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Practice-Based Research in Dentistry: Exploring Methodologies, Benefits, and Challenges

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Abstract

Background: Practice-Based Research Network (PBRN) studies typically assess the effectiveness of clinical interventions in settings that match real-world conditions. Dental PBRNs have the capacity to amass, identify, and analyze vast amounts of data from patient populations that include diverse racial, ethnic, socioeconomic, and geographic backgrounds. These dental studies encompass a broad spectrum of healthcare aspects, including prevention, diagnosis, symptom and disease treatment, quality enhancement, and care coordination.

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(The National Dental PBRN Collaborative Group comprises practitioners, faculty, and staff investigators who contributed to this network activity. A list of these persons is at <http://www.nationaldentalpbrn.org/collaborative-group.php>)

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Methods: An extensive range of research methodologies can be employed within dental PBRNs to investigate these topics, including randomized controlled trials. Dental PBRNs have evolved from primarily focusing on case observations to leveraging advanced network infrastructure and collaborating across multiple regional and national sites. In addition to producing numerous high-impact peer-reviewed publications, study results have led to improved clinical care. However, PBRNs encounter challenges, such as the sustainability of research capacity (relying heavily on ongoing support from funding agencies), diverse research cultures, and an imperative to design studies that are both feasible and relevant to everyday clinical practice. Recognizing the pivotal role of real-world evidence, it is important to have sustained investment in dental PBRN infrastructure and feasible opportunities for practitioners to participate in network activities nationwide.

Conclusion: PBRN studies capitalize on an important research context within which to investigate a range of clinical topics that can employ multiple research methodologies. However, sustaining productive networks requires strategic effort, ongoing financial support, and customized organizational skills.

Keywords

Research; Cross-sectional; Prospective Studies; Observational Studies; Surveys and Questionnaires; Randomized Clinical Trials; Treatment Outcomes

INTRODUCTION

Dental Practice-Based Research Networks Benefits and Challenges.

Dental Practice-Based Research Networks (PBRNs) have existed in the United States (US) since the 1970s and have experienced significant growth since the early 2000s.¹ These networks, comprised of dental practitioners and affiliated organizations, are dedicated to enhancing clinical dental care and promptly translating research findings into practical applications. A recent review identified 24 dental PBRNs globally, with only four active in the US.² The first one is the regional Dental PBRNs, established in 2005, a nationally coordinated program under the US National Institutes of Health. This PBRN evolved into the National Dental PBRN in 2012. It is the largest Network in the US. The second is the South Texas Oral Health Network (STOHN), established in 2008 and supported by the University of Texas Health Science Center San Antonio, Clinical and Translational Science Award (CTSA), which complements the efforts of the National Dental PBRN by focusing on understanding local challenges and community engagement. The third was the Clinical Research Associates, established in 1976, the world's oldest dental PBRN specializing in dental biomaterials evaluation. The fourth network, the American Association of Oral and Maxillofacial Surgeons (AAOMS) PBRN, focuses on surgery research and is directly funded by the AAOMS, distinguishing it from other networks that rely on external grants. Active dental networks were also identified in Europe (United Kingdom, Netherlands, Germany, Italy, France, Finland, etc.), Japan, Australia, and New Zealand. The Japanese Dental PBRN was established in 2010 and piloted studies in Japan in collaboration with the National Dental PBRN from the US.²

These dental networks empower practitioners to engage in research to improve the quality of care and promote evidence-based practice. Typically, their core administrative components include directors, one or more research coordinators, effective two-way communication among member practices, a member roster, regular meetings, and a governance structure.^{1,3,4} Effective PBRNs shape research by fostering collaboration between dental practitioners and researchers, often using a bottom-up approach to generate research ideas.¹

Certain factors can remain ongoing challenges for PBRNs, such as sustaining its overall infrastructure during periods when no studies are being funded, as well as maintaining practitioner interest and engagement during these periods. The ability to maintain the longevity of an established PBRN hinges on factors such as the volume and quality of conducted studies, patient participation, and, most significantly, the recruitment and meaningful engagement of practitioners.⁵ Persistent obstacles include time constraints, competing professional demands, inadequate training, insufficient compensation, and institutional regulatory requirements.⁵

To cultivate practitioner engagement, the National Dental PBRN offers Continuing Education (CE) credits for activities such as National Dental PBRN orientation and human subject protection training, study protocol training, and attending informational sessions that present study results in various formats, including YouTube videos, webinars, in-person regional practitioner meetings, and association symposia.⁶ Additional engagement provides opportunities for practitioners to coauthor National Dental PBRN publications and presentations.⁶ The STOHN has effectively emulated several of the participation and engagement strategies employed by the National Dental PBRN.

Practice-Based Research Networks Research Focus.

