Pediatric Dentists' Willingness to Participate in Practice Based Research

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Abstract

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Purpose: To determine the willingness of pediatric dentists to participate in practice based research networks (PBRNs) and the factors associated with their willingness.

Methods: A questionnaire was sent to 337 pediatric dentists in the states of Washington, Oregon, Idaho, Utah and Montana. The questionnaire consisted of 29 questions regarding their willingness to participate in PBRNs, research topics of interest, resources utilized to make clinical decisions and demographic information. Bivariate analysis was used to test for demographic and educational factors associated with a willingness to participate. Odds ratios (OR) were estimated using logistic regression.

Results: Of 337 surveys, 171 (51%) were returned. 74 (43%) pediatric dentists expressed a willingness to participate in PBRNs. The most common perceived barrier to participation was "lack of time to collect data in office" identified by 109 (64%) respondents. Younger age (p=0.01), greater number of regularly read scientific journals (p=0.04), frequent utilization of scientific web searches (p=0.05) or national dental meetings for practice guidance (p=0.001), and lack of concern about time to participate (p=0.01) or quality of data obtained in PBRN studies (p=0.03) were associated with increased willingness to participate. Caries prevention was the most important topic to have more research conducted in.

Conclusions: The results of this study suggest that there is a broad base of pediatric dentists willing to participate in dental PBRNs. Younger age or greater utilization of certain practice guidance resources was associated with increased participation. Future PBRN recruitment should address provider concerns over lack of time to collect data in the office. Practitioner demand for additional research is in the area of caries prevention.

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Introduction

A Practice based Research Network (PBRN) is a collaboration of healthcare providers committed to improving clinical practice through conducting research projects, often in collaboration with outside experts, while continuing to provide care to patients.[1-2] PBRNs have made important contributions to clinical research and quality improvement and have the potential to continue to make significant improvements to clinical practice.[2] The Institute Of Medicine has called practice based research "the most promising infrastructure development that [the committee] could find to support better science in primary care".[3] PBRNs focus on research that is patient centered and help increase the translation of research findings into clinical practice.[2,4,5,6] Practice based research networks have been used in medicine in the United States since the 1970s[7], however, they are relatively new in dentistry. In 2003 the National Institute of Dental and Craniofacial Research (NIDCR) began development of the General Dental Practice-Based Research Network initiative and two years later awarded three seven year grants totaling $75 million to establish practice based research in dentistry.[8] Recently the NIDCR continued its support of dental PBRNs with a $66.8 million grant which unifies the existing networks into a single nationally coordinated effort and renamed it to The National Dental Practice-Based Research Network (NDPBRN). [9]

Dental Practice Based Research

Practice based research networks have continued to grow in dentistry and the NIDCR has identified support of practice based research and the creation of a national-level dental practice collaborative as one of its current core objectives.[10] There are now 1,719 practitioners in 43 states enrolled.[9] The recent formation of the NDPBRN consolidated the previous three practice based research networks which were funded by NIDCR: DPBRN (Dental Practice-Based Research Network), Northwest PRECEDENT (Northwest Practice-based Research Collaborative in Evidence-based DENTistry) and PEARL (Practitioners Engaged in Applied Research and Learning). DPBRN had its administrative base at the University of Alabama at Birmingham and included practitioner-investigators in Alabama, Mississippi, Georgia, Florida, Oregon and Washington (Permanente Dental Associates), Minnesota (HealthPartners organization) and the Scandinavian countries of Sweden, Norway, and Denmark.[11] Northwest PRECEDENT was operated jointly by the Oregon Health and Science University and the University of Washington

and had active members in the states of Idaho, Montana, Oregon, Utah, and Washington.[12] The PEARL network had over 200 practitioner-investigators in 32 states and was supported by personnel from New York University College of Dentistry, and the EMMES Corporation.[13] The new consolidated network is headquartered at the University of Alabama at Birmingham (UAB) School of Dentistry.[9] It will serve as the hub and will oversee the six regional node research sites which are located in Rochester, NY; Gainesville, Fla.; Birmingham; Minneapolis; San Antonio; and Portland, Ore.[9]

Contributions of Dental Practice Based Research

While dental practice based research networks are relatively new to dentistry they have already begun to make significant contributions to dentistry and patient care. Since their inception, the three dental PBRNs have conducted 51 research studies which generated 87 journal articles.[9] Highlights from the previous Northwest PRECEDENT network include an ongoing study assessing the outcome of cracked teeth and an RCT evaluating treatment options for white spot lesions after removal of orthodontic brackets.[14] The PEARL network has completed multiple studies including a study of single tooth endodontic and restorative treatment outcomes.[14] Additionally they have been involved in an RCT to evaluate non-carious cervical lesions; the manuscript of which is currently in preparation. DPBRN has completed over twenty studies which include a large RCT on tobacco control in dental offices, a study on patient satisfaction with dental restorations, and a prospective cohort study on repaired or replaced dental restorations.[15] Additionally, the three networks had collaborated on a trans-PBRN entity called the Collaboration on Networked Dental and Oral Health Research (CONDOR) which allowed the networks to combine resources for specific projects.[2] This collaboration resulted in a case-control study published on osteonecrosis of the jaw, providing critical information on this rare and ill understood disease.[16] With a number of studies in process and plans for future expansion to include 5,000 practitioners including greater participation of dental subspecialists the research networks will continue to make important contributions to clinical research.[9]

Practice Based Research and Evidence Based Dentistry

Practice based research networks provide a unique approach to collecting and integrating research evidence into patient care at a time when making evidence based clinical decisions has

become increasingly important in today's rapidly changing health care system. There is an adage that says "if you want more evidence based practice you need more practice based evidence".[17] Evidence based dentistry (EBD) is defined as the integration of the dentist's clinical expertise, the patient's preferences and needs along with a systematic assessment of clinically relevant scientific evidence about the patient's condition.[18] It is essentially "personalized dental care based on the most current scientific knowledge".[18] The dental community has been slower to adapt to the methods of evidence based practice compared to their medical colleagues[19], however, its importance has begun to be appreciated and emphasized in dental schools curriculum[20] and professional association guidelines.[18] The American Academy of Pediatric Dentistry guidelines state, "the clinical practice of pediatric dentistry has to be driven by science and evidence-based dentistry (EBD)." and that "Where the evidence or science is lacking, research needs to be conducted to answer the relevant questions that arise in our clinical practice".[21] PBRNs can serve as an effective model for conducting research to address relevant clinical questions as well as aid in the dissemination and integration of evidence based practices into the clinic.

Provider's opinions and utilization of EBD

While dental professional organizations have been extremely supportive of EBD, individual provider's opinions and utilization of evidence-based methodologies have been more variable. Evidence based guidelines have been utilized as a mean to facilitate provider's ability to make clinical decisions.[22] Creation of evidence based clinical practice guidelines is a priority of the National Institutes of Health[22] and the American Dental Association (ADA).[23] The ADA has developed the ebd.ada.org website to help facilitate access to clinically relevant scientific evidence and present evidence based clinical recommendations when appropriate.[23] Yet numerous barriers to the implementation of the evidence based recommendations have been reported including: difficulty in changing current practice model, resistance and criticism from colleagues and a lack of trust in the evidence.[22] Research about general practice providers has found not all dentists are familiar or supportive of EBD practices but found that a majority are supportive of EBD concepts and are interested in finding out more about EBD.[24] There is no current literature exploring pediatric dentist's opinions about, or utilization of, evidence based methodologies. Additionally there has been no research to evaluate if provider utilization of

evidence based methodologies is associated with their participation in Practice based Research Networks.

