www.adha.org/resources-docs/7116_Benefits_of_Dental_Hygiene.pdf
7. Oregon Limited Access Permit Legislation. Oregon § 680.205 (1997).
8. Issuing Expanded Practice Permits. Oregon § 680.200 (2011).
9. Adams TL. Attitudes to independent dental hygiene practice: Dentists and dental hygienists in ontario. *J Can Dent Assoc*. 2004;70(8):535-538.
10. Anderson KL, Smith BS. Practicing dental hygienists' perceptions about the bachelor of science in dental hygiene and the oral health practitioner. *J Dent Educ*. 2009;73(10):1222-1232.
11. Lambert D, George M, Curran A, Lee J, Shugars D. Practicing dental hygienists' attitudes toward the proposed advanced dental hygiene practitioner: A pilot study. *J Dent Hyg*. 2009;83(3):117-125.
12. O'Keefe JP. Is competition good for care?. *J Can Dent Assoc*. 2006;72(6):485.
13. Battrell AM, Gadbury-Amyot CC, Overman PR. A qualitative study of limited access permit dental hygienists in Oregon. *J Dent Educ*. 2008;72(3):329-343.
14. Kushman JE, Perry DA, Freed JR. Practice characteristics of dental hygienists operating independently of dentist supervision. *J Dent Hyg*. 1996;70(5):194-205.
15. Astroth DB, Cross-Poline GN. Pilot study of six Colorado dental hygiene independent practices. *J Dent Hyg*. 1998;72(1):13-22.
16. Perry DA, Freed JR, Kushman JE. The california demonstration project in independent practice. *J Dent Hyg*. 1994;68(3):137-142.
17. Coplen A, Bell K. Barriers Faced by Independent Practice Dental Hygienists in Oregon: Implications for Education. *J Dent Hyg*. In press.
18. Oregon Health Authority. Fact Sheet: Coordinated Care Organizations. Oregon State website. 2013.
19. "Public Law 111 - 148: Patient Protection and Affordable Care Act." (124 Stat. 121; Date: 3/23/2010). Text from: U.S. Public and Private Laws. Available from: U.S. Government Printing Office: <http://www.gpo.gov/fdsys/pkg/PLAW-111publ148/pdf/PLAW-111publ148.pdf>
20. Oregon EHB Benchmark Plan. Centers for Medicare & Medicaid Services [Internet]. [cited 2015 February 10]. Available from: <https://www.cms.gov/CCIIO/Resources/Data-Resources/Downloads/oregon-ehb-benchmark-plan.pdf>
21. Orcher LT. Conducting a Survey: Techniques for a Term Project. California: Pycszak Publishing. 2007.