Oral health is an integral component of overall well-being, with conditions in the oral cavity capable of significantly impeding an individual's physical, psychological, emotional, and social aspects of life.⁷ Although there has been a global decrease in oral health issues, the prevalence of many conditions remains substantial, particularly concerning untreated caries in permanent teeth, impacting roughly 35% of the global population.^{8,9} The economic burden associated with treating dental diseases substantially strains individuals and public healthcare systems, with estimates that almost 5% of global health expenditures would be required to address these issues.¹⁰ A substantial gap exists between acquiring scientific evidence and its practical application in dentistry. An alternative methodological approach, practice-based research studies, has been employed to bridge this divide and offer research that closely mirrors real-world dental practice. These studies are developed within the clinical setting by healthcare practitioners to address questions arising from daily patient care. Consequently, the results can be more reliably generalized to the broader population. Additionally, involving patients and practitioners in data collection facilitates the seamless translation of findings from practice-based studies into direct, practical applications.

By leveraging dental PBRNs, we stand poised to uncover unique insights into practitioner and patient outcomes research. Patient-reported outcomes research is crucial for patient-centered care, assessing treatment effectiveness, improving dental healthcare quality, guiding decision-making, and advancing medical knowledge.¹¹ It ensures that dental care aligns

with patient needs and preferences, informs policy, and enhances clinical practice.¹¹ However, *practitioner-reported* outcomes research is also crucial for improving patient care by understanding practitioner knowledge and treatment decision-making – a unique contribution made by PBRNs.¹² Incorporating these practitioner insights enables healthcare practitioners to deliver patient care that is more patient-centered and helps shape the development of clinical guidelines and treatment protocols based on real-world data and practitioner expertise.¹² Therefore, PBRNs can be crucial in advancing outcomes research by providing valuable real-world insights and enhancing the relevance of outcomes research.

Dental PBRN research often focuses on patient outcomes, effectiveness and cost-effectiveness of care, and how to incorporate evidence-based care into everyday clinical practice, such as validating and refining the use of less-invasive techniques. For example, at the onset of the National Dental PBRN funding, it was common for US dentists to treat/restore questionable or minimal caries. In contrast, the Scandinavian dentists in the National Dental PBRN rarely restored these lesions, instead choosing to observe them for 1–2 years and only restoring them if the lesion progressed.^{13,14} By engaging both the US and Scandinavian dentists in this research, the US National Dental PBRN dentists were moved toward less-invasive treatment.^{15,16}

This manuscript aims to emphasize the significance of the dental PBRN research context and its studies as a crucial research framework for exploring a wide array of clinical topics using diverse research methodologies.

STUDY METHODOLOGY

Study Development.

The PBRNs regularly conduct in-person activities and surveys to understand practitioner research interests and how research might impact their clinical practice. The Southwest Region of the National Dental PBRN uses the Technology of Participation facilitation methods (ways to facilitate and engage participants) to generate study ideas.¹⁷ The National Dental PBRN also uses Quick Polls (brief 5-question surveys) to identify clinical topics of interest, expecting findings to inform the design of subsequent, full-scale questionnaires or clinical studies and publications.¹⁸ For example, the National Dental PBRN did a brief 5-question Quick Poll on bruxism.¹⁸ A total of 397 practitioners responded. The majority indicated that stress (97%) and sleep patterns (82%) affected bruxism in their patients. In contrast to most current experts' recommendations, 96% offered an occlusal guard/appliance, and 46% made occlusal adjustments, which may do more harm than good.¹⁸ There are many areas where the Quick Poll results are consistent with current research.¹⁸ The study's diverse responses among National Dental PBRN dental practitioners for factors affecting bruxism and treatment choices/offered to reveal and reflect the inconsistencies in practitioner knowledge. Hence, the preliminary results obtained from this Quick Poll are a crucial first step to preparing for future studies intending to develop a standardized protocol for assessing and managing bruxism in general dental practices. The National Dental PBRN has actively involved dental practitioners in numerous Quick Polls, as highlighted in Table 1.¹⁹

Study Designs.

Practice-based research studies encompass diverse study designs to meet diverse objectives. Many methodological approaches are feasible, including straightforward cross-sectional surveys and prospective cohort studies with extended follow-up periods. These designs can answer specific and important questions, but the limitations of non-randomized studies should be disclosed. Non-randomized studies can be at particular risk for selection bias, as dentists invariably choose the interventions according to their clinical judgment criteria. Selection bias is especially pertinent in cases where the study aims to compare treatment options. Other study designs include explanatory Randomized Controlled Trials (RCTs) and pragmatic RCTs— (RCTs assess the efficacy of an intervention under ideal conditions, employing strict control and standardized protocols, while pragmatic trials evaluate its real-world effectiveness in diverse and everyday clinical settings), case-control studies, retrospective cohort studies, qualitative studies (involve collecting data for exploratory purposes or to find common themes, which include focus groups and interviews), and mixed-method studies (involves the analysis of numerical data that can be used for statistical analysis and qualitative research or cross-sectional followed by prospective studies). Examples of types of research conducted in PBRNs include translational effectiveness research, quality improvement, and best practices, effects of health system factors on delivery of care, dentist-patient relationships, patient health behavior change, practice-enhancement interventions, electronic health records (EHR)-based research, clinical practice preferences and tracking the long-term effects of dental treatments in a substantial patient cohort.^{20,21}