Factors associated with participation in PBRN

Recruitment and retention of providers is an important part of effective practice based networks. Research into factors motivating participating providers in primary care practice based research have found common motivational themes related to "competence", "autonomy", and "relatedness".[1] The "competence" component relates to intellectual stimulation and staying up to date on the latest evidence, "autonomy" refers to the benefits of participating in research without the additional burdens of an academic career, and "relatedness" includes the concepts of mentorship, belonging to a group of likeminded colleagues and the idea that PBRNs are a way to combat the isolation of private practice.[1] There is no literature on the motivating factors of dentist's participating in dental PBRN's and little information on whether there are demographic factors associated with participation. A survey of dentist's participating in Northwest PRECEDENT found participating dentists to be relatively comparable demographically to general dentists practicing nationwide with the exception of a slightly higher proportion of rural practicing providers, younger providers and minority providers.[25] An understanding of provider demographics and characteristics associated with participating in PBRNs and factors that motivate providers to participate is important for future efforts to recruit and retain providers.

Pediatric dentists and PBRN

The initial NIDCR grant focused on establishing general practice providers in the network but soon expanded to include a limited number of specialists; the National DPBRN will likely expand to include more specialists.. Currently less than 20 pediatric dentists are involved in Northwest PRECEDENT and only 14.1 percent of the patient population in the Precedent network is below the age of 18.[25] Many of the current studies underway could benefit from additional pediatric patient enrollment which could be provided by having more pediatric dentist's participating in the studies. Research has found caries treatment rates on the rise in children age 2-5[27] and increased awareness of the importance of childhood oral health has prompted The American Academy of Pediatrics to name oral health one of its top four child-health priorities[28]. Additional research about etiology and prevention is needed and integration

of evidence-based dentistry into clinical practice is important to improve quality of care and to most effectively utilize the limited resources available for childhood oral health. Increased involvement of pediatric dentists in practice based research would allow important questions related to childhood oral health to be explored and aid in dissemination and integration of these findings into practice. The goals of this research project were to evaluate pediatric dentist's willingness to participate in dental PBRNs, which factors are associated with their willingness to participate, and what topics are they most interested in having future research conducted.

Purpose:

To determine the willingness of pediatric dentists to participate in practice based research networks (PBRNs) and the demographic and educational factors associated with their willingness.

1) Primary goal: Assess pediatric dentist's willingness to participate in practice based research networks.

2a) Secondary goal 1: Determine if there are demographic and educational factors associated with willingness to participate in practice based research networks.

2b) Secondary goal 2: Determine pediatric dental topics of interest for future practice based research studies.

Methods:

This study protocol was reviewed and deemed exempt by the Institutional Review Board at the University of Washington.

Study design: A cross-sectional internet and mailed survey design was utilized to estimate the prevalence of pediatric dentists willing to participate in practice based research and to evaluate if there are associations between demographic and/or educational data and a willingness to participate.

Population: The units of sampling were the pediatric dentists who were active members of the American Academy of Pediatric Dentistry, practicing in the states within the Northwest PRECEDENT region (Washington, Oregon, Idaho, Montana and Utah). Members of AAPD who were residents, dental students, general dentists, or retired pediatric dentists were not included. The listserve for contacting these providers was obtained by rental of the AAPD membership list. The number of providers included was 337 of which 305 had email addresses.

Survey design: Survey questions consisted of newly constructed questions in addition to modified questions based on a review of published literature on providers perceptions of evidence based practice and practice based research.[24,29,30] The survey was developed and piloted by a committee of research advisors and 11 pediatric dental residents. Based on their comments the survey was revised and a final 29 item survey was developed for the following topics: (see Appendix A).

a. Demographic data: Age, race, ethnicity, sex, practice type, practice location, patient insurance types, graduation year, and board certification status
b. Awareness of practice based research networks
c. Willingness to participate in future practice based research studies
d. Topics of interest for future practice based research studies
e. Utilization and awareness of educational resources: Use of evidence based reference databases, knowledge of important EBD terminology, regularly read journals, and reference sources for making clinical decisions.

Survey implementation: A mixed mode survey with systematic follow up was utilized to maximize response rate.[31] Pediatric dentists were initially invited to participate in the study via e-mail with a brief explanation of the study and directions to log on to the online survey data capture website. The online survey program, Catalyst (University of Washington), was utilized for confidential survey delivery and data collection. Each participant was assigned an ID number used to log on to the survey. Participation was voluntary; providers had the right skip questions and could opt out of the survey at any time. Follow up emails were sent at 3 and 6 weeks. Providers who had not responded after 12 weeks and those who did not have active email addresses were mailed a print version of the survey with a self addressed stamped envelope. A final email reminder was sent to all non responders six weeks after mailing of the survey. A flyer advertising the survey and encouraging participation was distributed at the Washington State Academy of Pediatric Dentistry annual meeting in Coeur d'Alene, Idaho on 10/1/2011.

Statistical Analysis:

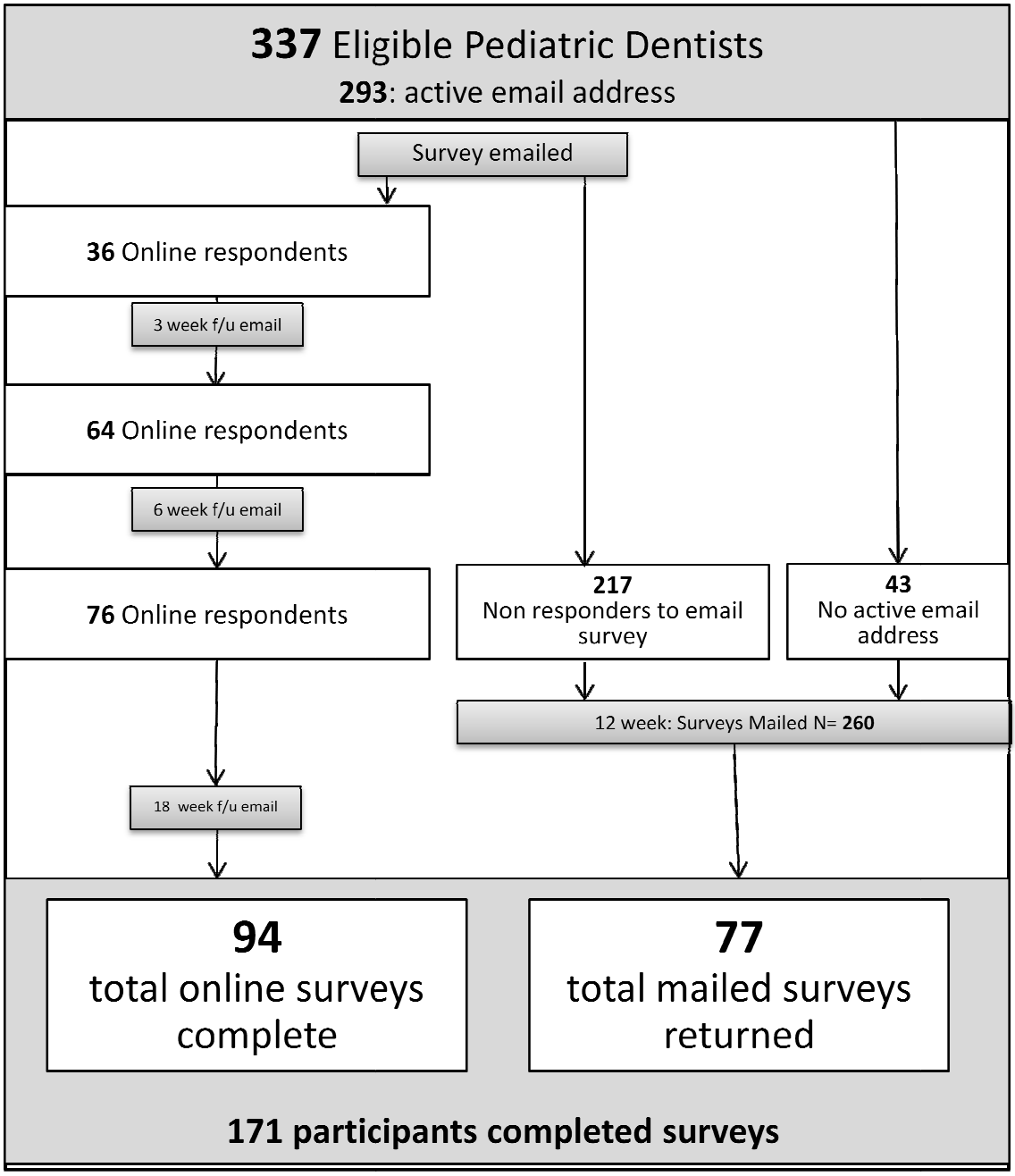
Descriptive statistics were utilized to examine provider demographics, educational resource awareness and utilization and willingness to participate in PBRNs. Binary categories were created from a five point scale (never, rarely, sometimes vs. quite frequently, every time available) for the variables related to frequency of use of resources for practice guidance. Additionally, binary categories were created from another five point scale (strongly disagree, disagree, neutral vs. agree, strongly agree) for the following variables: willingness to participate, awareness of PBRNs and Northwest PRECEDENT, and participation concerns.

