

COMMENTARY

Practice-based Research Network (PBRN) Engagement: 20+ Years and Counting

Robert L. Rhyne, MD, and Lyle J. Fagnan, MD

(J Am Board Fam Med 2018;31:833–839.)

This year marks 20 years since the Agency for Health care Research and Quality (AHRQ) first provided practice-based research network (PBRN) infrastructure funding in 2000. However, practice-based research in US primary care settings began over 40 years ago with a vision to engage community-based practices to link questions from practice to answers from practice through research.¹

In the early 1980s, we (RR and LJF) were practicing family medicine in rural communities, North Carolina and on the Oregon coast, respectively, and were yearning for opportunities to connect with the larger family medicine community and academic leaders, with the goal of improving health and health care of primary care populations through research. In 1961, Kerr White et al,² showed that most people in a community receive health care in primary care practices rather than hospitals and academic medical centers, providing the seminal rationale for performing research in primary care practices; this influenced our desire to build the evidence-base of family medicine.

We each enlisted in 2 early practice-based research endeavors: (1) Community Oriented Primary Care³ and (2) the first North American PBRN, the Ambulatory Sentinel Practice Network

(ASPN), a network of primary care providers across the United States and Canada.⁴ The majority of practices in ASPN were small, physician-owned, and comprised of family physicians interested in expanding the knowledge base of primary care through research. The purpose of Community Oriented Primary Care was to improve health by broadening the scope of primary care to defined practice populations; that is, a population-based approach for single practices. PBRNs such as ASPN provided a wider vision to engage multiple practices in answering pressing primary care questions: a network of collaborating practices.

In 2000, AHRQ began providing PBRN research infrastructure funding and initially awarded grants to 19 PBRNs. The number of PBRNs dramatically increased to 173 by 2016⁵, involving 29,455 practices and 153,736 clinicians and serving over 86 million patients. Types of networks included 34% mixed specialties; 30% family medicine; 13% pediatric; 3% each for internal medicine, pharmacy, and dental; and 14% “other.”⁶ In 2007, AHRQ awarded the Master Contract Program to 10 PBRNs and funded 24 task orders focusing on specific research projects.⁷

The next evolution of PBRN research expanded beyond the individual PBRN to networks of networks (consortia). The final infusion of AHRQ infrastructure funding came in 2012, with the Centers for Primary Care Practice-Based Research and Learning (P30), which funded 8 consortia across the country to improve the delivery of health care and quality improvement (QI).^{8,9} The end of P30 funding in 2017 marked a significant transition in the PBRN landscape and life cycle, the end of infrastructure grant funding, and the beginning of an existential crisis in PBRN functioning.^{5,7}

Over the past 2 decades, PBRNs have evolved into Health Improvement Networks by expanding their missions to include QI, practice transforma-

This article was externally peer reviewed.

Submitted 17 September 2018; revised 17 September 2018; accepted 17 September 2018.

From Research Involving Outpatient Settings Network (RIOS Net), Department of Family & Community Medicine, University of New Mexico Health Sciences Center, University of New Mexico, Albuquerque, NM (RLR); Oregon Rural Practice-based Research Network (ORPRN), Oregon Health & Science University, Portland, OR (LJF).

Funding: none.

Conflict of interest: none declared.

Corresponding author: Robert L. Rhyne, MD, Research Involving Outpatient Settings Network (RIOS Net), Department of Family & Community Medicine, University of New Mexico Health Sciences Center, MSC 09 5040, 1 University of New Mexico, Albuquerque, NM 87131 (E-mail: rhyne@salud.unm.edu).

tion, professional education, health care policy, improvement, and engagement at numerous levels.^{10,11} However, this may be a double-edged sword; expanding missions can help generate more infrastructure support, albeit with associated infrastructure maintenance costs.¹² In addition, the changing health care landscape, fueled by new reimbursement initiatives and massive changes in ownership structure of practices introduced new challenges to PBRNs. Independent and rural practices are being bought by large practice systems and regional hospitals. The transition from independent physician-owned practices to hospital and health system-owned practices has occurred rapidly, with hospital-owned practices now representing more than 50% of physician practices.¹³ Family physician autonomy has decreased and health system leadership emphasizes the business of practice, including practice throughput and system-performance benchmarks, as opposed to research. Recruiting these system-owned practices into PBRN projects requires added layers of engagement with leadership bureaucracy.