Cross-sectional questionnaires are the simplest method to apply within a practice-based context. In general, surveys are useful to ascertain practitioner-reported outcomes regarding a topic of interest that addresses discipline-specific issues such as current practices, perceptions, or opinions held by healthcare professionals. For example, the National Dental PBRN surveyed dental practitioners on opioid prescribing and risk mitigation implementation. A minority of dentists reported prescribing to at least half or more of their patients needing management of acute pain, opioids only (11%) or opioids in combination with a recommendation for nonsteroidal anti-inflammatory drugs or acetaminophen (18%).²² A higher frequency of opioid prescribing was associated with less-consistent risk mitigation implementation. The survey investigators concluded that continuing education for dentists in this area is needed.²²

A type of survey that is of particular interest in practice-based research has to do with clinical decision-making scenarios. In these studies, clinicians are asked to give their opinions about treatment/diagnosis decisions while being provided with specific clinical situations in a questionnaire. This methodological approach is useful for understanding the management of clinical situations in the real world, which may differ from management provided by academic dentists who may not have the same financial and time constraints as their counterparts in community practice. For example, 1,777 (83%) of National Dental PBRN-eligible members responded to a questionnaire to quantify practitioner variation in likelihood to recommend a crown and test whether certain dentists, practice, and clinical factors are associated significantly with this likelihood.²³ Practice owners, practitioners

in the Southwest region of the National Dental PBRN, and practitioners with a balanced workload were more likely than other regions in the National Dental PBRN to recommend crowns in the clinical scenarios posed in the questionnaire, as were practitioners who used optical scanners for digital impressions.²³

Additionally, aspects that should be considered in questionnaire studies include when and how the instrument will be administered. The response rate will depend mainly on these variables. For example, participation rates in questionnaire studies conducted in the National Dental PBRN were higher with a mixed-mode approach, namely, when postal mail invitation and a paper option for questionnaire completion were used, compared to using only online invitation and completion modes. Participation rates were also higher when invitations/reminders were staggered than when invitations/reminders were not staggered.²⁴

Observational designs are characterized by the absence of any intervention by researchers and are the most widely used designs within PBRNs. These studies are conducted to identify/observe treatment procedures and their clinical outcomes. For example, a study was conducted in the National Dental PBRN to identify the treatments recommended to manage dentin hypersensitivity among dentists.²⁵ The results indicated the most common treatment recommended was desensitizing over-the-counter potassium nitrate toothpaste (alone or in combination with other treatments) for 924 of 1,862 patients (50%). This was followed by an application of fluoride varnish (FV) for 516 patients (28%) and a prescription for fluoride toothpaste for 314 patients (17%). Restorative treatments were recommended to 151 patients (8%).²⁵

The longitudinal investigation of clinical outcomes, including practitioner-reported and patient-reported perspectives on these outcomes, is a good alternative to exploring how individual-related variables affect dental treatments in practice-based research. These studies also assess practitioner and patient characteristics and their impact on treatment outcomes. For example, the Cracked Tooth Registry (CTR) study conducted in the National Dental PBRN was a prospective, observational 3-year cohort study of posterior teeth with visible cracks.^{26–28} At the onset of the CTR, the prevailing consensus was that cracked teeth would progressively increase in the number of cracks, especially those presenting with pain. In addition, it was expected that most would present with pain, primarily biting pain, that this would be constant or get worse, and that cracks would get progressively worse, e.g., increase in number. What the study actually observed was that about 1/3 of the cracked teeth were treated by practitioners in the National Dental PBRN, primarily with full crowns. These cracked teeth typically had active caries, biting pain, and a crack visible on radiographs (only present on about 5% of all cracked teeth). Most surprising, of the non-treated teeth that had pain (biting, cold, or spontaneous pain), most resolved without treatment, and cracks progressed only minimally, e.g., only 3% developed a tooth fracture (primarily partial fractures), and 12% had crack progression (primarily increases in the number of cracks).^{26–28}

RCTs can also be conducted in PBRNs, offering opportunities to randomize at the practice, practitioner, and/or patient levels, as well as cover the continuum from explanatory RCTs to pragmatic RCTs. RCTs in the PBRN setting may have more-explanatory objectives and,

therefore, include extensive inclusion and exclusion criteria, or may be more pragmatic in nature and, therefore, have a design that emphasizes comparative treatment effectiveness so as to discern treatment correlation with health outcomes regardless of the presence of other, potentially confounding variables. For example, a successfully implemented RCT in the National Dental PBRN involved diagnosing suspicious occlusal carious lesions (SOCL).²⁹ The practitioners were randomized into one of three treatment arms: no diagnostic device, Spectra[®], or DIAGNOdent[®]. The study evaluated in two phases whether using a device changed (1) the percentage of SOCLs that were opened surgically and (2) among those SOCLs that were opened, the proportion that had penetrated dentin. The dentists were receptive to the randomization, 'following/accepting' what devices indicated. The study found no statistically significant difference in the change in the proportion of lesions receiving invasive treatment from phase 1 to phase 2 across the three groups ($p=0.3$) or in the change in the proportion of opened lesions that extended into the dentin ($p=0.3$).²⁹

Table 2 describes those mentioned above and other studies conducted in the National Dental PBRN, conveying the broad range of study designs used and the clinical topics investigated.

