



Enhancing the practice of medicine with embedded multi-disciplinary researchers in a model of change^{*}

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ABSTRACT

Successfully embedding researchers in a health care setting brings unique challenges and opportunities. Through a joint clinical and academic partnership, we have developed a novel approach to problem-solving in the health care context, by employing a model for leading through change to embed researchers in transformative initiatives. Using the model, we have been able to leverage our local environment and resources to engage multi-disciplinary researchers in solving complex issues. An example is our initiative, Enhancing the Practice of Medicine, to address burnout among health care providers. Through this work, we have identified 3 primary factors critical to the successful deployment of embedded researchers. First and foremost, a multi-disciplinary team with diverse expertise is necessary to truly understand the root causes and potential solutions for complex issues. Second, this diverse team of embedded researchers must be involved from the initial stages of project design and have a voice throughout all phases of planning and assessing the initiative. Finally, embedded researchers will be most successful when they are supported to build relationships, navigate the system, and conduct research as part of an integrated and comprehensive effort that aligns with health system priorities.

1. Background

Health care systems are under increasing pressure to deliver effective and innovative care, to improve population health, provide value-based care, and maintain a healthy workforce. These challenges require complex, multi-disciplinary solutions; yet, demands to accommodate more patients and manage complex populations at an increasingly rapid pace often prohibit health systems from implementing and establishing large-scale changes. In addition, organizational factors such as departmental silos and perceptions of research as too slow or irrelevant can prevent a concerted, scientific approach to problem-solving from taking hold. The Health Sciences Center at Prisma Health was created to foster engagement between scientists from three diverse academic institutions

and health system clinicians in research that furthers the mission of the health system to improve the health of the population it serves. The Health Sciences Center unites expertise across multiple disciplines to facilitate a scientifically driven methodology to problem-solving in healthcare. In this paper we will present a case study illustrating achievements and lessons learned in our attempt to build the team and infrastructure necessary to address one of the most pervasive, unsolved issues in healthcare today: burnout and well-being of the health care team.

1.1. Organizational context of the Health Sciences Center

The Health Sciences Center is uniquely situated within a large, not-

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for-profit health care organization and a shared academic medical center comprised of multiple academic partners. As the largest health system in South Carolina, Prisma Health spans more than half of South Carolina and serves more than 2.4 million patients annually with 15 inpatient hospitals and more than 300 outpatient facilities and affiliated doctors' offices. In the Upstate of South Carolina, Prisma Health has partnered with three primary academic partners, Clemson University, Furman University and the University of South Carolina, in the dynamic collaboration known as the Health Sciences Center (HSC). The HSC provides access to more than 40 academic, professional and workforce development programs across the health sciences. The HSC addresses three distinct areas: 1) research; 2) undergraduate studies and pipeline programs; and 3) graduate and professional studies including both a School of Nursing and a School of Medicine.

The alliance between academic partners and the health system provides the framework for a shared "clinical university" model that bridges the gap between academics and clinical practice. The HSC is innovative, interinstitutional, interprofessional, and interdisciplinary and is positioned to respond to the dynamic, evolving needs of the health system. A collaborative leadership structure across all academic partners positions the HSC to be a transformational entity for education and workforce, research and scholarship, and innovation in all areas of health care. The HSC offers a unique shared governance model, where decisions are made among senior leaders of higher education and the health system. Fig. 1 displays an overview of the HSC leadership structure. Institutional support that is provided for these initiatives includes 0.6 full time equivalent (FTE) support for the HSC Chief Medical Research Officer and 0.5 FTE support for the HSC Chief Science Officer who lead the Research Development Division that oversees and coordinates the programs described below.

