

Changing the Paradigm of Research in Pediatric Hospital Medicine

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Pediatric hospital medicine (PHM) is the newest subspecialty recognized by the American Board of Pediatrics. The academic focus of PHM has largely centered on clinical, educational, and health services research, quality improvement, and advocacy, with a notable paucity of either basic or translational research. Advances in biomedical technology, which are increasingly affordable and accessible, allow for an improved ability to identify specific patient phenotypes, tailor treatments, and identify patients at high risk for poor outcomes. This approach improves the care of hospitalized children, which is an essential aspect of PHM. Accordingly, there is a fundamental need to start building capacity to support and promote basic science and translational research to strengthen the existing evidence base for the management of hospitalized children. A critical first step is providing the education and support necessary to ensure interested hospitalists are able to succeed as physician scientists. In this perspectives piece, we provide our opinion as early- to midcareer researchers engaged in basic science and translational research in PHM.

Although there are translational researchers within the PHM community,¹⁻⁵ there is currently no framework for formal training in basic and translational research within PHM, nor is there precedent in the adult hospitalist community; therefore, PHM has an opportunity to lead the way for developing basic and translational researchers.⁶ Despite the current absence of formalized training, hospitalists already possess skills that are directly applicable to the translational world. Hospitalists routinely manage the pathologies from multiple organ systems, focus on coordination of care for children with medical complexity, and implement evidence to promote high-value care. The ability to collaborate with content experts can be extended to include basic scientists, who frequently benefit from the addition of clinical perspective to their work, and skills in implementation science can be used to evaluate and integrate novel diagnostic tests into clinical care. Furthermore, PHM has a strong contingent of practitioners who work primarily in community settings, allowing for collaboration between university-associated researchers, who have access to the necessary resources and technology, and clinicians who care for a large proportion of hospitalized children. Finally, there is no plausible reason why basic and translational research cannot exist in the realm of PHM; the PHM community just needs to build the capacity to support it.

EXAMPLES OF TRANSLATIONAL RESEARCH IN PHM

The breadth of clinical care provided by pediatric hospitalists affords numerous opportunities for conducting basic science and translational research. The PHM patient population allows for investigations into understanding the differential pathophysiology of the minority of patients who do not follow the expected illness trajectory. One recent

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www.hospitalpediatrics.org

DOI: <https://doi.org/10.1542/hpeds.2019-0028>

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HOSPITAL PEDIATRICS (ISSN Numbers: Print, 2154-1663; Online, 2154-1671).

FINANCIAL DISCLOSURE: The authors have indicated they have no financial relationships relevant to this article to disclose.

FUNDING: No external funding.

POTENTIAL CONFLICT OF INTEREST: The authors have indicated they have no potential conflicts of interest to disclose.

Dr Forster conceptualized this project, drafted portions of the initial manuscript, and critically reviewed the manuscript; Drs Tang Girdwood, Morrison, and Ambroggio each drafted portions of the manuscript and provided critical feedback; and all authors approved the final manuscript as submitted and agree to be accountable for all aspects of the work.