DISCUSSION

The success of practice-based research hinges on the motivation of participating practitioners. The National Dental PBRN engages dental practitioners in every step of the research process, including engagement about clinical research topic priorities, how to maximize the feasibility of studies, how to efficiently address time and workflow constraints, feedback about practitioner and patient protocol instructional materials, how to conduct its annual practitioner meetings, how to share its research findings with practitioners and patients, and how to offer CE credit opportunities.⁵ Incentives like financial reimbursement or CE credits enhance engagement and study completion. Networks with substantial and sustained funding, such as the National Dental PBRN, enjoy greater predictability regarding Network survival and research outcomes. The STOHN is funded through an academic institution that offers potential and is limited in its regional scope. However, funding constraints in other countries may curtail the scope of such initiatives. Makansi et al. highlighted that researchers and practitioners hold differing motivations for participating in PBRNs.³⁰ While practitioners perceived PBRNs as a means to alleviate professional isolation, researchers viewed them as avenues for generating more research.³⁰

Practice-based research in dentistry validates and improves less-invasive techniques by gathering real-world data. It identifies best practices, focusing on patient satisfaction and long-term benefits, as reported by practitioners and patients. This research fosters a culture of continuous quality improvement and contributes to evidence-based dentistry while customizing treatments and assessing cost-effectiveness. PBRNs also serve as valuable partners in community health, offering a unique opportunity to conduct research within the context of dental care and community settings. This approach leads to more community-focused, practical, and impactful research, ultimately contributing to improving public health outcomes.

The STOHN PBRN, due to its collaboration with the community engagement component of CTSA, has conducted community-based participatory research (CBPR) incorporating PBRN research, two approaches that complement each other in dental care and research. CBPR involves actively engaging community members in research, ensuring their needs and concerns are addressed. A powerful synergy is created when combined with practice-based research, which focuses on real-world healthcare settings and the practical application of research findings. For example, STOHN members expressed a strong interest in learning more about vaping and electronic nicotine devices (ENDS). Based on that interest, qualitative research was designed, and focus groups were conducted with South Texas dental practitioners and community members. Findings from dental practitioner focus groups indicated that they were interested in ENDS cessation and willing to deliver interventions to their patients but lacked the knowledge and training to do so – only 48% were confident that they could explain adverse systemic effects. Similarly, community members lacked knowledge about ENDS's risks, safety, and health effects but were willing to learn about these topics from their dental practitioner. Ninety percent of community participants reported not being asked about ENDS use by their dentists. Based on these results, an education and cessation program was developed, piloted, and tested for feasibility in a PBRN setting.³¹ All practitioners reported the program as useful and important to patient care. In addition, after completing the program, 67% (n=9) of patients reported that the program was helpful, and 100% (n=12) would recommend the program to other ENDS users.³²

This paper presented the use of various study designs and practitioner engagement activities used in PBRNs. It is crucial to consider methodologic aspects for each study design to ensure optimal execution and reporting. Additionally, it is essential to disclose all limitations to prevent scientific bias and misinterpretation.

Despite the numerous benefits, PBRNs encounter significant limitations and challenges that can impact their effectiveness. A primary challenge is the sustainability of research capacity, which relies heavily on consistent funding from agencies. Without stable financial support, maintaining the infrastructure necessary for research activities becomes difficult, and the longevity of established PBRNs may be compromised. Additionally, diverse research cultures across different regions and institutions can pose obstacles to standardizing methodologies and achieving cohesive collaboration. Designing studies that are both feasible and relevant to everyday clinical practice is imperative but often challenging, requiring a balance between scientific rigor and practical applicability. Another issue is the engagement and recruitment of practitioners, which is essential for data collection and study success. However, practitioners face time constraints, competing professional demands, inadequate training, and insufficient compensation, all of which can limit their participation. Furthermore, institutional regulatory requirements can add another layer of complexity, potentially hindering research progress. Overcoming these challenges necessitates strategic efforts, including sustained investment in infrastructure, effective engagement strategies, and tailored organizational skills to ensure the productive operation of dental PBRNs.