1.2. The Embedded Scholar program as a tool for transformation

An Embedded Scholars program was initiated between Clemson University and Prisma Health in 2015 and rapidly expanded to other partners of the HSC. The program leverages investments in health research from the university partners and is designed to integrate university faculty researchers into the health system and provides enhanced

and consistent interaction between clinical faculty and researchers. The Embedded Scholar model provides a framework to align the goals of the health system and the academic partners by connecting health system needs with research opportunities. The model is similar to the approach of "engaged scholarship" that Ven de Ven and Johnson espouse, arguing for its value in enhancing the relevance of research for practice.²

The Embedded Scholar model in the HSC has taken several forms, including embedded student researchers (undergraduate and graduate), post-doctoral scholars, faculty fellows (pseudo-sabbatical program), and embedded named professors. In FY 2019, a joint investment from the health system and an academic partner of \$95,000 was made to fund an embedded post-doctoral fellow and \$75,000 was made by an academic partner to fund a faculty fellow. Each embedded scholar has both a university faculty mentor and clinical Prisma Health co-mentor. A tiered leadership structure links Research Directors from each academic institution with academic health system Vice Chairs in the clinical learning environment, to foster collaborative partnerships between scientific investigators and clinician researchers. Physician leaders have been appointed as Vice Chairs of Academics for each clinical department. Physician Vice Chairs work with university Research Directors to identify and prioritize research initiatives that are informed by system needs. University Research Directors from each university partner to provide critical leadership and structure for the program, and serve as key program champions, facilitating funding for post-doctorate and faculty positions dedicated to the program. Vice Chairs and Research Directors lead an ongoing process of matching research expertise of university faculty with potential clinical investigators. Faculty researchers who embed within the health system gain greater depth of knowledge of the practices, challenges, and research opportunities within the clinical environment and play a vital role in the continued growth of transformative collaboration.

Prisma Health senior leaders define the research impact areas and metrics for success for the health system (including quality and patient safety, high-value care, patient experience, and patient and provider well-being). Support for health system projects is provided through the Prisma Health Transformative Seed Grant program. The seed grant funding opportunities provide funds to initiate projects, establish preliminary data and potentially position clinical and academic dyads to

Prisma Health and Health Sciences Center (HSC) Leadership Structure

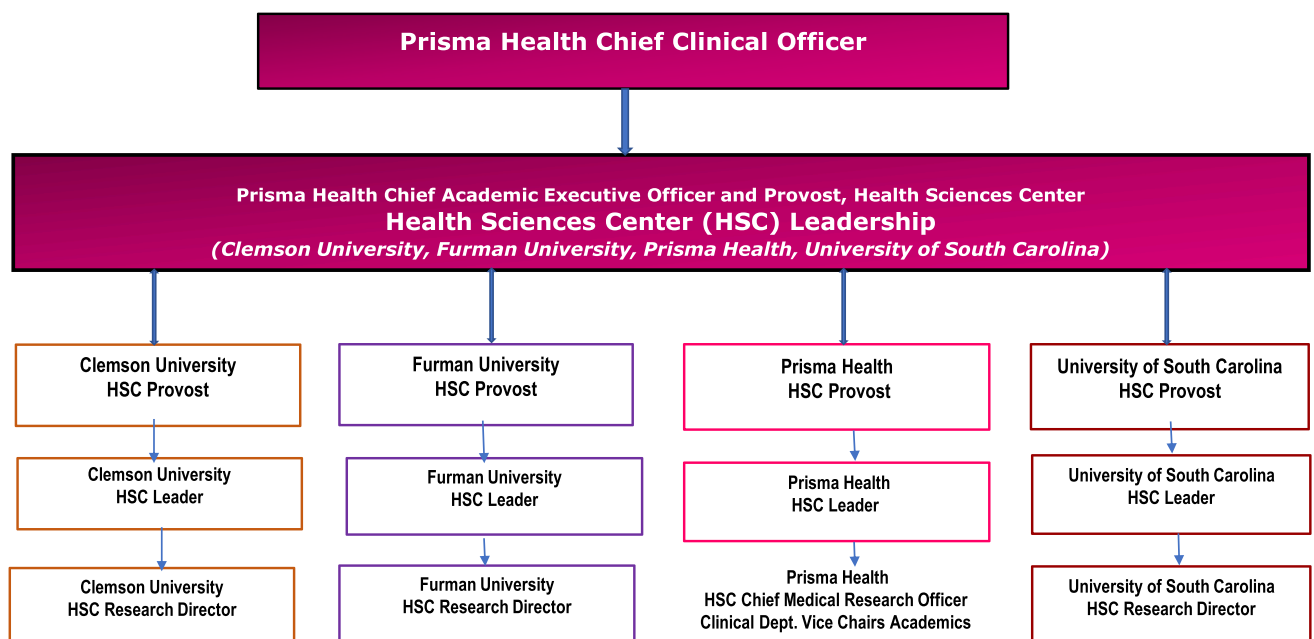


Fig. 1. Overview of the HSC leadership structure.