The science and contributions of practice-based research continue to be relevant and important, but how PBRNs continue as viable research laboratories remains unclear.⁵ Funding infrastructure has become more difficult with the changing landscape, and some PBRNs have become more “virtual” than formal. They now rely on sequential funding of specific projects to cover basic infrastructure costs, such as retaining experienced research assistants and community engagement activities.

We believe the key to PBRN sustainability and success is maintaining focused community engagement and collaborating with multiple entities at different organizational levels: with practices as they experience change; with the research community that has a variety of funding priorities; with community, population, and public health entities; and with the educational needs of primary care practices and communities. As illustrated in this *JABFM* theme issue, practice-based research continues to make significant contributions. The articles in this issue demonstrate the variety of engagement strategies necessary to further the field of practice-based research.

Engagement in the Midst of a Changing Health Care Landscape

The movement to change from a volume to a value clinical reimbursement system is driving practice

redesign programs. PBRNs have adapted to this changing health care landscape by pursuing grant opportunities of the funding agencies charged with guiding this transition. Changes in the business landscape, namely changing ownership systems, increasing demands on clinicians’ time, reporting pressures, and the use of large electronic medical record (EMR) data systems, are forcing practice-based researchers to change the way they do business.

Practice-based researchers have diversified their portfolios to create new, innovative business lines to support these projects and their infrastructure, namely practice transformation, QI, academic detailing, practice facilitation/health extension, and information technology technical assistance. Specific funding opportunities through AHRQ and the Centers for Medicare & Medicaid blend QI and research under the umbrella of practice transformation. Another research opportunity is collaborating with Clinical and Translational Science Awardees on community engagement, especially as the Institute of Medicine (now the National Academy of Sciences) Clinical and Translational Science Awardees report¹⁴ emphasized community engagement at all levels of research as a necessary component of translational research.^{15,16,17} Despite these initiatives, PBRNs remain a largely untapped and unsupported research resource available to academic health centers and the larger research community.

An example of how engaging with these new initiatives affected PBRNs is the AHRQ Evidence-NOW: Advancing Heart Health in Primary Care¹⁸ project, based on the premise that patients and their communities are best served by transforming from a volume to value reimbursement model, which requires small- to medium-sized practices to use high-performing QI teams. This transformation requires practices to extract population data to improve outcome reporting. The engagement, expertise, and effort required for large-scale QI increased the relevance of PBRNs, by engaging practices where they were in their capacity to transform.

QI in This Issue

Three articles in this issue reflect how practice-based researchers engage practices through QI strategies. Although quality measures were in-

tended to help shift volume to value reimbursement, it has resulted in a burdensome reporting system.¹⁹ Mutter et al²⁰ offer 4 core principles aimed at measuring quality rather than disease-oriented outcomes, all of which require meaningful engagement between practices and their patient populations. Bartels et al²¹, in their research letter, highlight another potential adverse effect of QI efforts. They surveyed family physicians in Colorado and had a low response rate, but, nonetheless, their results generate the hypothesis that the use of patient satisfaction surveys to affect salary may increase opioid prescribing, presumably to affect satisfaction ratings. In addition, addressing the prescription opioid problem, Voelker and Schauburger²², in their research letter, report that a QI process of providing performance reports plus academic detailing to clinicians practicing obstetrics in 1 hospital system led to decreased opioid prescriptions for mothers postdelivery.

Engagement with the Research Community

Effective engagement strategies with practices and clinicians are essential to the success of practice-based research, especially for multisite projects that perform complicated study designs, that is, pragmatic clinical trials. Fernald et al²³ performed a qualitative analysis of practice recruitment strategies in a pragmatic randomized trial on diabetes self-management with 36 primary care practices in 2 states. The key lessons learned inform the reader about how important the following engagement strategies are when implementing complicated pragmatic trials: engaging practice staff at multiple levels, having bilateral communication plans, and being aware that studies often take longer than anticipated. And Phillips et al²⁴, in a preliminary study, hypothesize the Transforming Clinical Practice Initiative enrolled a higher proportion of rural family medicine practices, a workforce that needs more engagement and resources to succeed in practice-based research.