Chi-square and Fisher Exact tests were utilized to test for difference between providers who were willing to participate in PBRN and those who were not. Crude and adjusted odds ratios were estimated via logistic regression. Variables which had a $p<0.2$ in Chi-square tests were included in the multivariate analysis. Analyses were performed using Stata/IC 11.2 for Windows software (StataCorp LP, College Station, TX, USA)

Results:

Survey Response: Of the 337 pediatric dentists who qualified, 305 had an email address on record with the AAPD. After initially emailing the survey 12 email addresses were inactive resulting in total of 293 providers with active email addresses. A mailed copy of the survey was then sent to all non responding providers including those who did not have active email addresses (N=260). The response rate to the mailed survey of those with an active email address was 30% (N=65) while the response rate for those without an active email address was 27% (N=12). Overall, seventy-seven providers returned the mailed survey and a total of 94 online surveys were completed. This resulted in a total of 171 respondents for a response rate of 51% (Figure 1).

Figure 1: Survey Response Flow Diagram



Provider Demographics: Table 1 presents a summary of demographic and practice characteristics of the respondents. Of the 171 respondents, 121 (71%) were male. The majority of respondents (63%) were under the age of 45; 42% within 35-44 years old. Seventy-nine

(46%) respondents have been practicing dentistry less than 10 years, while 45 (26%) have practiced for greater than 20 years. Non-Hispanic whites accounted for 74.9 percent of respondents followed by Asian (9.4%), Hispanic white (2.3%), other (2.4%), Black (1.2%), and multiple race/ethnicity (1.2%). Fifteen (8.8%) did not report race or ethnicity. The majority of respondents 112 (66%) were diplomats of the American Board of Pediatric Dentistry. Another 23 (13%) were in the process of becoming board certified.

The vast majority (87%) worked in private practice setting with 86 (51%) in solo private practice and 62 (36%) in group private practice. The remaining respondents worked in community clinics (5%), managed care clinics (1%), academia (3%) or other (4%). The majority of respondents 81 (47%) practices in a suburban area, while 56 (32%) reported an urban setting and 33 (20%) practice in a rural area.

Table 1. RESPONDENTS' DEMOGRAPHIC AND PRACTICE INFORMATION	
	N (%) of respondents N=171
Gender	
Male	121 (70.8%)
Female	50 (29.2%)
Age category	
25-34	35 (20.5%)
35-44	72 (42.1%)
45-54	30 (17.5%)
55+	34 (19.9%)
Race/Ethnicity	
Non-Hispanic white	128 (74.9%)
Hispanic white	4 (2.3%)
Black	2 (1.2%)
Asian	16(9.4%)
Other	4 (2.3%)
Multiple	2 (1.2%)
Unreported	15 (8.8%)
Diplomat of the American Board of Pediatric Dentistry [+]	
No	59 (34.5%)
Yes	112 (65.5%)
Years in practice	
10 or fewer	79 (46.2%)
11-20	45 (26.3%)
Greater than 20	45 (26.3%)
unreported	2 (1.2%)
Practice location	
Rural	33 (19.3%)
Urban	56 (32.7%)
Suburban	81 (47.4%)
unreported	1 (0.6%)
Practice type	
Private solo practice	86 (50.3%)
Private group practice	62 (36.3%)
Other	23 (13.5%)

[+] Those in process of board certification are included in "No" category

Willingness to Participate in PBRNs: Ninety-two respondents (54%) reported an awareness of PBRNs and 53 (31%) were aware of Northwest PRECEDENT. Thirteen (8%) respondents had participated in a PBRN and 74 (43%) reported that they would be willing to participate in practice based research networks.

Factors prohibiting willingness to participate: The most common concern was the lack of time to participate (109 respondents; 64%). The second most common concern was about patient's willingness to participate (29%), followed by loss of income (26%) and concerns about staff willingness to participate (18%). The area with the least concern to the respondents was related to low quality of collected data (12%). Thirty-eight percent of those providers who had previously participated in a PBRN were concerned about staff willingness to participate compared to 18% of those who had not previously participated ($p=0.04$). There was no difference between the two groups in regards to other participation concerns.

Regularly read journal: The most commonly read journal was Pediatric Dentistry (92%) followed by Journal of the American Dental Association (70%). The International Journal of Pediatric Dentistry was reported by 9%, Journal of Dental Research 5%, Evidence Based Dentistry 4% and Caries Research 2%. The majority of respondents (57%) regularly read a total of two journals, while 18% reported reading three or more journals regularly.

Respondents were given the opportunity to write in other regularly read journals. Journals reported by more than one participant included: Dental Traumatology, American Journal of Orthodontics & Dentofacial Orthopedics (AJODO) and Oral Surgery Oral Medicine Oral Pathology Oral Radiology and Endodontics (OOOE).

Resources for practice guidance: The most commonly reported resource used for practice guidance was printed peer reviewed journals (52%). Informal conversations with a colleague (50%), national dental meetings (46%), state or local dental meetings (42%), study clubs (35%) and scientific web searches (e.g Pubmed) (30%) were also reported. General web searches (e.g Google) (24%), online CDE (13%) and non peer reviewed journals (8%) were less commonly reported.

Use of bibliographic databases: Participants were asked how frequently they had utilized MEDLINE or another bibliographic database for literature searching in the last year. Almost half of the respondents (48%) had utilized a database 1-5 times last year. Thirty percent reported utilization six or more times, while 22% did not use a database at all. The timing of the last literature search that influenced participants practice was also addressed. The majority (69%) had performed an influential search in the last year.

Publication history: Thirty-nine respondents (23%) reported having been an author on a published peer reviewed scientific article other than their research project in residency training. Another 4 respondents reported having an article submitted but pending publication. Twenty-one respondents (12%) reported being a 1st author on a published peer reviewed scientific article.

Knowledge of and use of evidence based dentistry resources: The majority of respondents (54%) had not attended an evidence based dentistry course in the past. Of those who had attended an EBD course, the AAPD annual meeting was the most commonly reported location of the course followed by residency training.

The vast majority of respondents (89%) were aware of Pubmed, 63% were aware of Cochrane Review, 50% of the American Dental Association's Evidence Based Dentistry website (ebd.ada.org) and 36% of The Journal of Evidence Based Dental Practice (JEBDP). Thirty percent reported having utilized Pubmed to help make clinical decisions, 14% Cochrane Review, 8% ebd.ada.org and 1% The Journal of Evidence Based Dental Practice. Fifty providers (29%) reported using at least one of the listed EBD resources (Pubmed, Cochrane Review, ebd.ada.org or JEBDP) to help in making clinical decisions.

Understanding of EBD terminology: Table 2 presents a summary of providers understanding of research terminology, particularly evidenced-based terms. The majority of respondents reported having a good understanding of randomized controlled trial (62%) and case control study (51%). The least well understood research terms were meta-analysis (25%) and odds ratio (21%).