competitively pursue external grant funding. In FY 2019, \$359,859 was jointly invested from the health system and academic partners to fund 21 awards in the seed grant program. In addition, research administrative infrastructure has been developed to facilitate data sharing and to support efforts to secure external grant funding.

2. Problem: burnout in healthcare

Burnout among frontline healthcare professionals is a major public health concern currently plaguing health systems across the country. Described as a set of psychological symptoms, burnout includes emotional exhaustion, depersonalization, and reduced feelings of personal accomplishment.^{3,4} These symptoms often translate into decreased physical and emotional well-being, increased rates of healthcare professional absenteeism and turnover in already understaffed fields,⁵ as well as reduced quality and coordination of care, and increased medical errors.^{6–8} Recent figures indicate that in the United States, burnout impacts healthcare professionals at twice the rate of comparable workforces,⁹ with 43% of nurses and 49% of physicians experiencing burnout as compared to 28% in the broader population.^{7,10}

Unfortunately, Prisma Health statistics parallel national trends in team member burnout. Standard annual surveys revealed a decided shift from 2015 to 2018, with deterioration in employee metrics related to wellness, autonomy, and self-reported burnout. In line with national findings, results indicated that approximately 55% of respondents ($N = 14,249$) reported feeling burned out from work, with residents, physicians, nurses and administrative staff members all reporting equally high rates of burnout. In response to these survey results, a series of practice level town hall style meetings were conducted to learn more from front line team members about their specific concerns and needs. Taken together, system leaders knew immediate action was necessary to identify and address the root causes of this pervasive issue within the health system.

Because burnout was not a new problem across the system, the first step was to assess existing efforts and review evidence-based models to address burnout. Within Prisma Health, individual programs existed but they were often lacking a rigorous research arm to assess their effectiveness in reducing burnout or increasing the well-being of our team members. Previous attempts to partner with researchers had been met with challenges, including mismatches between the researchers' interests and the needs of the health system and barriers to accessing data. Differences between academic and healthcare expectations and benchmarks of success also complicated common goals. Differing assumptions, such as "research is too slow" or "providers won't listen" could prove insurmountable without concerted efforts and avenues to work through differences and gain common understanding. All these factors contributed to a fractured approach to addressing the problem of burnout.

3. Solution: A case study in addressing burnout

As burnout is often driven by a host of diverse factors, the HSC leadership understood that a single department, discipline or intervention could not successfully "fix" the multi-level, multi-faceted, system-wide problem. In response, the HSC leadership created *Enhancing the Practice of Medicine (EPM)* as a new Transformative Initiative in May of 2018. The Initiative was endorsed and funded by the health system, and a launch was attended by hundreds of front-line team members and health system leaders. This Initiative implemented a new and comprehensive problem-solving methodology to identify and study sustainable solutions. The problem-solving model was predicated on embedding HSC researchers into all efforts, working with faculty who were already familiar with the health system as well as recruiting new embedded scholars to the initiative. The embedded researchers helped guide the work of the initiative, including designing critical research questions, developing interventions, collecting data, conducting evaluations, and scaling and spreading successful innovations. Our approach leveraged

diverse academic and clinical backgrounds to combine numerous fields (e.g., medicine, nursing, public health, operations research, operations management, data analytics, organizational psychology, business anthropology, human-computer interaction, human factors, healthcare management, inter-professional education) in order to rapidly and holistically deepen our understanding and chosen approach to reducing burnout.

The EPM leadership team identified two major goals for the Transformative Initiative: 1) to create evidence-based practices that reduce burnout systematically across the health system, and 2) to develop solutions that contribute to the national discourse on this industry-wide problem.