PBRNs in other specialties face similar challenges in engaging their clinicians and practices. The majority of dentists work in independent/solo practices. Mungia et al²⁵, in a cohort study in the National Dental PBRN over a 12-year period, illustrates that longitudinal participation in PBRNs depends on certain principles of engagement, including engagement of clinicians in all aspects of the research process, posing questions that improve

the health of patients, minimizing time/workflow pressures, supporting participating clinicians, periodic convocation meetings, practical study designs, and disseminating results to clinicians.

Participation in PBRN research benefits clinicians by providing professional engagement and intellectual stimulation, and has been associated with retention of clinicians in rural, underserved communities²⁶ and with long-term change in clinical practice behavior.²⁷ The knowledge base of primary care is vibrant and growing, as new strategies are explored to maintain engagement with practices and communities, such as practice facilitation, academic detailing, information technology support, and health extension programs. As scientific methodology among PBRNs evolves into more rigorous study designs, including pragmatic randomized clinical trials, scientific contributions are guiding the way to improving the health of primary care patients and their communities, as illustrated by 2 articles in this *JABFM* issue. Kiran et al²⁸ conducted a pragmatic randomized clinical trial comparing mailed versus phone call reminders in an attempt to increase cervical, breast, and colorectal cancer screening. Phone calls, albeit more expensive, were more effective than mailed reminders, and women had a significant increase of at least 1 screening test.

A growing set of studies show how practices can improve patient health and the health care system by using nonclinician dependent, clinical team approaches to cancer screening, such as these reminders or a patient decision aid plus navigation.²⁹ Tsoh et al³⁰ tested the feasibility of using an interactive, mobile, smoking cessation messaging application among Korean and Vietnamese-speaking male smokers before a clinic visit. They showed a 19% 7-day abstinence rate. Results of these patient engagement and communication interventions can inform practices how to augment the primary care visit for improved clinical outcomes workflow.

Community, Population, and Public Health Engagement

By their nature, primary care PBRNs are relationship based, not disease based. They were established with the goal of improving the health of patients and their communities. Accomplishing this goal depends on forging longitudinal relationships with and engaging practices, communities, and

populations by using systematic public health methods.³¹ Population management and empanelment are now considered essential building blocks of primary care.³²

PBRNs have a fundamental value of engaging patients and populations in all aspects of the research process. Some of the strategies for accomplishing this goal include community-based participatory research,³³ Boot Camp Translation,³⁴ and Practice and Family Advisory Councils.³⁵ Articles already cited in this issue emphasize patient and population engagement. It is an inherent part of the Mutter et al²⁰ 4 core principles of improving quality management. Fernald et al²³ show the importance of engaging a broad group of stakeholders within a practice and having an effective communication strategy. Also, Phillips et al²⁴ suggests the importance of engaging rural populations through practices.

Early framers of PBRNs listed epidemiology as a necessary component, and performing population-based research requires a broad knowledge of public health concepts, clinical research design, and analysis. It takes a team to apply public health concepts to individual practices. For example, patients and populations potentially benefit from incorporating evidence-based clinical practice guidelines into routine care; however, the sheer number of clinical practice guidelines, the discrepancy between recommendations by specialty societies, and the frequency they change are difficult for primary care physicians to follow.^{36,37} Lin et al³⁸ provide very complex information about how to test for Zika virus, identify high-risk patients (mostly women of childbearing age) for screening, and interpret the results in various risk populations. To implement this information into practice, clinicians would have to engage with their local health departments about the current guidelines that affect their populations. PBRNs would be an ideal setting to establish sentinel practices to monitor and address infectious disease outbreaks.

There are mounting pressures and opportunities for using large data sets to answer pressing clinical questions. Three studies in this issue analyze large data sets. Peters et al³⁹ studied heroin and non-heroin opioid overdose hospitalizations by using National Inpatient Sample data between 1998 and 2013. They compared the proportion of hospitalizations in Medicare disabled beneficiaries under age 65 versus non-Medicare disabled beneficiaries

of the same age and showed a significant increasing hospitalization rate in the disabled population, especially in women and those aged 50 to 64. This observation has research implications for primary care PBRNs. Is the increased risk due to pathophysiology, opioid abuse, adverse social determinates, access to primary care, or other factors? Also, what intervention could mitigate this risk?