Table 2. UNDERSTANDING OF RESEARCH TERMINOLOGY

Research term	It would not be helpful for me to understand		I don't understand the term but I would like to		I have some understanding of the term		I have a good understanding and could explain it to others	
Meta-analysis	14	(8%)	33	(19%)	76	(44%)	43	(25%)
Systematic review	6	(4%)	16	(9%)	90	(53%)	55	(32%)
Randomized controlled trial	5	(3%)	3	(2%)	52	(30%)	106	(62%)
Case control study	5	(3%)	7	(4%)	68	(40%)	87	(51%)
Cohort study	12	(7%)	23	(13%)	67	(39%)	65	(38%)
P-Value	14	(8%)	21	(12%)	70	(41%)	60	(35%)
Odds ratio	14	(8%)	43	(25%)	73	(43%)	36	(21%)

Topics of interest: Table 3 summarizes respondent's interest in seeing more research on specified topics. . The topic most commonly reported as most important for future research was caries prevention (29%). Caries management (9%), sedative agents (9%), pulp therapy (8%), efficacy of infant oral health (8%) and restorative materials (8%) were other commonly reported topics.

Table 3. RESEARCH TOPICS OF INTEREST

Topic	MOST IMPORTANT TOPIC N (%)	INTEREST IN MORE RESEARCH IN THIS TOPIC AGREE N (%)	DISAGREE N (%)
Caries prevention	50 (29)	149 (88%)	20 (12%)
Caries management	16 (9)	143 (85%)	25 (15%)
Sedative agents for behavior management	15 (9)	115 (68%)	55 (32%)
Pulp therapy	14 (8)	140 (83%)	29 (17%)
Efficacy of infant oral health	13 (8)	121 (71%)	49 (28%)
Restorative materials	13 (8)	144 (85%)	25 (15%)
National databank on pediatric dental issues	10 (6)	95 (56%)	74 (3%)
Disparities and access to care	8 (5)	68 (41%)	99 (59%)
Caries risk assessment	6 (4)	114 (67%)	55 (32%)
Early caries detection	6 (4)	127 (75%)	42 (25%)
Patients with special health care needs	6 (4)	128 (75%)	42 (25%)
Practice management/marketing	5 (3)	83 (49%)	87 (51%)
Parenting styles	4 (2)	94 (56%)	74 (44%)
Unreported	5 (3)		

Factors associated with a willingness to participate: Table 4 summarizes the demographic and practice characteristics in relation to willingness to participate in PBRNs. One participant did not respond to the question addressing willingness to participate and was thus excluded from analysis (N=170). Females (57%) were more likely than males (38%) to be willing to participate (p=0.02). More providers in the younger age bracket (25-34 years) were willing to participate than other age categories though this was not found to be significant in the bivariate analysis (p=0.08). No other demographic or practice characteristics were significantly related to willingness to participate.

Table 4. DEMOGRAPHICS AND PRACTICE CHARACTERISTICS OF RESPONDENTS BY WILLINGNESS TO PARTICIPATE IN PBRNS

	WILLINGNESS TO PARTICIPATE IN PBRN		TOTAL	
	N	%	N	P-VALUE*
All	74	(43%)	170	
Gender				0.02
Male	46	(38%)	121	
Female	28	(57%)	49	
Age category				0.08
25-34	21	(60%)	35	
35-44	27	(38%)	71	
45-54	15	(50%)	30	
55+	11	(32%)	34	
Race/Ethnicity				0.49**
Non-Hispanic white	54	(42%)	128	
Hispanic white	2	(50%)	4	
Black	2	(100%)	2	
Asian	7	(44%)	16	
Other	1	(33%)	3	
Multiple	0	(0%)	2	
Unreported			16	
Diplomat of the American Board of Pediatric Dentistry +				0.83
No	25	(42%)	59	
Yes	49	(44%)	111	
Years in practice				0.45
10 or fewer	37	(47%)	79	
11-20	20	(45%)	44	
Greater than 20	16	(36%)	45	

unreported			2	
Years since graduation from dental school				0.29
10 or fewer	29	(53%)	55	
11-20	22	(39%)	56	
Greater than 20	23	(40%)	57	
unreported			2	
Years since graduation from pediatric dental residency				0.38
10 or fewer	44	(49%)	90	
11-20	16	(40%)	40	
Greater than 20	14	(37%)	38	
unreported			2	
Practice location				0.67
Rural	13	(39%)	33	
Urban	25	(45%)	56	
Suburban	35	(44%)	80	
Unreported			1	
Practice type				0.27
Private solo practice	33	(38%)	86	
Private group practice	28	(46%)	61	
Other	13	(57%)	23	

*Chi-square test
**Fisher exact test
[+]Those in process of board certification are included in "No" category

Table 5 presents variables related to PBRN awareness, participation concerns, resources for practice guidance and use of evidence based dentistry resources in relation to willingness to participate. Seventy-seven percent of those who had previously participated in a PBRN were willing to participate which was significantly more than the 40% of those who had not participated in the past (p=0.02). Forty-six percent of those who were aware of PBRNs were willing to participate compared to 42% of those who were unaware which was not a significant difference (p=0.59). Awareness of Northwest PRECEDENT, however, was found to be significantly associated with willingness to participate (p=0.04) with 55% of those aware compared to 38% of those not aware willing to participate.

Thirty-seven percent of those providers who were concerned about lack of time to collect data were willing to participate compared to 56% of those who were not concerned about time (p=0.02). Providers who had concerns about low quality of collected data were also found to be significantly less likely to be willing to participate (p=0.01). The percentage of providers

willing to participate that had other areas of concerns about participation was not found to be significantly different from the percentage willing to participate without the concerns.

Reading three or more journals regularly was associated with an increased willingness to participate in PBRNs compared to reading up to one journal regularly (p=0.01). Those providers who made frequent utilization of peer reviewed journals (p=0.04), scientific web searches (p=0.01), or national dental meetings (p=0.03) were significantly more willing to participate than those who did not frequently utilize these resources. An increased utilization of bibliographic databases for literature searching in the last year was found to be positively associated with a willingness to participate in PBRNs (p=0.02) with 59% of those performing six or more literature searches in the last year willing to participate compared to 38% of those who performed one or less searches. Forty-seven percent of those who performed a literature search in the last year were willing to participate compared to 31% of those who did not perform a search, however, this was not a significant difference (p=0.06).

Significant positive associations were also found between the utilization of EBD resources (Cochrane, Pubmed, ada.ebd.org, JEBDP) for clinical decision making (p=0.05), and authoring a peer reviewed article (p=0.01) and willingness to participate in PBRNs.

Table 6 summarizes the multivariate analysis conducted to further evaluate the association of demographic and educational variables while controlling for confounding factors. The following variables where found to be significant in the bivariate analysis but not in the multivariate analysis: history of participation in PBRNs, awareness of Northwest PRECEDENT, gender, number of literature searches in last year, utilization of EBD resources for clinical decision making, authoring a published peer reviewed article, and frequent use of peer reviewed journals for practice guidance.

The multivariate model confirmed that providers with concerns about lack of time (Odds Ratio (OR)=0.32, 95% Confidence Interval (95%CI)=0.13, 0.74) or low quality of collected data (OR=0.15, 95% CI=0.03,0.83) were less likely to participate. Additionally the finding that an increased number of regularly read journals was associated with increased willingness to participate was confirmed with providers reading three or more journals having 6.27 times the odds (95% CI=1.14,34.3) of participation as someone reading one or less journals regularly.

The multivariate analysis also confirmed increased participation amongst providers who regularly used scientific web searches (OR=3.95, 95%CI=1.01,15.4) or attended national

meetings (OR=4.33, 95%CI=1.81, 10.38) for practice guidance. Participant age, which was not significantly associated in the bivariate analysis, was found to be significant (p=0.01) after controlling for other factors; increasing age resulted in a decreasing willingness to participate.