Key areas of concern were identified from surveys and focus groups, and then sub-committees were formed around four key objectives:

- 1 Reduce the barriers and burdens that impede patient care
- 2 Help team members experience joy and meaning in their work
- 3 Create a culture of curiosity and inclusion
- 4 Integrate learners into the clinical learning environment in a way that enhances the experience for everyone involved

The EPM Leadership Team employed the Kotter model for leading through change.¹¹ Below we discuss how each of the eight steps in the model were applied to the problem of burnout, specifically detailing how embedded researchers were integrated to scaffold and support this initiative at all stages. An infographic of the application of the model is supplied in Fig. 3. Beyond the goal of addressing burnout, this model of interinstitutional partnerships and embedded researchers may serve as a standing, reproducible and highly effective problem-solving method for any number of other large-scale problems affecting health care systems.

3.1. Step 1: creating a sense of urgency

A sense of urgency was necessary to gain leadership and stakeholder support despite competing health care priorities. Data specific to the local level and impact of burnout were a key driver of institutional and leadership support. For example, Prisma Health survey results demonstrating that burnout was a top concern among Prisma physicians generated urgency and a compelling need for physician leadership. Accordingly, embedded researchers and health care providers who had already conducted preliminary efforts to examine burnout in the system, partnered to more thoroughly examine existing data sources, such as the annual employee and leadership surveys. This rapid, yet systematic analysis, created a solid evidence base that enabled an expanded focus to be inclusive of all team members across the system. Furthermore, by creating a system priority and urgent need, we were able to more clearly convey system priorities and potential research opportunities to the system's academic partners and HSC leadership.

3.2. Step 2: build a guiding coalition

After the launch of the *Enhancing the Practice of Medicine* Initiative, the next steps were to expand interest and awareness among team members and establish a meaningful governance structure. Discussions were facilitated by departmental leadership and followed by institution-wide calls for participation. A steering committee was established representing a diverse coalition of leaders to guide the work of the EPM Initiative. Because burnout is such a pervasive issue, our efforts at times paralleled traditional departmental responsibilities. Our focus on team member well-being and reducing administrative burdens, for example, dovetailed with human resources, information technology, organizational development, and quality, to name just a few departments. The initiatives also provided strategic research connections to several academic disciplines now highly engaged in the work of the EPM Initiative (Public Health Sciences, Industrial Engineering, Psychology, Sociology, and Management). A multi-faceted steering committee with insight into

and understanding of the different organizational dimensions and a commitment to shared decision-making was critical to the long-term success of this work.

3.3. Steps 3 and 4: form strategic vision and initiatives and enlist Volunteer army

Implementing steps three and four of the Kotter Model in the EPM initiative was an iterative process. In order to be relevant to the needs of front-line team members, the Initiative was purposefully structured to be driven by the team members and supported by the leadership. Four committees were created to advance the mission in a comprehensive manner: practice innovation, team member well-being, culture and inclusion, and academics and learners (Fig. 3). Each committee was led by a dyad consisting of a physician and an administrative leader. Members were selected to represent several diverse dimensions, including profession, expertise, career stage, location, age, gender, race and ethnicity. Over 150 team members participated in the committees. Each team was given an overall charge and process to follow, but team members themselves were responsible for selecting projects that would accomplish the end goals.

Once teams had identified a particular need and desired intervention, the matching process with an embedded researcher began. The project proposal was shared with Research Directors from each of the partner institutions. The Research Directors know their faculty interests and capacity and were able to help match potential projects reflecting needs for the health system with potential researchers with both interest and expertise in the arena. The matching process required careful consideration to ensure a good fit between the research interests and career goals of the researcher and the project needs and desired outcomes for the health care system. The seed grant opportunities were available each year to help fund projects and researcher resources such as graduate assistants to assist with executing projects.