Obtaining analyzable data from different EMRs is a huge barrier, especially if there are different vendors, but it remains a priority with PBRNs. Selby et al⁴⁰ were able to compare hypertension control data by using a common data repository from 3 different health systems with 2 different EMRs, a laudable accomplishment. They compared risk for uncontrolled hypertension between and within health systems, which can inform future QI interventions. The PBRN functioned as a trusted knowledge broker, sharing best practices across health systems.

In another EMR-based study, Huguet et al⁴¹ measured the effect of the Affordable Care Act on diabetes care among community health centers, in Medicaid expansion versus nonexpansion states. Using EMR data from the PBRN PCORNnet ADVANCE in 13 states (9 expansion and 4 nonexpansion states), they showed a decreased uninsured rate overall and increased access to preventive care for vulnerable patients with prediabetes but did not find support for their hypothesis that more improvement in diabetes care would occur in the Medicaid expansion states. This may be due to the high-quality care provided at community health centers regardless of insurance status.

Engagement with Educational Programs

PBRNs can help educate practicing clinicians, community stakeholders, researchers, and policy makers. They generate new knowledge and often function as knowledge brokers for primary care clinicians and practices. They are potential educational resources for academic health centers, health systems, and health professional students, especially in community settings.

However, established PBRN investigators are retiring and there is a lack of young investigators to take their place. We have a major pipeline issue, with little resources for training the next generation of PBRN researchers. Binienda et al⁴² surveyed 126 PBRN directors to document current

PBRN efforts, compared with what thought leaders suggested in the past. They discovered that research efforts involve mainly community engagement, practice transformation, and QI projects. Results show a modest effort to supply continuing medical education for PBRN activities, show a low level of addressing health policy issues, and suggest an urgent need to train the future generation of primary care researchers. Voelker and Schaubberger²² illustrate how QI can use evidence-based academic detailing to educate clinicians. We already know that PBRN participation changes clinical behavior through education and experience.²⁷ Tsoh et al³⁰ show how a mobile device can educate patients about the process of smoking cessation. Also, Lin et al³⁸ demonstrate the type of public health information that could be incorporated into educational continuing medical education programs for primary care clinicians and practices.

Conclusion

The articles in this 2018 *JABFM* theme issue highlight that practice-based research is alive and well; however, we are concerned about the state of PBRNs. In this issue, only 4 articles report PBRN research^{23,25,40,42} and the others report non-PBRN practice-based research. So, how important are PBRNs to practice-based research? AHRQ has a 20-year history of functioning as the PBRN “mother ship,” providing infrastructure funding and creating a learning community across 173 PBRNs. That infrastructure support is now gone. In the next 20 years, where will PBRNs find support to maintain the infrastructure that engages practices and communities?

The overriding PBRN vision remains to improve the health and health care of primary care patients and their communities and to expand the knowledge base of primary care. The evolution of PBRNs is steeped in long-term relationship building; first between researchers and practices, second between practices in networks, and then between networks. PBRNs are experts in long-term engagement strategies, relationships, and collaboration, creating bridges with communities, funders, and policy makers.⁴³ This engagement approach may be the difference between PBRN and non-PBRN practice-based research. PBRNs have made the investment to sustain trusting partnerships that engage clinicians, which has assured access to primary

care practices. Building trust takes years of visiting practices and communities. Once you stop showing up, the practice is often not interested or has lost the sense of value instilled in past work, especially after staff turnover dims the institutional memory of the collaboration.

PBRNs are currently relying on opportunistic funding, using a diversity of sources and specific grant project dollars to fund infrastructure. As a result, many PBRNs continue to perform practice-based research without consistent infrastructure funding and are less formal and more virtual. We believe the future of PBRNs will depend on their ability to build trust and long-term engagement strategies with practices, health systems, communities, local and federal funders, other researchers, and those who can benefit from evidence-based education. Maintaining these relationships is, we believe, the most important infrastructure component that will lead to PBRN survival, enabling our colleagues in the primary care trenches to generate new knowledge and improve the health and health care of their patients and communities.

To see this article online, please go to: <http://jabfm.org/content/31/6/833.full>.