Table 5: PBRN AWARENESS, PARTICIPATION CONCERNS, RESOURCES FOR PRACTICE GUIDANCE AND USE OF EVIDENCE BASED DENTISTRY RESOURCES BY WILLINGNESS TO PARTICIPATE IN PBRNS

	WILLINGNESS TO PARTICIPATE IN PBRN		TOTAL	
	N	%	N	P-VALUE*
Awareness of PBRNs				0.59
Yes	42	(46%)	92	
No	32	(42%)	77	
Unreported			2	
Awareness of Northwest PRECEDENT				0.04
Yes	29	(55%)	53	
No	44	(38%)	116	
Unreported			1	
History of participation in PBRN				0.02
Yes	10	(77%)	13	
No	63	(40%)	156	
Unreported			1	
Concerned about participating because of:				
Lack of time to collect data				0.02
Agree	40	(37%)	109	
Disagree	33	(56%)	59	
Unreported			2	
Potential loss of income				0.66
Agree	18	(40%)	45	
Disagree	53	(44%)	121	
Unreported			4	
Low quality of collected data				
Agree	3	(14%)	21	
Disagree	70	(48%)	146	
Unreported			3	
Staff not willing to participate				0.16
Agree	10	(32%)	31	

Disagree	63	(46%)	137	
Unreported			2	
Patients not willing to participate				0.26
Agree	18	(37%)	49	
Disagree	55	(46%)	119	
Unreported			2	
Regularly read journals				0.003
0-1	15	(38%)	39	
2	36	(37%)	97	
3+	22	(71%)	31	
Unreported			3	
Number of literature searches within last year				0.02
0	12	(32%)	38	
1-5	32	(40%)	81	
6+	30	(59%)	51	
Last literature search which influenced practice				0.06
Within last year	54	(47%)	115	
More than 1 year	16	(31%)	51	
Unreported			4	
Utilization of EBD resources for clinical decision making[+]				0.05
Yes	27	(54%)	50	
No	42	(37%)	113	
Unreported			7	
Author on peer reviewed article□				0.01
Yes	26	(60%)	43	
No	47	(37%)	126	
Unreported			1	
Understanding of study designs†				0.58
Yes	55	(44%)	124	
No	17	(40%)	43	
Unreported			3	
How frequently do you make use of this resources for practice guidance?				
Peer reviewed journals				0.04
Frequently	45	(51%)	89	
Rarely	28	(35%)	80	
Unreported			1	
Non-peer reviewed journals				0.42
Frequently	7	(54%)	13	
Rarely	66	(42%)	156	

Unreported			1	
Online CDEs				0.998
Frequently	10	(43%)	23	
Rarely	63	(43%)	145	
Unreported			2	
General web search (e.g Google)				0.08
Frequently	13	(32%)	41	
Rarely	59	(47%)	125	
Unreported			4	
Scientific web search (e.g Pubmed)				0.01
Frequently	31	(60%)	52	
Rarely	42	(36%)	116	
Unreported			2	
Conversation with colleague				0.85
Frequently	37	(43%)	86	
Rarely	36	(44%)	81	
Unreported			3	
Study or journal clubs				0.56
Frequently	27	(46%)	59	
Rarely	44	(41%)	107	
Unreported			4	
State or local dental meetings				0.68
Frequently	30	(42%)	72	
Rarely	44	(45%)	98	
Unreported				
National dental meetings				0.03
Frequently	41	(53%)	78	
Rarely	33	(36%)	91	
Unreported			1	

*Chi-square test

[+] Use of Cochrane Review, PubMed, ebd.ada.org, Journal of Evidence Based Dentistry Practice

 Not including pediatric dental residency research project. Yes includes "submitted but pending publication"

† Systematic review, Randomized control trial, case control, cohort study

Table 6. ASSOCIATION OF WILLINGNESS TO PARTICIPATE AND DENTIST CHARACTRERISTICS (N=170): CRUDE AND ADJUSTED ODDS RATIOS (OR) AND 95% CONFIDENCE INTERVALS

	Crude OR	(95%CI)	p-value	Adjusted OR	(95% CI)	p-value
Gender			*0.02*			0.30
Male	1	-		1	-	
Female	2.17	(1.11, 4.28)		1.6	(0.67, 3.6)	
Age category			0.08			*0.01*
25-34	1	-		1	-	
35-44	0.41	(0.18, 0.94)		0.45	(0.14, 1.41)	
45-54	0.67	(0.25, 1.79)		0.49	(0.14, 1.64)	
55+	0.32	(0.12, 0.86)		0.06	(0.01, 0.33)	
History of participation in PBRN			*0.02*			0.07
No	1			1		
Yes	4.92	(1.30,18.66)		6.68	(0.89, 50.22)	
Awareness of Northwest PRECEDENT			*0.04*			0.57
No	1			1		
Yes	1.98	(1.02, 3.82)		1.34	(0.49, 3.69)	
Concerned about participating because of:						
Lack of time to collect data			*0.02*			*0.01*
Disagree	1			1		
Agree	0.46	(0.24, 0.87)		0.32	(0.13, 0.74)	
Low quality of collected data			*0.01*			*0.03*
Disagree	1			1		
Agree	0.18	(0.05, 0.64)		0.15	(0.03, 0.83)	
Staff not willing to participate			0.17			0.11
Disagree	1			1		
Agree	0.56	(0.24, 1.28)		0.36	(0.36, 0.23)	
Regularly read journals			*0.01*			*0.04*
0-1	1			1		
2	0.94	(0.44, 2.03)		0.99	(0.32, 3.11)	
3+	3.91	(1.42, 10.76)		6.27	(1.14, 34.30)	
Number of literature searches within last year			*0.03*			0.75
0	1			1		
1-5	1.41	(0.62, 3.21)		0.78	(0.17, 3.60)	
6+	3.10	(1.28, 7.50)		1.18	(0.21, 6.64)	
Last literature search which influenced practice			0.06			0.12
More than 1 year	1			1		
Within last year	1.94	(0.96, 3.89)		1.10	(0.31, 3.73)	
Utilization of EBD			*0.05*			0.15

resources for clinical decision making[+]						
No	1			1		
Yes	1.98	(1.01, 3.90)		0.48	(0.18, 1.30)	
Author on peer reviewed article*			*0.01*			0.23
No	1			1		
Yes	2.57	(1.26, 5.24)		1.79	(0.69, 4.65)	
Frequently use for practice guidance:						
Peer reviewed journals			*0.04*			0.23
Rarely	1			1		
Frequently	1.90	(1.02, 3.53)		1.79	(0.69, 4.65)	
General web search (e.g Google)			0.09			0.10
Rarely	1			1		
Frequently	0.52	(0.25, 1.10)		0.36	(0.11, 1.22)	
Scientific web search (e.g Pubmed)			*0.01*			*0.05*
Rarely	1			1		
Frequently	2.60	(1.32, 5.10)		3.95	(1.01, 15.4)	
National dental meetings			*0.04*			*0.001*
Rarely	1			1		
Frequently	1.95	(1.05, 3.61)		4.33	(1.81, 10.38)	

[+] Use of Cochrane Review, PubMed, ebd.ada.org, Journal of Evidence Based Dentistry Practice

[*] Not including pediatric dental residency research project. Yes includes "submitted but pending publication"

Discussion:

The results of this study suggest that there is a broad base of pediatric dentists who are willing to participate in PBRNs. Provider age and multiple factors related to providers' utilization of reference resources were significantly related to a willingness to participate in PBRNs. Overall there was a high utilization of certain reference resources but only a modest amount of reported translation to clinical decision making. Caries management was considered to be the most important topic of interest for future research.

Overall pediatric dentists are not widely aware of practice based research networks; only half of the respondents reporting awareness. Furthermore, less than a third of respondents were aware of the PBRN located in their region of the country (Northwest Precedent). On the positive side, there remained a strong base of pediatric dental providers (43%) who are willing to participate in PBRNs. This suggests that there is an interest in PBRNs and a foundation for more pediatric dentist involvement. Interestingly, awareness of PBRNs was not significantly associated with willingness to participate. Thus, efforts to increase awareness may not translate into increased participation.

Lack of time to collect data was the major concern of many providers regarding their ability or desire to participate. Other concerns such as staff or patients not being willing to participate were less common. Approximately one-tenth of respondents had concerns about the quality of the data that could be collected in clinical practices, suggesting the majority of providers see practice based research as an effective means of conducting clinical studies. Concerns about lack of time or quality of data were significantly associated with not being willing to participate suggesting that better education about time commitment, practice integration techniques and data quality may yield increased participation. It is important to note that these reported concerns about willingness to participate are primarily perceived concerns and that the majority of those who had previously participated in PBRNs reported a continued willingness to participate.