CONCLUSION

PBRNs are well-suited for studying many oral health topics due to their focus on real-world clinical settings, interdisciplinary collaboration, and inclusivity of diverse patient populations. For example, their longitudinal capability allows for tracking the progression of specific conditions (e.g., sleep apnea), while the direct involvement of practitioners ensures the translation of research findings into effective clinical practices, ultimately improving patient outcomes. In light of the discussion presented in this manuscript, PBRNs have emerged as a valuable and unique research environment to conduct research studies that closely mirror real-world clinical practice, thus offering enhanced external validity. This, in turn, facilitates the translation of findings into dental practice with greater ease. PBRN studies comprise diverse designs, ranging from surveys assessing dentists' preferences to conducting long-term retrospective or prospective evaluations of treatments and deploying pragmatic designs to test various hypotheses. PBRNs can also assess practitioner-reported and patient-reported outcomes, essential aspects of healthcare delivery to improve patient care.

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Data availability statement:

The data that support the findings of this study are openly available at [nationaldentalpbrn.org](https://www.nationaldentalpbrn.org/)

REFERENCES

1. Fagnan LJ, Davis M, Deyo RA, Werner JJ, Stange KC. Linking practice-based research networks and Clinical and Translational Science Awards: new opportunities for community engagement by academic health centers. *Acad Med*. Mar 2010;85(3):476–83. doi:10.1097/ACM.0b013e3181cd2ed3 [PubMed: 20182121]
2. Canceill T, Monsarrat P, Faure-Clement E, Tohme M, Vergnes JN, Grosogoeat B. Dental practice-based research networks (D-PBRN) worldwide: A scoping review. *J Dent*. Jan 2021;104:103523. doi:10.1016/j.jdent.2020.103523 [PubMed: 33186627]
3. Gilbert GH, Williams OD, Korelitz JJ, et al. Purpose, structure, and function of the United States National Dental Practice-Based Research Network. *J Dent*. Nov 2013;41(11):1051–9. doi:10.1016/j.jdent.2013.04.002 [PubMed: 23597500]

4. Gilbert GH, Fellows JL, Allareddy V, et al. Structure, function, and productivity from the National Dental Practice-Based Research Network. *J Clin Transl Sci.* 2022;6(1):e87. doi:10.1017/cts.2022.421 [PubMed: 35989860]
5. Mungia R, Funkhouser E, Buchberg Trejo MK, et al. Practitioner Participation in National Dental Practice-based Research Network (PBRN) Studies: 12-Year Results. *J Am Board Fam Med.* Nov-Dec 2018;31(6):844–856. doi:10.3122/jabfm.2018.06.180019 [PubMed: 30413541]
6. Mungia R, Funkhouser E, Makhija SK, et al. Practitioner Engagement in Activities of the National Dental Practice-Based Research Network (PBRN): 7-Year Results. *J Am Board Fam Med.* Sep-Oct 2020;33(5):687–697. doi:10.3122/jabfm.2020.05.190339 [PubMed: 32989063]
7. Peres MA, Macpherson LMD, Weyant RJ, et al. Oral diseases: a global public health challenge. *Lancet* Jul 20 2019;394(10194):249–260. doi:10.1016/s0140-6736(19)31146-8 [PubMed: 31327369]
8. Oral Health in America: Advances and Challenges: Executive Summary. National Institute of Dental and Craniofacial Research (US); 2021.
9. Lobbezoo F, Aarab G. Medicine and Dentistry Working Side by Side to Improve Global Health Equity. *J Dent Res.* Sep 2022;101(10):1133–1134. doi:10.1177/00220345221088237 [PubMed: 35331053]
10. Listl S, Galloway J, Mossey PA, Marcenes W. Global Economic Impact of Dental Diseases. *J Dent Res.* Oct 2015;94(10):1355–61. doi:10.1177/0022034515602879 [PubMed: 26318590]
11. Mills I, Frost J, Cooper C, Moles DR, Kay E. Patient-centred care in general dental practice--a systematic review of the literature. *BMC Oral Health.* Jun 5 2014;14:64. doi:10.1186/1472-6831-14-64 [PubMed: 24902842]
12. Pantaleon L. Why measuring outcomes is important in health care. *J Vet Intern Med.* Mar 2019;33(2):356–362. doi:10.1111/jvim.15458 [PubMed: 30784125]
13. Lehmann M, Veitz-Keenan A, Matthews AG, et al. Dentin caries activity in early occlusal lesions selected to receive operative treatment: findings from the Practitioners Engaged in Applied Research and Learning (PEARL) Network. *J Am Dent Assoc.* Apr 2012;143(4):377–85. doi:10.14219/jada.archive.2012.0180 [PubMed: 22467698]
14. Ridell K, Olsson H, Mej re I. Unrestored dentin caries and deep dentin restorations in Swedish adolescents. *Caries Res.* 2008;42(3):164–70. doi:10.1159/000128560 [PubMed: 18446024]
15. Gilbert GH, Gordan VV, Funkhouser EM, et al. Caries treatment in a dental practice-based research network: movement toward stated evidence-based treatment. *Community Dent Oral Epidemiol.* Apr 2013;41(2):143–53. doi:10.1111/cdoe.12008 [PubMed: 23036131]
16. Rindal DB, Flottemesch TJ, Durand EU, Godlevsky OV, Schmidt AM, Gilbert GH. Practice change toward better adherence to evidence-based treatment of early dental decay in the National Dental PBRN. *Implement Sci.* Dec 2 2014;9:177. doi:10.1186/s13012-014-0177-x [PubMed: 25603497]
17. Mungia R, Hayes H, Reyes S, et al. Generating National Dental PBRN Research Ideas Through the ToP Consensus Method Workshop. *Prog Community Health Partnersh.* Autumn 2015;9(3):447–56. doi:10.1353/cpr.2015.0051
18. Mungia R, Lobbezoo F, Funkhouser E, et al. Dental practitioner approaches to bruxism: Preliminary findings from the national dental practice-based research network. *Cranio.* Apr 4 2023;1–9. doi:10.1080/08869634.2023.2192173 [PubMed: 36735770]
19. National Dental PBRN Quick Polls. June 10, 2024. <https://www.nationaldentalpbrn.org/quick-polls/>
20. Davis MM, Keller S, DeVoe JE, Cohen DJ. Characteristics and lessons learned from practice-based research networks (PBRNs) in the United States. *J Healthc Leadersh.* Sep 2012;4:107–116. doi:10.2147/jhl.S16441 [PubMed: 26213481]
21. Demarco FF, Correa MB, Cenci MS, Burke FJT, Opdam NJM, Faria ESAL. Practice based research in dentistry: an alternative to deal with clinical questions. *Braz Oral Res.* 2020;34 Suppl 2:e071. doi:10.1590/1807-3107bor-2020.vol34.0071 [PubMed: 32785489]
22. McCauley JL, Leite RS, Gordan VV, et al. Opioid prescribing and risk mitigation implementation in the management of acute pain: Results from The National Dental Practice-Based Research