References

1. Hickner J, Green LA. Practice-based research networks (PBRNs) in the United States: growing and still going after all these years. *J Am Board Fam Med* 2015;28:541–5.
2. White KL, Williams TF, Greenberg BG. The ecology of medical care. *N Engl J Med* 1961;265:885–92.
3. Nutting PA. Community-oriented primary care: from principle to practice. Washington, DC: US Department of Health and Human Services, Health Resources and Services Administration; 1987.
4. Green LA, Wood M, Becker L, et al. The ambulatory sentinel practice network: purpose, methods, and policies. *J Fam Pract* 1984;18:275–280.
5. Nease DE, Jr. Evidence, engagement, and technology: themes of and the state of primary care practice-based network research. *J Am Board Fam Med* 2016; 29:521–4.
6. Agency for Healthcare Research and Quality. AHRQ PBRN Registry. <https://pbrn.ahrq.gov/pbrn-registry>, (accessed 24 August 2018). Last descriptive information, June 2015, <https://pbrn.ahrq.gov/sites/default/files/docs/page/2015AHRQPBRNDataSlides.pdf>.
7. Pace WD, Fagnan LJ, West DR. The Agency for Healthcare Research and Quality (AHRQ) practice-based research network (PBRN) relationship: deliv-

- ering on an opportunity, challenges, and future directions. *J Am Board Fam Med* 2011;24:489–92.
8. Agency for Healthcare Research and Quality. AHRQ Centers for Primary Care Practice-Based Research and Learning. Available from: <https://www.ahrq.gov/professionals/systems/primary-care/rescenters/index.html>. Published 2012. Accessed August 29, 2018.
 9. Agency for Healthcare Research and Quality. Centers for Primary Care Practice-Based Research and Learning. Nurture partnerships, method development, and trans-network collaborations. Available from: <https://pbrn.ahrq.gov/sites/default/files/docs/page/P30-Overview.pdf>. Published 2015. Accessed August 29, 2018.
 10. Williams RL, Rhyne RL. No longer simply a practice-based research network (PBRN) health improvement networks. *J Am Board Fam Med* 2011;24:485–8.
 11. Fiscella K. Improving the health of patients and communities: evolving practice-based research (PBR) and collaborations. *J Am Board Fam Med* 2017;30:562–6.
 12. Green LA, White LL, Barry HC, Nease DE, Jr., Hudson BL. Infrastructure requirements for practice-based research networks. *Ann Fam Med* 2005;3:S5–S11.
 13. Kocher R, Sahni NR. Hospitals' race to employ physicians—the logic behind a money-losing proposition. *N Engl J Med* 2011;364:1790–3.
 14. Committee to Review the Clinical and Translational Science Awards Program at the National Center for Advancing Translational Sciences; Board on Health Sciences Policy; Institute of Medicine; et al. The CTSA Program at NIH: Opportunities for advancing clinical and translational research. Washington, DC: The National Academies Press; 2013.
 15. Riley-Behringer M, Davis MM, Werner JJ, Fagnan LJ, Stange KC. The evolving collaborative relationship between practice-based research networks (PBRNs) and Clinical and Translational Science Awardees (CTSAs). *J Clin Transl Sci* 2017;1:301–9.
 16. 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* 2010;85:476–83.
 17. Kaufman A, Rhyne RL, Anastasoff J, et al. Health extension and clinical and translational science: an innovative strategy for community engagement. *J Am Board Fam Med* 2017;30:94–9.
 18. Meyers D, Miller T, Genevro J, et al. Evidence-NOW: balancing primary care implementation and implementation research. *Ann Fam Med* 2018;16:S5–S11.
 19. Young RA, Roberts RG, Holden RJ. The challenges of measuring, improving, and reporting quality in primary care. *Ann Fam Med* 2017;15:175–82.
 20. Mutter J, Liaw W, Moore M, et al. Core principles to improve primary care quality management. *J Am Board Fam Med* 2018;31:931–40.
 21. Carrico JA, Mahoney K, Raymond, KM, et al. The association of patient satisfaction-based incentives with primary care physician opioid prescribing. *J Am Board Fam Med* 2018;31:941–43.
 22. Voelker KA, Schauburger C. Academic detailing for postpartum opioid prescribing. *J Am Board Fam Med*. 2018;31:944–46.
 23. Fernald D, Jortbert BT, Hessler DM, et al. Recruiting primary care practices for research: reflections and reminders. *J Am Board Fam Med* 2018;31:947–51.
 24. Phillips RL, Bishop EM, Peterson LE, Dai, M. Practice rurality of family physicians enrolled in a practice transformation network. *J Am Board Fam Med* 2018;31:952–56.
 25. Mungia R, Funkhouser E, Buchberg MK, et al. Practitioner participation in national dental Practice-based Research Network (PBRN) Studies: 12-year results. *J Am Board Fam Med* 2018;31:844–56.
 26. Sinclair-Lian N, Rhyne RL, Alexander SH, Williams RL. Practice-based research network membership is associated with retention of clinicians in underserved communities: a Research Involving Outpatient Settings Network (RIOS Net) study. *J Am Board Fam Med* 2008;21:353–5.
 27. Rhyne R, Sussman AL, Fernald D, et al. 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;24:496–502.
 28. Kiran T, Davie S, Moineddin R, Lofters, A. Mailed letter versus phone call to increase uptake of cancer screening: A pragmatic, randomized trial. *J Am Board Fam Med* 2018;31:857–68.
 29. Reuland DS, Brenner AT, Hoffman R, et al. Effect of combined patient decision aid and patient navigation vs usual care for colorectal cancer screening in a vulnerable patient population: a randomized clinical trial. *JAMA Intern Med* 2017;177:967–74.
 30. Tsoh JY, Quach T, Duong TB, et al. Interactive mobile doctor (iMD) to promote patient-provider discussion on tobacco use among Asian American patients in primary care: a pilot study. *J Am Board Fam Med* 2018;31:869–80.
 31. Westfall JM, Fagnan LJ, Handley M, et al. Practice-based research is community engagement. *J Am Board Fam Med* 2009;22:423–7.
 32. Bodenheimer T, Ghorob A, Willard-Grace R, Grumbach K. The 10 building blocks of high-performing primary care. *Ann Fam Med* 2014;12:166–71.
 33. Wallerstein N, Duran B. Oetzel, Minkler M, editors. Community-based participatory research for health:

- advancing social and health equity, 3rd ed. San Francisco, CA: Jossey-Bass; 2018.
34. English AF, Dickinson LM, Zittleman L, et al. A community engagement method to design patient engagement materials for cardiovascular health. *Ann Fam Med* 2018;16:S58–S64.
 35. Sharma AE, Knox M, Mleczko VL, Olayiwola JN. The impact of patient advisors on healthcare outcomes: a systematic review. *BMC Health Serv Res* 2017;17:693.
 36. Shaughnessy AF, Cosgrove L, Lexchin JR. The need to systematically evaluate clinical practice guidelines. *J Am Board Fam Med* 2016;29:644–8.
 37. Wall E. Clinical practice guidelines-is “regulation” the answer? *J Am Board Fam Med* 2016;29:642–3.
 38. Lin KW, Kraemer J, Piltch-Loeb R, Stoto, MA. The complex interpretation and management of Zika virus test results. *J Am Board Fam Med* 2018;31:924–30.
 39. Peters JL, Durand WM, Monteiro KA, Dumenco L, George P. Opioid overdose hospitalizations among Medicare-disability beneficiaries. *J Am Board Fam Med* 2018;31:881–96.
 40. Selby K, Michel M, Gildengorin G, et al. Disparities in hypertension control across and within three health systems participating in a data-sharing collaborative. *J Am Board Fam Med* 2018;31:897–904.
 41. Huguet N, Springer R, Marino M, et al. The impact of the Affordable Care Act (ACA) Medicaid expansion on visit rates for diabetes in safety net health centers. *J Am Board Fam Med* 2018;31:905–16.
 42. Binienda J, Neale AV, Wallace LS. Future directions for practice-based research networks (PBRNs): a CERA survey. *J Am Board Fam Med* 2018;31:917–23.
 43. Gaglioti AH, Werner JJ, Rust G, Fagnan LJ, Neale AV. Practice-based research networks (PBRNs) bridging the gaps between communities, funders, and policymakers. *J Am Board Fam Med* 2016;29:630–5.