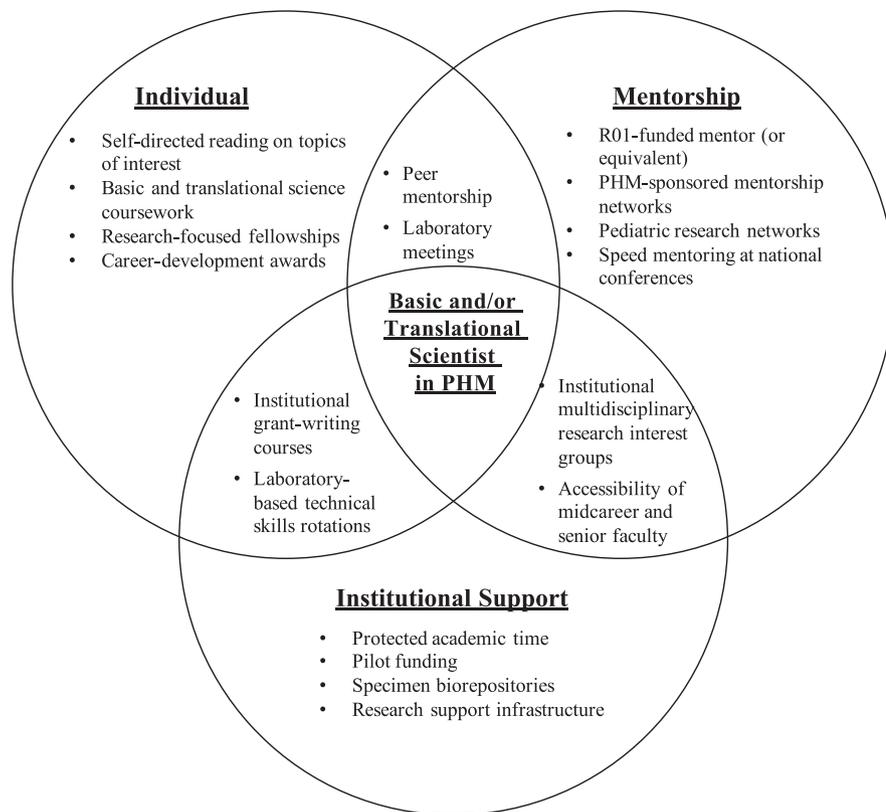


FIGURE 1 Venn diagram demonstrating the interrelationship between the multiple factors that contribute to the success of a basic or translational researcher in PHM.

example is the use of transcriptome profiling of patients with Kawasaki disease and its potential to reduce unnecessary treatments with immunoglobulin.⁷ Others include the role of “multiomics” to predict bronchiolitis severity,^{8,9} pathogen physiology in patients with tracheostomy-associated infections,^{10,11} and identification of patients with asthma who will respond to corticosteroids.¹² Indeed, given the variety of patients seen by hospitalists, as well as PHM’s focus on high-value care, hospitalists are uniquely positioned to translate basic science discoveries into clinical care using a variety of approaches.

NEXT STEPS

Incorporation of basic and translational research into PHM requires engagement at multiple levels, from individual hospitalists to professional societies (Table 1). The factors necessary to expand the academic

focus of PHM to include basic and translational science center around support, training, and mentorship (Fig 1).

Institutional Support

Divisional and institutional support is necessary for the success of any research program. The PHM division leader can be a powerful advocate for the hospitalist pursuing translational research, especially with regard to institutional support. Support from the institution comes in many forms, including protected time for research, pilot funds, laboratory or bench space, support to attend conferences and workshops, and biostatistical and research coordinator assistance. However, this degree of support requires institutional leadership to adopt the view of hospitalists as physician scientists, which is another area in which the PHM divisional leader can advocate on behalf of researchers.

Protected time is arguably 1 of the most important resources that can be provided

by the institution. Institutional allotment of protected time between funded opportunities is especially important. This includes providing bridging support at critical times, such as between completion of fellowship training and the receipt of a career-development award, as well as after the completion of a career-development award and before a successful application for independent funding (eg, R01 or the equivalent). Intellectual support is also essential for the development of PHM physician scientists. In addition to mentorship, as discussed below, intellectual support includes providing opportunities for feedback on research ideas, such as formalized faculty crosstalks or data-blitz sessions, and creating a network of researchers who are willing to review each other’s grants. Additionally, joint appointments with another division already invested in basic science or translational research infrastructure (eg, pharmacology and microbiology) can provide necessary support for the faculty member. Finally, project funds, either in the form of a start-up package or competitive pilot awards, are critical to the development of a successful research program. The institutional provision of both protected time and intellectual support is key to the success of the hospitalist physician scientist.

Training

Training hospitalists to become translational researchers should focus on attaining the relevant research skills and mentorship. These recommendations are different for hospitalists who want to become independent investigators versus recommendations for those who are interested in participating in translational research as part of a multidisciplinary team. Here, we speak to those hospitalists interested in a career as an independent investigator, although the recommendations can be modified for hospitalists who are interested in participating, but not leading, such studies.

It is important to ensure that interested hospitalists have the opportunity for training and experience. Because PHM fellowships are currently becoming standardized, inclusion of translational

