

EDITORIAL

Development of the Pediatric Research in Inpatient Settings (PRIS) Network: Lessons Learned

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Since the term “hospitalist” was coined in 1996,¹ the field of hospital medicine has grown exponentially. Hospitalists are caring for increasing numbers of adults—including Medicare beneficiaries in hospitals across the United States.² Pediatric hospital medicine has grown in parallel. By 1998, 50% of pediatric department chairs across the US and Canada had implemented hospitalist programs, with another 27% reporting they were soon to do so.³ A bit more than a decade later, pediatric hospitalists can be found in nearly every major academic medical center, and in a large proportion of community hospitals throughout the US and Canada.

In the past several years, major advances have begun to occur in the manner in which hospital medicine research is conducted. In this article, we will describe the manner in which pediatric hospital medicine research has advanced over the past several years, culminating in the conduct of several large multicenter research projects through the Pediatric Research in Inpatient Settings (PRIS) Network. We believe that lessons learned in the development of PRIS could help foster the growth of other current and future networks of hospitalist researchers, and lay the groundwork for national improvement efforts.

HOSPITAL MEDICINE RESEARCH: GROWTH AND DEVELOPMENT

In 2001, a small group of thought leaders in pediatric hospital medicine (see Acknowledgements) conceived the notion of starting a hospitalist research network, which they named the Pediatric Research in Inpatient Settings (PRIS) Network.⁴ PRIS was modeled in part after a successful pediatric primary care network.⁵ Since hospitalists in institutions across the country were being tasked to improve the care of hospitalized

patients, and to lead diverse quality and safety initiatives, why not create a network to facilitate identification of high priority problems and evidence-based approaches to them, and coordinate improvement efforts? The ambitious goal of the fledgling network was to conduct transformative research into inpatient healthcare delivery and discover both condition-dependent and condition-independent processes of care that were linked to patient outcomes.

PRIS began as (and remains) an open research network—from the outset, any hospitalist could join. The notion of this network, even in its earliest stages, was sufficiently appealing to professional societies that the Society of Hospital Medicine (SHM), the Academic Pediatric Association (APA), and the American Academy of Pediatrics (AAP) agreed to cosponsor the network, fostering its early growth. The community of pediatric hospitalists was tremendously supportive as well; over 300 hospitalists initially signed up to participate. Initial studies were generated through surveys of members, through which variability in systemic organization and variation in the management of clinical conditions and systems-based issues across inpatient settings was identified and quantified.^{6–8}

In the 2000s, as PRIS grew as a network, the research capacity of individuals within the field also grew. An increasing number of hospitalists began dedicating their academic careers to pursuing rigorous methodological training and conducting pediatric hospital medicine research. A series of studies began to emerge analyzing data from large administrative datasets that described the variation in hospital care (but lack clinical results and clinical outcomes outside of the hospital setting), such as the Pediatric Health Information Systems (PHIS) database operated by the Children's Hospital Association (formerly known as the Child Health Corporation of America).^{9–13} Pediatric hospital medicine fellowships began to appear,¹⁴ and over time, a cohort of hospitalist investigators with sufficient independence to mentor others arose.

THE REDESIGN OF PRIS

In 2009, a Pediatric Hospital Medicine Roundtable of 22 international leaders was convened under the guidance of SHM, APA, and AAP.¹⁵ This initiative, roughly a decade after the inception of the field, was critical to bringing pediatric hospitalist research and PRIS to the next level. It was recognized in that

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TABLE 1. Research Experience of the Individual Investigators

Published papers, total number of papers: 150
Grants awarded, funding ~\$3.7 million
Grants pending, funding ~\$3.3 million
Research positions included director of research center, NIH study sections, national research committees, journal editorial experience
Mentors to junior faculty, fellows, and housestaff
However, no division chief or professor rank at the time of the executive council creation (this has since changed)

NOTE: Eight executive council members from 6 years of prior data. Abbreviations: NIH, National Institutes of Health.

meeting that while PRIS had made a good start, it would not be possible to grow the network to the point of conducting top quality multicenter studies without the active involvement of a larger number of rigorously trained hospitalist researchers. To stimulate the network's growth, the existing PRIS Steering Committee—a diverse group of clinical, educational, administrative, and research leaders in the field—facilitated the transfer of leadership to a new Executive Council led entirely by trained researchers (see Table 1), with the support of the APA. The Executive Council subsequently developed a series of standard operating procedures (see Table 2) that have created a transparent process to deal with important, but often difficult, academic issues that networks face.

DEVELOPMENT OF MULTICENTER RESEARCH PROJECTS

The redesign of PRIS did not alter its objective: to build the evidence base regarding the optimal inpatient management of children. Evidence on how best to care for many pediatric conditions remains lacking, largely due to the facts that: a) death, the most definitive and readily measured of outcomes, is rare in pediatric hospitals; b) many pediatric conditions are relatively uncommon in any single hospital; and c) few validated, well-developed metrics of inpatient pediatric quality exist.

As PRIS sought to launch multicenter studies of inpatient care quality, it continued to receive strong support from the APA, SHM, and AAP, and gained the support of a new partner, the Children's Hospital Association, which is comprised of a large group of children's hospitals across Canada and the US. The membership of PRIS grew to involve over 600 pediatric hospitalists from more than 75 hospitals.⁴ With a core group of funded hospitalist investigators, and strong support from partner organizations, the network sought and received funding for 3 major studies that are currently underway. Release of the federal government's Affordable Care Act and Comparative Effectiveness Research portfolio stimulated much of this work, stimulating the network to reach out to existing and new stakeholders and successfully compete for several multicenter studies.