The HSC has an added benefit in the existence of the Patient Engagement Studio (PES). The Patient Engagement Studio is a resource for the HSC serving all four academic partners, providing structured opportunities for patients, community stakeholders, physicians, and academic researchers to collaborate in planning, conducting and disseminating results of research projects and health system innovations. These patients who are engaged with the PES are trained in communication, research, and engagement principles. The studio began in February of 2016, and to date has reviewed over 80 projects. This unique resource has informed many research projects with critical patient perspective and has received national recognition and funding from PCORI. Any of the identified projects that would specifically

impact patients were presented to the group for feedback and patient perspectives. Intentionally including patients and public stakeholders as partners in research and innovation has been shown to reduce research cost and increase value,¹² improve research translation,¹³⁻¹⁵ and enhance care delivery as well as the quality of care.¹⁶ Working with patient partners can help researchers, clinicians, and public health departments to develop research agendas and program planning that fit with patient and community priorities.¹⁷⁻¹⁹

Each team undertook a process of literature review, brainstorming and feasibility analysis, ultimately creating over fourteen discrete pilot projects that they felt would provide an immediate impact on burnout and well-being within the health system (Fig. 2).

3.4. Step 5: enable action by removing barriers

The power of the HSC lies in the ability to convene partners to work together toward a common goal. For example, the team of embedded researchers working across committees and project would meet monthly to discuss project progress, barriers and solutions. Each member would have the opportunity to brief the group on what they have learned and encountered through their experiences. It was an open environment where researchers could learn from others' experiences and apply strategies to their own work if need be. In addition, the monthly meetings were attended by HSC leadership and when problems arose that couldn't be solved by researchers and clinicians, HSC leadership would intervene to break down system barriers. During the monthly meetings, both successes and learning opportunities are celebrated and communicated to provide sustained encouragement for both the interventions and the ability to learn from our work.

3.5. Step 6: short term wins

Step six of Kotter's model emphasizes the importance of short term wins, as well as the communication of the victories to keep the team motivated and moving forward.¹¹ This strategy is particularly relevant in the health care setting where change tends to be the only true constant. Our health care system, like many others, was change-weary and initially unsure of the benefits and trade-offs of the new model. The approach was purposefully designed to have each committee focus initially on short term wins in order to build momentum and commitment to change. Committees were asked to develop pilot projects in 6-month cycles to allow for rapid results that our team members could quickly see and feel. Embedded researchers were also challenged to design studies in ways where initial results could be rapidly inform more comprehensive long-term studies.

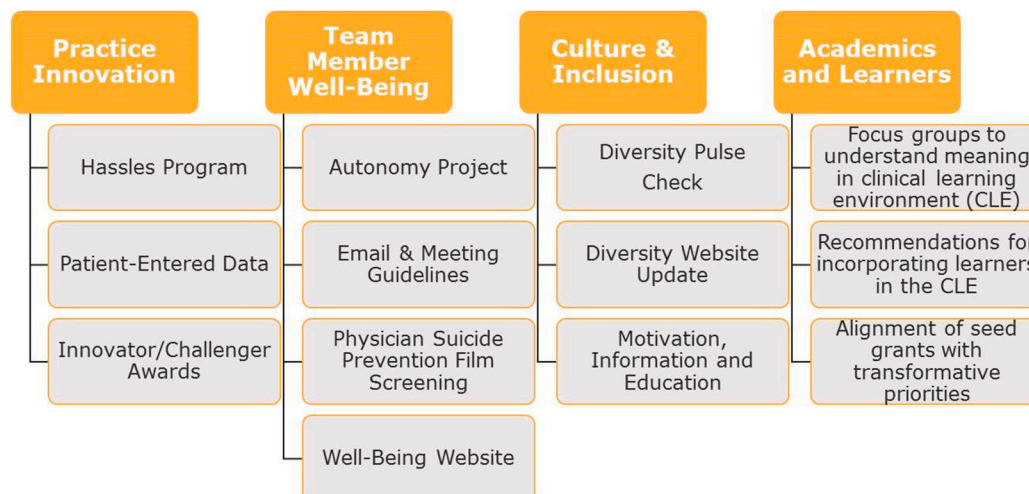


Fig. 2. Enhancing the practice of medicine committee and project structure.