A variety of demographic and educational factors were evaluated for an association with willingness to participate in PBRNs. After controlling for confounding factors the following variables were significantly associated with an increased willingness to participate: younger age, greater number of regularly read journals, frequent utilization of scientific web searches or national dental meetings for practice guidance, and lack of concern about time to participate or

quality of data obtained in PBRN studies. Increased willingness of younger providers may in part be related to an increased emphasis on evidence based practice during their training years. However, this is in contrast to the actual age profile of the NW PRECEDENT PBRN participants who tended to be older; the highest percentage of participants were aged 51-60 years.[25] The increase in willingness to participate in a PBRN with an increase in the number of journals regularly read or frequent utilization of scientific web searches or national dental meetings for practice guidance suggests that providers with a desire for intellectual stimulation and staying up to date on the latest evidence appear to be more willing to participate. This is consistent with a previous study on motivating factors for physicians who are participating in PBRNs which found participants commonly reported that the benefits of participation included intellectual stimulation, applying evidence based care and staying up to date.[1] These studies suggest that future recruitment efforts can emphasize the intellectual stimulation of participation. In addition, recruitment efforts should occur at national meetings.

Provider driven research topics are an important component of PBRNs and serve to identify relevant clinical questions and aid in translation of results into clinical practice. A recent review by the Dental Practice-Based Research Network of lessons learned after the implementation of its first 21 studies reemphasized the importance that research questions mainly originate from the providers and that the study results have the potential for quickly improving clinical practice.[12] This survey reveals that the vast majority of pediatric dentists agree that research in caries prevention is the most important topic for future studies. This result is not surprising given that caries treatment rates are on the rise in children age 2-5[27] and much of the daily burden of clinical pediatric dentistry is related to the treatment of the destructive carious process. Additionally, it speaks to the difficulty of implementation of the current prevention techniques and the need to continue the search for more effective therapies.

The second tier of recommended areas of research includes a broad range of topics. Demand for more knowledge about sedative agents for behavior management, restorative materials and pulp therapy suggests a desire to improve the effectiveness of current restorative therapy and associated child behavior. Interestingly, there was a high demand for additional research into the efficacy of infant oral health. This may be related to a desire to have a more solid foundation of high level clinical evidence to stand behind the increasing promotion and implementation of infant oral health programs.

Encouragingly, the provider recommended research topics are well represented by the current AAPD research Agenda[21] with "Transmission, etiology, risk assessment, early detection, prevention and management of caries using antimicrobials, fluorides, and remineralizing agents." being listed as the top priority. Additionally, highly reported topics in this survey such as sedative agents, restorative materials, pulp therapy and efficacy of infant oral health are all listed in the top ten areas of focus on the AAPD's research agenda.

The results of this study also present an overview of pediatric dentists utilization of reference resources. Almost all respondents reported reading the Pediatric Dentistry journal and a large majority read the Journal of the American Dental Association, however, only 18% regularly read more than two journals. By comparison a study of UK pediatricians found 79% read more than 3 journals and 16% read 10 journals or more.[32] To keep abreast of a discipline as diverse as the pediatric dentistry specialty suggests a need for more wide spread review of the scientific literature. Surprisingly absent from the self reported journals was the medical journal, Pediatrics, where an awareness of current pediatric medical literature can be found to help better serve pediatric patients. A significant component of this limited breadth of journal review could be related to access to journals and databases and cost of subscriptions.

Pediatric dentists reported a high use of the online database Pubmed with over three-quarters of the respondents conducting a search within the last year. However, only one third reported having utilized Pubmed to help make clinical decisions, suggesting a deficit of translation of research results into clinical practices. This is consistent with findings in other disciplines. A survey of general dentists in 2005 found that only a quarter had used online resources for clinical decision making[33] and a study of pharmacists in 2009 reported that 27% had used Pubmed to help make a clinical decision.[30] Use of online evidence based research databases such as the Cochrane library and "ada.ebd.org" usage was also evaluated in our study. The Cochrane library, which is an important resource for systematic reviews in healthcare, was familiar to two thirds of the pediatric dentists; however, only 13% have used it to make a clinical decision. A study of general dentists in England in 2001 found only 28% of respondents were familiar with the Cochrane Collaboration.[24] This suggests an increasing awareness of the Cochrane library, however, translation to clinical practice remains low.

"Ada.ebd.org" is a collection of evidence based resources and practice guidelines compiled by the ADA to assist dentists in making evidence based clinical decisions. About half

of the pediatric dentists were aware of this resource but less than 10 percent had used it to help make a clinical decision. As clinicians are faced with a rapidly increasing volume of research results and limited time for review, resources such as Cochrane and "ada.ebd.org" serve as important filters. However, there must be additional efforts to increase clinician's awareness of these resources and most importantly an increased translation of the findings into clinical practice.

Limitations of this study include the response rate (51%). It is possible that the responders are not representative of the non-responders creating a non response bias. While it is difficult to fully characterize the non-responding providers, the state of residence was not found to be of statistical significance (p=0.39) between responders and non-responders. However, the national average of board certified pediatric dentists is 53.6%[34] compared to 66% of those responding to the survey. This may be accounted for by regional variation or may be suggestive of a significant difference between the responding and non-responding populations. It is also possible that providers who were interested in PBRNs were more likely to respond which would artificially increase the estimate of overall willingness to participate. However, a response rate of 51% is considerably higher than many recently published surveys of similar populations.[35,36,37] Additionally, studies have found that non response bias may be less of a concern in physician surveys compared to the surveys of the general public.[38]

Another important limitation is that a reported willingness to participate in PBRNs may not be a true representation of actual enrollment and participation. While there is no literature comparing reported willingness to participate in PBRNs with actual participation, studies have found hypothetical willingness to participate in medical screenings tests or biobank participation to be a poor representation of factual participation.[39, 40] Additionally, providers may over report their utilization and understanding of EBD resources and terminology.

If PBRNs expand to include more pediatric dentists future studies will be needed to characterize enrollees and evaluate associated factors. Continued evaluation of provider research topics of interest is important as demand for clinical knowledge changes as additional evidence is published and new clinical challenges present themselves. Future studies to evaluate in more detail the translation of evidence into clinical pediatric dental practice are necessary.

Conclusions

There is a broad base of pediatric dentists who are willing to participate in practice based research networks. Younger age, greater number of regularly read journals, frequent utilization of scientific web searches or national dental meetings for practice guidance, and lack of concern about time to participate or quality of data obtained in PBRN studies were associated with increased willingness to participate. Utilization of online Pubmed literature searches is high but use of evidence based resources such as Cochrane library and ada.ebd.org are underutilized. Reported translation into clinical practice of research data found in Pubmed and other evidence base resources is low. Caries prevention is considered by the majority of providers the most important topic for future research in pediatric dentistry.