Prioritization Project

Through its Prioritization Project (\$1.6 million over 3 years, Children's Hospital Association), PRIS is using data on over 3.5 million hospitalizations in the PHIS database to identify conditions that are prevalent and costly, and whose management varies highly across institutions.¹⁶ After identifying the top ranked medical and surgical conditions for further study, the project is conducting "drill downs" in which the reasons for variation are being sought. By partnering with hospital and clinical leadership at these hospitals, and producing a data-driven approach to prioritization, PRIS aims to conduct collaborative research and improvement work across hospitals that aim to understand and reduce the unwarranted variation in resource utilization for several of these conditions, and measure the impact of such efforts on patient and cost outcomes.

PHIS+

PHIS+ (\$9 million over 3 years, Agency for Healthcare Research and Quality) is a project that is taking electronically stored laboratory, microbiology, and radiology data from 6 children's hospitals, with diverse electronic health record systems, to build a robust new database.¹⁷ The project also funds several comparative effectiveness projects (several of which are either high prevalence, high cost, or exhibit high variation in resource utilization, as demonstrated in the Prioritization Project) that are being carried out using this new database. This PHIS+ database will serve as an ongoing resource for hospitalist and subspecialist investigators interested in evaluating and improving the care of hospitalized children across multiple medical centers at once.

I-PASS

Innovation in Pediatric Education (IPE)-PRIS Accelerating Safe Sign-outs (I-PASS) (\$3 million over 3 years, Department of Health and Human Services) is a research and improvement project that is evaluating

TABLE 2. Governance and Standard Operating Procedures for the PRIS Network

Mission
Vision
Values
Objectives (first 5 years)
Organizational structure (executive council, ex officio members, advisory group, staff and participant organizations/member hospitalist groups)
Authorship and publication
Institutional review board approval
Protocol selection and review
Network funding
Ancillary studies
Adverse event reporting
Site monitoring

Abbreviations: PRIS, Pediatric Research in Inpatient Settings.

TABLE 3. Key Lessons Learned

Governance involves hospitalist investigators
In-person governance meetings to ensure/gauge buy-in
Stable infrastructure critical for success
Mentoring important for succession
Grants to fund large-scale projects demonstrate track record for network
Membership—What do members want/need?

the effects on patient safety, resident experience, and diverse care processes of implementing a bundle of interventions designed to improve handoffs at change of shift.^{18,19} It is one of the first multicenter educational improvement projects of its kind. Given the commonalities between change-of-shift handoffs in pediatrics and other fields, and the commonalities between different types of handoffs in the inpatient and outpatient setting, I-PASS may yield communication and improvement lessons that extend beyond the confines of the study population itself.

The strategic focus of these 3 grants was to develop studies that are relevant for both the membership of practicing hospitalists and appealing to the stakeholders of the network. PRIS intends that these 3 projects will be but the first few in a long series of studies led by investigators nationwide who are interested in better understanding, and advancing the care of hospitalized children.

RELEVANCE TO OTHER NETWORKS

We believe that the story of PRIS' development, current studies, and future plans has relevance to other adult, as well as pediatric, hospital medicine networks (see Table 3). As in pediatrics, a growing group of midcareer adult hospital medicine investigators has emerged, with proven track records in attracting federal funding and conducting research germane to our field. Some have previously worked together on large-scale multisite studies.^{20–23} A core group have come together to form the HOspital Medicine Reengineering Network (HOMERUN).²⁴ HOMERUN has recently secured funding from the Association of American Medical Colleges (AAMC) for a project that is linking clinical data from several hospitals to a centralized database, a project analogous to PHIS+, and will allow for Comparative Effectiveness Research studies that have more accurate case ascertainment (by using clinical data to build cohorts) and ensuring additional power by securing a larger number of cases. Defining which clinical questions to address first will help establish this new entity as a leader in hospital medicine research. Attracting stakeholder involvement will help make these endeavors successful. In recent months, PRIS and HOMERUN jointly collaborated on the submission of a large Centers for Medicare and Medicaid Innovation (CMMI) proposal to extend the work of I-PASS to include several internal medicine and additional pediatric resident and hospi-

talist care settings. Future collaborations between networks may help foster more rapid advances in care.

Another pediatric hospitalist network has also emerged in the past few years, with a focus on quality improvement across inpatient pediatric settings, the Value in Pediatrics (VIP) Network.²⁵ Although still early in its development, VIP has already successfully engaged in national quality improvement work regarding benchmarking care provided for children with bronchiolitis, reducing patient identification (ID) band errors, and improving discharge communications. VIP recently became part of the AAP's Quality Improvement Innovation Network (QuINN) group through which it is receiving infrastructure support.

As they develop, hospital medicine research and improvement networks will seek to systematically design and rigorously execute multicenter projects that provide answers to those clinical questions which practicing hospitalists face on a daily basis. As they do so, mentoring of both junior investigators and novice investigators will be necessary for the longevity of networks. To foster junior investigators, PRIS has undertaken a series of workshops presented at various national conferences, in addition to working with junior investigators directly on its currently funded studies.

CONCLUSION

Hospitalists' engagement in research and quality improvement networks builds upon their already successful engagement in clinical care, education, and quality improvement at a local level. A research and improvement mission that is tightly coupled with the day-to-day needs of these other important hospitalist activities creates a synergy with the potential to lead to transformative advances in patient care. If hospitalists can discover how best to deliver care, train the next generation of providers, and work to implement needed improvements at a local and national level, they will have an unprecedented opportunity to improve the care and health of children and adults.

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