8. Institution Change

- Perpetual cycle of solving problems, disseminating results, and expanding successful programs which are rigorously evaluated by embedded researchers
- Health system leaders act as change agents
- Growing requests for embedded researchers for new projects

7. Sustain Acceleration

- Disseminated results drive cultural shift
- Successful pilot projects replicated and expanded
- Grant funding sought to sustain embedded researcher model

6. Generate Short-term Wins

- Short term projects – 6 months or less
- Results disseminated quickly
- Learning opportunities lead to actual change within system

5. Enable Action by Removing Barriers

- Working together—executive sponsors & steering committee support EPM committees
- Researchers meet, share resources and troubleshoot hurdles
 - Executive sponsors and steering committee help break down barriers
 - IRB hurdles overcome
 - Transformative seed grants help fund researchers to initiate research projects
 - Data request streamlining

1. Creating A Sense of Urgency

- Utilized data queried from stakeholders to advise leadership of depth and breadth of issue
- Leadership advances policy and sets system level priority to investigate issue and propose solutions
- Launch the Enhancing the Practice of Medicine (EPM) Initiative

2. Build a Guiding Coalition

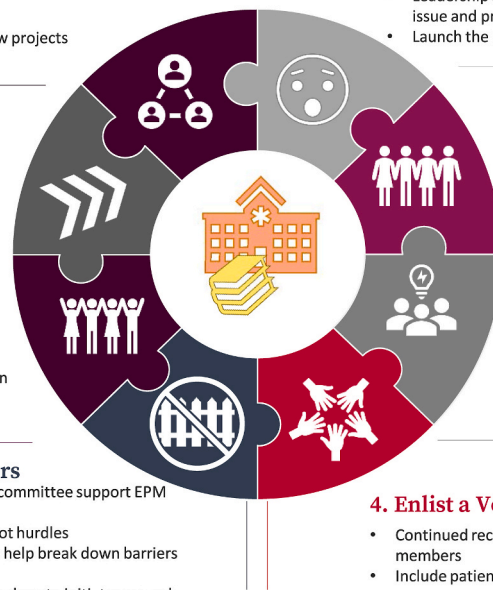
- EPM Steering Committee formation, inclusion of a range of leadership, disciplines
- Chairs/Co-Chairs of Committees selected
- Academic Research Directors engaged

3. Form a Strategic Vision and Initiatives

- Determine four specific focus areas based on stakeholder feedback (Figure 3)
- Committee work to determine initial projects
- Initial embedded researcher selection for projects

4. Enlist a Volunteer Army

- Continued recruitment for embedded researchers and committee members
- Include patient perspectives



Adapted and Applied Leading through Change Model by Kotter: Kotter JP. *Leading Change*. Boston, Mass.: Harvard Business School Press; 1996. <http://www.books24x7.com/marc.asp?bookid=3479>. Accessed September 11, 2019.

Fig. 3. Kotter's model of change adapted for Enhancing the practice of medicine.

One of the short-term wins achieved by the EPM initiative centered around increasing autonomy and decreasing burnout among nurses in the Neonatal Intensive Care Unit (NICU) at Prisma Health. Four pilot sites were chosen that reflected the diversity of unit types, including practices, inpatient units, and support teams. Through workshops facilitated by research personnel, small groups of clinicians (total N = 48) agreed to design meaningful change initiatives by identifying specific, achievable short-term goals. Schedule challenges were identified by nurses in the NICU as the most pressing issue, and thus leadership in the department overhauled the scheduling system to suit the needs and desires of all nurses within the NICU, reassigning many nurses based on their preference of unit (Level 1 vs. Level 2) and shift (day vs. night). All NICU units subsequently reported a significant increase in autonomy (mean autonomy 2018 = 3.23 vs. mean autonomy 2019 = 4.17) and a significant decrease in burnout (mean burnout 2018 = 2.68 vs. mean burnout 2019 = 1.71) in follow-up surveys, reflecting a short-term win.