- Network. *J Am Dent Assoc.* May 2018;149(5):353–362. doi:10.1016/j.adaj.2017.11.031 [PubMed: 29550022]
23. McCracken MS, Louis DR, Litaker MS, et al. Treatment recommendations for single-unit crowns: Findings from The National Dental Practice-Based Research Network. *J Am Dent Assoc.* Nov 2016;147(11):882–890. doi:10.1016/j.adaj.2016.06.012 [PubMed: 27492046]
24. Funkhouser E, Fellows JL, Gordan VV, Rindal DB, Foy PJ, Gilbert GH. Supplementing online surveys with a mailed option to reduce bias and improve response rate: the National Dental Practice-Based Research Network. *J Public Health Dent.* Fall 2014;74(4):276–82. doi:10.1111/jphd.12054
25. Kopycka-Kedzierawski DT, Meyerowitz C, Litaker MS, et al. Management of dentin hypersensitivity by practitioners in The National Dental Practice-Based Research Network. *J Am Dent Assoc.* Oct 2017;148(10):728–736. doi:10.1016/j.adaj.2017.05.003 [PubMed: 28629602]
26. Hilton TJ, Funkhouser E, Ferracane JL, et al. Baseline characteristics as 3-year predictors of tooth fracture and crack progression: Findings from The National Dental Practice-Based Research Network. *J Am Dent Assoc.* Feb 2021;152(2):146–156. doi:10.1016/j.adaj.2020.09.023 [PubMed: 33358237]
27. Hilton TJ, Funkhouser E, Ferracane JL, et al. Associations of types of pain with crack-level, tooth-level and patient-level characteristics in posterior teeth with visible cracks: Findings from the National Dental Practice-Based Research Network. *J Dent.* Mar 2018;70:67–73. doi:10.1016/j.jdent.2017.12.014 [PubMed: 29289728]
28. Ferracane JL, Hilton TJ, Funkhouser E. Lessons learned from the Cracked Tooth Registry: A 3-year clinical study in the Nation's Network. *J Am Dent Assoc.* Mar 2023;154(3):235–244. doi:10.1016/j.adaj.2022.11.020 [PubMed: 36690539]
29. Makhija SK, Bader JD, Shugars DA, et al. Influence of 2 caries-detecting devices on clinical decision making and lesion depth for suspicious occlusal lesions: A randomized trial from The National Dental Practice-Based Research Network. *J Am Dent Assoc.* Apr 2018;149(4):299–307.e1. doi:10.1016/j.adaj.2017.11.001 [PubMed: 29475554]
30. Makansi N, Bedos C, Allison P. Creating a research network of general dental practitioners: lessons learned from a pilot project. *J Can Dent Assoc.* 2010;76:a93. [PubMed: 20831853]
31. Mungia R, Case K, Valerio MA, et al. Development of an E-Cigarettes Education and Cessation Program: A South Texas Oral Health Network Study. *Health Promot Pract.* Jan 2021;22(1):18–20. doi:10.1177/1524839920914870 [PubMed: 32281882]
32. Mungia R, Mexquitic M, Case K, et al. Implementation of a youth and young adult e-cigarette cessation program within a dental clinic setting : A SToHN feasibility study. *Tex Dent J.* Sep 2022;139(9):542–554. [PubMed: 36644550]