TABLE 1 Recommended Actions

Responsible Party	Recommended Action	Implication and/or Objective
Individual	Read basic science articles	Allows one to be current with the literature within the field of the disease or condition
	Attend institutional seminars	Provides exposure to new areas of research and methods and allows opportunity for developing collaborations within the institution
	Seek and attend relevant webinars	Provides training and education around relevant basic science or translational topics
	Attend laboratory meetings, complete experiential laboratory rotation	Allows one to increase depth of knowledge in 1 specific area of research and gain technical skills in that area
	Apply for research fellowships	Provides protected time and rigorous training in basic science and translational research and may be combined with a traditional PHM fellowship
	Develop collaborative or mentoring relationships with established basic science or translational researchers	Allows for involvement in translational research without need for additional training
	Apply for foundational and internal pilot awards	Opportunity to develop skills in grant writing while potentially providing funding for pilot studies
	Apply for career-development awards	Allows for protected time and additional research training to provide skills that are necessary for a career as an independent investigator
Institution	Provide protected time and pilot funding for PHM researchers	Provides critical support necessary for investigators to develop their research program
	Provide opportunities for intellectual support from researchers across the institution	Provides opportunity for mentorship, collaboration, and refinement of research ideas
	Include doctorate-trained researchers or nurse scientists within PHM divisions	Helps advance scholarship and provide research support and mentorship for other divisional members
	Provide joint appointment for faculty members in the division with basic science translational research infrastructure	Provides additional mentorship, funds, laboratory or bench space and support and fosters collaborations between PHM and other divisions
	Create biorepositories, including those from university-associated hospitals and community-based samples	Allows for a greater diversity of children and conditions to be investigated in developing new diagnostics or in studying pediatric diseases
Professional society	Provide opportunities for networking among those interested in basic science and translational research	Allows for the development of a national network of hospitalists with interest in basic science and translational research
	Include basic science and translational research workshops and/or symposia in annual conferences	Increases presence of basic science and translational research and allows for formation of an accepted community in this research field within PHM

research methodologies into education curricula would address this need for trainees. A career-development award (eg, K award or the equivalent) can be an invaluable source of protected time and additional research training necessary for a career as an independent investigator, such as a master's degree. Outside of fellowship or a career-development award, hospitalists can seek research training through various

professional societies, several of which offer opportunities for research training or exposure. Institutions frequently host other venues that can be helpful to junior researchers, such as K clubs, which allow for an opportunity to both network and become exposed to other areas of research at an institutional level. An additional way is through hands-on experience. Although fully immersing oneself into this field of research is invaluable, it is rarely realistic.

Experiential learning by spending a few months in a basic science laboratory to learn techniques or by contributing to an ongoing translational study can be critical in the decision to pursue a basic science career. However, because many PHM physicians do not have this amount of protected time, attending weekly laboratory meetings in which methodology and data are discussed can address this gap.

Mentorship and Network Formation

Many subspecialties have thriving basic science and translational research programs, such as pediatric emergency medicine and pediatric critical care medicine; thus, it is important for PHM physician scientists to consider mentorship from R01-funded researchers outside their divisions. PHM division directors can also seek mentorship from pediatric emergency medicine and pediatric critical care medicine division directors in fostering growth of these researchers within their own divisions. As interest in these areas grows, we encourage PHM physician scientists to identify peer mentors within PHM with this shared interest to create a culture that supports this new frontier. This approach can be done through networking at conferences (eg, speed networking) or leveraging Listservs. Finally, support from the larger PHM community is needed to aid in the acceptance and promotion of hospitalist researchers engaging in basic science and translational research. PHM leadership on a national level can support these efforts through inclusion of basic science- or translational science-related content at national meetings, providing a network or peer-mentorship opportunities and encouraging hospitalists to consider engaging in translational research. PHM physician scientists should consider attending additional non-PHM conferences that incorporate more basic science and translational research conferences.

CONCLUSIONS

As the PHM field continues to grow, it is important to consider the broad realm of research that will be undertaken to improve all facets of the management of care among hospitalized children. There are several areas in which hospitalists can advance the science of diseases using basic science and translational research. Although there are already various examples of basic science research for chronic and infectious diseases conditions that are managed by hospitalists, additional conditions such as failure to

thrive, brief resolved unexplained events, chronic pain, fever of unknown source, and many others are ripe for investigation. An increase in human capital is needed to grow this type of research within PHM. Therefore, it is imperative to support residents, fellows, and hospitalists who are interested in the field of basic science and translational research by supplementing existing PHM programs and by protecting their time to conduct research in this field. It is time for PHM to be on the forefront of basic and translational research that will directly improve the care of hospitalized children.

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Hospital Pediatrics 2019;9;732
DOI: 10.1542/hpeds.2019-0028 originally published online August 23, 2019;

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Hospital Pediatrics®

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DOI: 10.1542/hpeds.2019-0028 originally published online August 23, 2019;

The online version of this article, along with updated information and services, is located on the World Wide Web at:

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