BIBLIOGRAPHY

1. Fagnan LJ, Handley MA, Rollins N, Mold J. Voices from left of the dial: reflections of practice-based researchers. J Am Board Fam Med 2010 Jul-Aug;23(4):442-51.
2. Gilbert GH, Williams OD, Rindal DB, Pihlstrom DJ, Benjamin PL, Wallace MC; DPBRN Collaborative Group. The creation and development of the dental practice-based research network. J Am Dent Assoc 2008 Jan;139(1):74-81.
3. Donaldson MS, Yordy KD, Lohr KN, Vanselow NA, editors. Primary care. America's health in a new era. Washington (DC): Institute of Medicine; National Academy Press; 1996
4. Gilbert GH, Richman JS, Qvist V, Pihlstrom DJ, Foy PJ, Gordan VV; DPBRN Collaborative Group. Change in stated clinical practice associated with participation in the Dental Practice-Based Research Network. Gen Dent. 2010 Nov-Dec;58(6):520-8
5. Rhyne R, Sussman AL, Fernald D, Weller N, Daniels E, Williams RL; PRIME Net Clinicians. Reports of persistent change in the clinical encounter following research participation: a report from the Primary Care Multiethnic Network (PRIME Net). J Am Board Fam Med. 2011 Sep-Oct;24(5):496-502
6. Benjamin P; DPBRN Collaborative Group. Promoting evidenced-based dentistry through "the dental practice-based research network". J Evid Based Dent Pract 2009 Dec;9(4):194-6
7. Green LA, Hickner J. A short history of primary care practice-based research networks: from concept to essential research laboratories. J Am Board Fam Med 2006 Jan-Feb;19(1):1-10
8. Kuska B. NIDCR awards grants for new practice-based initiative. Bethesda, Md.: National Institute of Dental and Craniofacial Research, National Institutes of Health; 2005. Available at "www.nidcr.nih.gov/Research/ResearchResults/NewsReleases/ ArchivedNewsReleases/NRY2005/PR03312005.htm". Accessed on February 21, 2011.
9. National Institute of Dental and Craniofacial Research, National Institutes of Health. NIDCR Establishes National Dental Practice-Based Research Network. Available at http://www.nidcr.nih.gov/Research/ResearchResults/NewsReleases/CurrentNewsReleases/NDPBRN.htm. Accessed on April 29, 2012
10. National Institute of Dental and Craniofacial Research, National Institutes of Health. NIDCR Strategic Plan 2009-2013. Available at http://www.nidcr.nih.gov/Research/ResearchPriorities/StrategicPlan/. Accessed on February 21, 2011
11. Dental Practice Based Research Network. Enrollment Maps. Available at http://www.dentalpbrn.org/users/maps/maps.asp. Accessed on February 21, 2011
12. Northwest PRECEDENT. About PRECEDENT, REGION. Available at https://workbench.axioresearch.com/NWPrecedent/region.htm. Accessed on February 21, 2011
13. PEARL Network. About the PEARL Network. Available at https://web.emmes.com/study/pearl/about/about.htm. Accessed on February 21, 2011
14. National Institute of Dental and Craniofacial Research, National Institutes of Health. Study Highlights: Dental Practice-Based Research Networks. Available at

http://www.nidcr.nih.gov/Research/DER/ClinicalResearch/PBRNStudyHighlights.htm. Accessed on April 29, 2012
15. Gilbert GH, Richman JS, Gordan VV, Rindal DB, Fellows JL, Benjamin PL, Wallace-Dawson M, Williams OD; DPBRN Collaborative Group. Lessons learned during the conduct of clinical studies in the dental PBRN. J Dent Educ. 2011 Apr;75(4):453-65
16. Barasch A, Cunha-Cruz J, Curro FA, et al. Risk Factors for Osteonecrosis of the Jaws: a Case-Control Study from the CONDOR Dental PBRN. J Dent Res 2011 Feb 11
17. Berg AO. What do we get from participating in practice-based research networks? J Am Board Fam Med 2010 Jul-Aug;23(4):440-1
18. ADA Center for Evidence Based Dentistry. About EBD. Available at http://ebd.ada.org/about.aspx. Accessed February 21, 2011.
19. Ismail AI, Bader JD; ADA Council on Scientific Affairs and Division of Science; Journal of the American Dental Association. Evidence-based dentistry in clinical practice. J Am Dent Assoc 2004 Jan;135(1):78-83
20. Levine AE, Bebermeyer RD, Chen JW, Davis D, Harty C. Development of an interdisciplinary course in information resources and evidence-based dentistry. J Dent Educ 2008 Sep;72(9):1067-76
21. American Academy of Pediatric Dentistry Research Agenda. American Academy of Pediatric Dentistry reference manual 2010-2011. Pediatr Dent 2010-2011;32: 1-334
22. Spallek H, Song M, Polk DE, Bekhuis T, Frantsve-Hawley J, Aravamudhan K. Barriers to implementing evidence-based clinical guidelines: a survey of early adopters. J Evid Based Dent Pract 2010 Dec;10(4):195-206.
23. ADA Center for Evidence Based Dentistry. ADA Clinical Recommendations. Available at http://ebd.ada.org/ClinicalRecommendations.aspx. Accessed February 21, 2011
24. Iqbal A, Glenny AM. General dental practitioners' knowledge of and attitudes towards evidence based practice. Br Dent J 2002 Nov 23;193(10):587-91
25. DeRouen TA, Cunha-Cruz J, Hilton TJ, et al. Northwest Practice-based REsearch Collaborative in Evidence-based DENTistry (PRECEDENT). What's in a dental practice-based research network? Characteristics of Northwest PRECEDENT dentists, their patients and office visits. J Am Dent Assoc 2010;141:889-99
26. U.S. Department of Health and Human Services. Oral Health in America: A Report of the Surgeon General, Rockville, MD: U.S. DHHS, National Institute of Dental and Craniofacial Research, National Institutes of Health, 2000 available at http://www.surgeongeneral.gov/library/oralhealth/. Accessed February 21, 2011
27. Dye BA, Tan S, Smith V, Lewis BG, Barker LK, Thornton-Evans G, et al Trends in oral health status: United States, 1988–1994 and 1999–2004 National Center for Health Statistics. Vital Health Stat 11(248). 2007.
28. American Academy of Pediatrics. Oral Health Initiative. Available at http://www.aap.org/oralhealth/aboutOHI.cfm. Accessed on February, 21, 2011
29. McColl A, Smith H, White P, Field J. General practitioner's perceptions of the route to evidence based medicine: a questionnaire survey. BMJ. 1998 Jan 31;316(7128):361-5
30. Peterson GM, Jackson SL, Fitzmaurice KD, Gee PR. Attitudes of Australian pharmacists towards practice-based research. J Clin Pharm Ther. 2009 Aug;34(4):397-405
31. Dillman D, Smyth J, Christian, L. 2009. Internet, Mail, and Mixed-Mode Surveys: The Tailored Design Method. 3rd ed. Hoboken (NJ): John Wiley & Sons, Inc. 588 p.

32. Jones TH, Hanney S, Buxton MJ. The information sources and journals consulted or read by UK paediatricians to inform their clinical practice and those which they consider important: a questionnaire survey. BMC Pediatr. 2007 Jan 15;7:1
33. Haj-Ali RN, Walker MP, Petrie CS, Williams K, Strain T. Utilization of evidence-based informational resources for clinical decisions related to posterior composite restorations. J Dent Educ. 2005 Nov;69(11):1251-6
34. Casamassimo PS. Tipping the balance at 53.6%. Pediatr Dent. 2010 Jul-Aug;32(4):280-1
35. Oueis H, Atwan S, Pajtas B, Casamassimo PS. Use of anterior veneered stainless steel crowns by pediatric dentists. Pediatr Dent. 2010 Sep-Oct;32(5):413-6
36. To'olo G, Nash DA, Mathu-Muju KR, Haney CA, Mullins MR, Bush HH. Perspectives of board certified pediatric dentists on adding a pediatric oral health therapist to the dental team. Pediatr Dent. 2010 Nov-Dec;32(7):505-12
37. Needleman HL, Bang S, Zhou J, Johnson JR, McPeek B, Graham D. Personality types of pediatric dentists: comparative analysis and associated factors. Pediatr Dent. 2011 Jan-Feb;33(1):37-45
38. Kellerman SE, Herold J. Physician response to surveys. A review of the literature. Am J Prev Med. 2001 Jan;20(1):61-7
39. Herbert C, Launoy G, Gignoux M. Factors affecting compliance with colorectal cancer screening in France: differences between intention to participate and actual participation. Eur J Cancer Prev. 1997 Feb;6(1):44-52
40. Johnsson L, Helgesson G, Rafnar T, Halldorsdottir I, Chia KS, Eriksson S, Hansson MG. Hypothetical and factual willingness to participate in biobank research. Eur J Hum Genet. 2010 Nov;18(11):1261-4

Appendix A: Questionnaire

Attitudes of Pediatric Dentists' to Practice Based Research Networks: Survey Questionnaire

PART 1: PRACTICE BASED RESEARCH NETWORKS

This section asks about your awareness and willingness to participate in practice based research networks.

Defining practice based research network: A practice based research network (PBRN) is a collection of healthcare providers who conduct research, in collaboration with outside experts, while continuing to provide care to patients. This often involves collecting data within the clinical practice. Examples of recent dental studies include: comparison of direct pulp capping materials, outcomes of cracked teeth, and caries diagnosis.