Table 1:
Quick Polls Conducted by the National Dental Practice-Based Research Network 2014–2024

Study	Date	Number Of Participants
ADA pain management guideline	05/2024	526
Molar Hypo-mineralization	10/2023	163
Food Insecurity	07/2023	333
Opioid Use Disorder	05/2023	356
Dental Sealants	04/2023	349
Restorative Tx for Subgingival Margins or Deep Margin Elevation Restorative Technique	11/2022	533
Sjögren's Syndrome	11/2022	156
Business Outcomes	08/2022	116
Endodontics	08/2022	422
Tooth and Restoration Fractures Post COVID	06/2022	319
Pulpotomy	05/2022	416
Orthognathic Surgery	04/2022	280
Oral Biofilm - Dental Hygienists	03/2021	151
Dental Sleep Medicine	02/2021	311
Clear Aligners	01/2021	404
COVID Vaccination	12/2020	531
All-Ceramic Restorations	11/2020	220
Light Curing in Dentistry	08/2020	381
Covid-19 in Dentistry	07/2020	509
Juvenile Idiopathic Arthritis	05/2020	604
Pregnancy and Dentistry	01/2019	526
Cleft Lip and Palate Treatment	04/2020	414
Probiotic and Antibiotic Prescriptions	02/2020	372
Ectodermal Dysplasia	12/2019	282
Smiles for Sobriety	06/2019	360
Health Information Exchange	04/2019	428
Dental Ethics	03/2019	451
Intraoral Digital Scammers	03/2019	448
Practitioner Burnout	12/2018	620
Mental Health of Patients	10/2018	465
Enamel Defects in Cystic Fibrosis (CF) Patients	05/2018	320
Network Participation	03/2018	544
American Association for Dental Research Affiliate Membership	03/2018	454
Cavities May Interfere with Detection of Developmental Defects	03/2018	367
Root Caries	01/2018	460
Incomplete Caries Removal	11/2017	400
ICON Resin Infiltration	07/2017	413
Dental Flossing	06/2017	544
Cement-retained vs Screw-retained Implant Restorations	03/2017	410

Study	Date	Number Of Participants
Ergonomics	02/2017	500
Office Medical Emergencies	01/2017	578
Obstructive Sleep Apnea	11/2016	420
Silver Diamine Fluoride	10/2016	397
Child/Adolescent Periodontal Disease	09/2016	346
Color in Dentistry	07/2016	385
Phantom Bite	06/2016	338
Peri-implant	05/2016	308
Geriatrics	05/2016	278
Periodontal Scaling/Root Planning	04/2016	383
Integrated Diabetic Care Model	03/2016	391
Bruxism	10/2015	400
Impact of Network Participation	08/2015	547
Dental Erosion	07/2015	637
Caries Classification System	06/2015	600
Digital Communications	05/2015	707
Use of Prophylactic Antibiotics	03/2015	775
Digital Radiography	02/2013	~800
Implant-Retained Mandibular Overdenture	01/2015	450
Oil Pulling	12/2014	504
Dental Lasers	09/2014	434
Dental Implant Failure	06/2014	277

Table 2:
Studies Conducted by the National Dental Practice-Based Research Network

Phase ¹	Study title	Study design ²	# practitioners / offices	# of patients	# other entity
1	Assessment of caries diagnosis and caries treatment	Qx: Paper	494		
1	Assessing the impact of participation in PBRNs on patient care	Qx: Paper	613		
1	Assessing the impact of participation in PBRNs on patient care (2 nd administration)	Qx: Paper	556		
2	Isolation techniques used when performing root canal treatment	Qx: Electronic and paper	1,491		
2	Factors for Successful Crowns Stage 1	Qx: Electronic and paper	1,852		
1	Primary care management of temporomandibular joint disorders	Qx: Electronic	434		
1	Infrastructure update survey	Qx: Electronic	649		
2	Management of dentin hypersensitivity: Part 1	Qx: Electronic	171		
2	Reducing prescription opioid misuse	Qx: Electronic	822		
2	Understanding dental information Networks	Qx: Electronic	1,860		
2	Common practices of head & neck examinations in U.S. dental offices	Qx: Electronic	1,126		
2	Prophylactic use of antibiotics in dental office	Qx: Electronic	2,169		
3	Coronavirus acceptability and readiness among dentists (CARAD)	Qx: Electronic	550		
3	Dental management of patients with special healthcare needs (CADTAPS)	Qx: Electronic	505		
3	National Dental PBRN COVID-19 Research (CORE) Registry	Qx: Electronic	1,819		
3	Selective versus non-selective caries removal in permanent teeth (DCRS)	Qx: Electronic	478		
3	Treatment of patients on conventional and direct oral anticoagulants in the dental office	Qx: Electronic	866		
1	Reasons for placing the first restoration on permanent tooth surfaces	Cross-sectional	192	4,844	9,870 restorations
1	Reasons for replacement or repair of dental restorations	Cross-sectional	157	6,092	9,828 restorations
1	Development of a patient-based provider intervention for early caries management	Cross-sectional	10	336	-
1	Patient satisfaction with dental restorations	Cross-sectional	159	4,680	
1	Prevalence of questionable occlusal caries lesions	Cross-sectional	58	4,478	2,687 lesions
1	Blood glucose testing in dental practice	Cross-sectional	23	387	-
2	Stakeholder engagement and multi-risk assessment in dental care settings	Cross-sectional	505 DHCW	857	-
3	Mental health screening and referral in dental practices (pilot)	Cross-sectional	17	36	
1	Diagnoses for persistent dentoalveolar pain following root canal therapy	Nested case series	63	354	
1	CONDOR case-control study of osteonecrosis of the jaws	Case-control	81	764	