3.6. Step 7: sustain acceleration

Successes are leveraged throughout the health system for sustained programs, innovations, and the necessary accompanying cultural shift. The evidence base generated through the initial pilots helps create the support for expansion. Projects are either sunset, adapted or replicated based on the findings from the pilot. As an innovation hub, HSC members and leadership are fully transparent and encourage communication about successes and failures. It is critically important to set expectations with leadership and the teams that not all projects will be successful or worthy of replication. Though critically important is the ability to measure progress which provides the initial data to make informed decisions about resource allocation. Lastly, the sustained acceleration should position the system for additional funding to support the embedded researcher model.

3.7. Step 8: institutional change

Finally, to fully ensure the success of transformative initiatives, the

work must be fully integrated into the everyday process and function of the health system. By having system leaders at the table throughout the planning and implementation process, integration flows more smoothly as leaders are eager to integrate effective programs that benefit their team members into their daily workflow. The process of embedding researchers in our work is still new; however, as we model this process and demonstrate the benefits, it becomes easier to generate commitment. Within just the last year, requests are growing to have researchers embedded in new projects as team members are able to experience the benefits. The more we model successful implementation of the embedded researcher model, the more desire there is to engage in high-quality research that shares and improves our knowledge of reducing burnout across health care.

4. Unresolved questions and lessons for the field

At just over 1 year old, the *Enhancing the Practice of Medicine* Transformative Initiative is still assessing the impact of our work. However, we have already learned important lessons from the experience of implementation. To date, over 12 embedded researchers have been aligned with the 14 projects directly or indirectly targeting burnout, including faculty, graduate students, and postdoctoral fellows. The annual Prisma Health Transformative Seed Grant program provides an opportunity to align health system goals, including the mission of the *Enhancing the Practice of Medicine* Transformative Initiative, and research and implementation resources. In 2018 21 projects were supported by the seed grant program, which included an investment totaling \$359,859 dollars. Not all of those 21 projects targeted burnout, but some did. For example, a mixed-methods study examining the relationship between burnout, teaching and meaning in the clinical learning environment was selected and funded. The reception of the embedded researcher model has been overwhelmingly positive. However, there were some initial barriers to overcome and challenges remain. Our work has demonstrated the need for the right team at the right time with the right tools:

The Right Team: Reaching out to engage embedded researchers

from a range of disciplines is key to tackling complex systemic challenges in health care. Institutional leadership support was also critical to allow and encourage participation in these efforts. Physician executive sponsors and a strong steering committee helped remove barriers, facilitate integration, open doors and keep projects focused and on track. Academic Research Directors who are knowledgeable regarding the skills and interests of faculty at their academic institutions are central to finding the right alignment between research interests and clinical opportunities. The importance of the match between operational and academic expertise and interest cannot be overstated. Faculty health researchers have been highly successful in collaboration with clinical researchers when both interests and expertise were aligned, promoting an appropriate level of scientific rigor to enable reproducible findings. Furthermore, as previous interdisciplinary teams have discovered, the intentional team diversity has also provided for richer insights, innovative ideas, and system level changes.^{20–23} A key metric for success of the Embedded Scholar Model is scholarly productivity of investigators and the HSC. Between FY17 and FY 18, publications increased in the HSC by 8.5%, and research funding awards increased by 65%. The research collaborations of the Embedded Scholars have been a factor enabling this growth.

The Right Time: The most common challenge is when to embed researchers in the work and how to manage the time commitment required. Every attempt was made to identify the researchers at the very beginning of the project proposal stage so that the researchers could share their expertise in the initial design phases and help plan the implementation and assessment of the project. Learning the health care context and building trusting relationships can be time-consuming. In any complex healthcare system global cultural shifts take time and require a sustained commitment to achieve success.

The Right Tools: A successful initiative employing embedded scholars requires the right mix of support and structure. The right team alone is not enough. That team must be able to access data, navigate the unique regulatory requirements in health care, and be able to design studies to integrate into efficient clinical operations. Regular meetings and networking opportunities are key for keeping embedded researchers and providers connected as well as for sharing and addressing any challenges. However, such meetings must be well-structured with clear goals and actions.

While short-term wins have been achieved, the longer-term impact of the EPM Initiative on burnout within the system is still being assessed. Both successes and failures will be evaluated to determine the actions, innovations, and programs that have the greatest sustained impact on our environment and improve our team members' well-being.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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