Question 1. Have you participated in a practice based research network (PBRN)? ☐ No ☐ Yes

If YES specify which network: _____

Question 2. *This question asks about your awareness and interest in practice based research networks.* Choose the button that best fits your response to each statement.

	Strongly disagree	Disagree	Neutral	Agree	Strongly Agree
I am aware of practice based research networks	☐	☐	☐	☐	☐
I am aware of Northwest PRECEDENT Research Network (Dental PBRN affiliated with the University of Washington and Oregon Health & Science University)	☐	☐	☐	☐	☐
I am interested in participating in a practice based research network	☐	☐	☐	☐	☐

Question 3. *This question is about factors that might prohibit you from being willing to participate in practice based research networks. Choose the button that best fits your response to the following statement.*

I am concerned about participating because of:	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Lack of time to collect data in office	☐	☐	☐	☐	☐
Potential loss of income	☐	☐	☐	☐	☐
Perceived low quality of collected data in clinical practice	☐	☐	☐	☐	☐
Staff not willing to participate	☐	☐	☐	☐	☐
Patients not willing to be enrolled into studies	☐	☐	☐	☐	☐

Question 4. Specify if there are any additional factors that prohibit you from being interested in participating in practice based research.

PART 2: SOURCES OF INFORMATION USED FOR CLINICAL DENTISTRY

This section asks you where you look for information on clinical dentistry

Question 5. Which of the following journals do you regularly read? (Select all that apply)

Journal of the American Dental Association	☐
Pediatric Dentistry	☐
Journal of Dental Research	☐
Caries Research	☐
International Journal of Pediatric Dentistry	☐
Evidence Based Dentistry	☐
Other: Specify:_____	☐

Question 6. How frequently do you make use of the following resources for practice guidance?
Choose the button that best fits your response for each resource listed.

	Never	Rarely	Sometimes	Quite frequently	Every time available
Printed peer reviewed journals *(e.g J American Dental Association)*	◻	◻	◻	◻	◻
Printed non-peer-reviewed journals *(e.g. Dental Products Reports)*	◻	◻	◻	◻	◻
Online CDEs	◻	◻	◻	◻	◻
General web searchs *(e.g Google, Bing)*	◻	◻	◻	◻	◻
Scientific web search *(e.g Pubmed, Medline)*	◻	◻	◻	◻	◻
Informal conversation with a colleague	◻	◻	◻	◻	◻
Study or journal clubs	◻	◻	◻	◻	◻
State or local dental meeting	◻	◻	◻	◻	◻
National dental meeting	◻	◻	◻	◻	◻

Question 7. In the last year, how many times have you used MEDLINE or another bibliographic database for literature searching? *(limit response to one answer)*

0	◻
1	◻
2-5	◻
6-10	◻
More than 10	◻

Question 8. When did you last do a literature search which influenced your practice? *(limit response to one answer)*

Within the last six months	◻
6 months to 1 year ago	◻
1 year to 5 years ago	◻
More than 5 years ago	◻
Never	◻

Question 9. What was the topic of the last literature search which directly influenced your practice?

In the next series of questions, we would like to assess your knowledge and use of evidence based dentistry resources.

Question 10. Have you attended any courses on evidence based dentistry? ◻ No ◻ Yes

If YES, what was the most recent one? _____

Question 11. *There are a growing number of extracting journals, review publications and databases relevant to evidence based dentistry.* Choose the button that best fits your response for each resource listed.

	Unaware	Aware but not used	Read	Used to help in clinical decision making
Cochrane Review	◻	◻	◻	◻
Medline (PubMed)	◻	◻	◻	◻
American Dental Association Evidence Based Dentistry website (ebd.ada.org)	◻	◻	◻	◻
Journal of Evidence Based Dentistry Practice	◻	◻	◻	◻

Question 12. *The following terms are used in research studies and papers about evidence-based dentistry that may be relevant to clinical practice.* Choose the button that best fits your response for each term listed.

	Not helpful for me to understand	Don't understand but would like to	Some understanding	Yes, understand and could explain it to others
Meta-analysis	◻	◻	◻	◻
Systematic review	◻	◻	◻	◻
Randomized controlled trial	◻	◻	◻	◻
Case control study	◻	◻	◻	◻
Cohort study	◻	◻	◻	◻
P-value	◻	◻	◻	◻
Odds ratio	◻	◻	◻	◻

Question 13. Other than your research project during your pediatric dental residency training, are you an author on a published, peer reviewed scientific article?

No	◻
Yes	◻
Submitted but pending publication	◻

Question 14. Other than your research project during your pediatric dental residency training, are you a FIRST author on published, peer reviewed scientific article?

No	◻
Yes	◻
Submitted but pending publication	◻

One of the benefits of practice based research is that research topics are driven by the suggestions of providers. The next few questions ask about pediatric dental topics which you might be interested in having studied.

Question 15. *Below is a list of various pediatric dentistry topics. Select the appropriate box for each topic in response to the following statement:*

I am interested in having more research done in this topic:	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Caries risk assessment	◻	◻	◻	◻	◻
Early caries detection	◻	◻	◻	◻	◻
Caries prevention	◻	◻	◻	◻	◻
Caries management	◻	◻	◻	◻	◻
Disparities and access to care	◻	◻	◻	◻	◻
National databank on pediatric dental issues	◻	◻	◻	◻	◻
Efficacy of infant oral health *(e.g. first dental visit by age 12 mos)*	◻	◻	◻	◻	◻
Pulp therapy	◻	◻	◻	◻	◻
Sedative agents for behavior management	◻	◻	◻	◻	◻
Parenting styles	◻	◻	◻	◻	◻
Restorative materials	◻	◻	◻	◻	◻
Practice management/Marketing	◻	◻	◻	◻	◻
Patients with special health care needs	◻	◻	◻	◻	◻

From the topics listed in the previous question select the two topics that you feel are the most important to have more research conducted in?

Question 16: Most important:	
Question 17: 2nd most important:	

Question 18. Identify any other research topics or questions that you would like to see addressed by practice based research networks?

PART 3: DENTIST AND PRACTICE CHARACTERISTICS

This section asks about yourself including your practice characteristics and dental training

Question 19. What is your gender?	Male	☐
	Female	☐
Question 20. What is your age category?	25-34	☐
	35-44	☐
	45-54	☐
	55-64	☐
	65+	☐
Question 21. What ethnicity do you consider yourself to be?	Hispanic or Latino	☐
	Not Hispanic or Latino	☐
	Unknown	☐
	Not reported	☐
Question 22. What race do you consider yourself to be? (Check all that apply)	American Indian/Alaska Native	☐
	Asian	☐
	Black/African American	☐
	Native Hawaiian/Pacific Islander	☐
	White	☐
	Not reported	☐
Question 23. When did you graduate from dental school?		
Question 24. When did you graduate from pediatric dental residency?		
Question 25. How many years have you been practicing dentistry?	5 or fewer	☐
	6-10	☐
	11-15	☐
	16-20	☐
	21-25	☐
	26+	☐
Question 26. *Board certification status*: Are you a diplomat of the American Board of Pediatric Dentistry?	No	☐
	Yes	☐
	In process of becoming certified	☐
Question 27. What type of practice do you work mainly in?	Private solo practice	☐
	Private group practice	☐
	Community clinic/public health	☐
	Managed care clinic	☐
	Academia	☐
	Industry	☐
	Other: Specify_____	☐
Question 28. Where is your practice located?	Rural	☐
	Urban	☐
	Suburban	☐

Question 29. Approximately what percentage of all the patients who visited the entire practice in 2010 were:

Covered by private insurance program that pays or partially pays for their dental care?	____%
Covered by a public assistance program that pays or partially pays for their dental care?	____%
Not covered by an insurance program?	____%

Thank you! We greatly appreciate your time and effort to complete the questionnaire.
Please place completed survey in enclosed stamped and addressed envelope and mail to:

Dr. Joseph Stout
The Center for Pediatric Dentistry
6222 NE 74th Street
Seattle WA 98115