Phase ¹	Study title	Study design ²	# practitioners / offices	# of patients	# other entity
1	Longitudinal study of dental restorations placed on previously un-restored surfaces	Prospective cohort: 3 years	192	4,844	9,870 restorations
1	Longitudinal study of repaired or replaced dental restorations	Prospective cohort: 3 years	157	6,092	9,820 restorations
1	Longitudinal study of questionable occlusal caries lesions	Prospective cohort: 18 months	58	4,478	2,671 lesions
1	Peri-operative pain and root canal therapy	Prospective cohort: 1 week	55	655	
1	Persistent pain and root canal therapy	Prospective cohort: 6 months	55	655	
2	Management of dentin hypersensitivity: Part 2	Prospective cohort: 8 weeks	200	1,876	
2	Predicting root canal treatment outcomes	Prospective cohort: 12 months	172	1,883	
2	Factors for Successful Crowns Stage 2	Prospective cohort: 21-42 days	207	3,847	156 dental laboratories
2	Cracked tooth registry study	Prospective cohort: 3 years	236	3,017	
2	Risk for oral cancer/HPV study	Prospective cohort: 6 months	37	1,025	
2	TMD treatment methods	Prospective cohort: 6 months	185	1,901	
2	Anterior openbite (AOB)	Prospective cohort: Until AOB closed	96	358	
3	Acute pain pathways (APP)	Prospective cohort	--	1,513	
3	Post-operative pain study (POPS)	Prospective cohort	160	3,139	
3	Dental implant restoration registry (DIRR)	Prospective cohort	In progress (200 planned)	--	2,000 implants
1	Practice-based root canal treatment effectiveness	Retrospective cohort	13	84	174 teeth
1	Retrospective cohort study of osteonecrosis of the jaws	Retrospective cohort	--	572,606	-
1	Dental tobacco control	RCT	190	11,898	
1	Hygienists' internet tobacco cessation	RCT	100	1,814	-
2	Management of suspicious occlusal caries lesions	RCT	125	3,093	
3	Effectiveness of nicotine replacement sampling in dental practices: Free Samples for Health (FreSH)	RCT	In progress (50 planned)	In progress (1,200 planned)	
3	Periodontal adjunctive antibiotics in dental practice (PAAS)	RCT	In progress (34 planned)	In progress (544 planned)	
2	Leveraging Electronic Dental Records (EDR) data for clinical research	EDR Extraction of patients who received specified treatments	99	217,887	1,207,155 procedures
3	Assessment of personal protective equipment (PPE) for DHCW	Pilot: Qualitative Qx and short prospective	70 DHCW	NA	
3	Innovative mDentistry eHygiene study amid the COVID -19 epidemic	Pilot: Remote exams, acceptability by patients & DHCW	18 DHCW	62	
3	Evaluation of aerosol generating procedures in dental settings	Prospective aerosol composition assessment during specific procedures	5 offices	NA	

Phase ¹	Study title	Study design ²	# practitioners / offices	# of patients	# other entity
3	Evaluation of aerosol composition in dental settings	Prospective office aerosol composition assessment	One office	NA	
3	Particle topography and aerosol size distribution in dental settings in COVID-19 era	Dental office simulation	One office and laboratory	NA	
3	Pragmatic return to effective dental infection control through triage and testing	Feasibility non-RCT	30 DHCW	43	
2	Quit Advisor DDS smoking cessation study	Feasibility non-RCT	30	248	

¹Funding phase: 1:2005-2012; 2:2012-2019; 3:2019-2026

²Qx: Questionnaire (with dentists unless stated otherwise); RCT: Randomized Controlled Trial; DHCW: Dental Health Care Workers