

A Blueprint for Creating Mentored, Collaborative Networks for Early-Career Physician-Scientists Developed by the AUGS Junior Faculty Research Network

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Objectives: The objective is to improve the high-quality collaborative research of early-career investigators, the American Urogynecologic Society/Pelvic Floor Disorders Foundation funded and developed the Junior Faculty Research Network (JFRN). The purpose of this report is to describe the process of development of the network, discuss barriers, acknowledge accomplishments, and provide a framework for future collaborations.

Methods: The development of the JFRN provided sponsorship and mentorship, supported collaboration, and created a network structure for early-career investigators. A request for applications was circulated, requiring a competitive submission process, and 6 physician-scientists were selected to participate in a multicenter trial whose initial focus was on the urinary microbiome and its interaction with sacral neuromodulation.

Results: The JFRN infrastructure consisted of early-career investigators, senior advisors, and research support staff. Study development and roll-out progressed over monthly conference calls. Initial barriers included the development of institutional participation agreements, logistics of funding disbursement, and coordination of support staff. In addition to the inaugural research project, the network continued to collaborate, and the initial grant provided pilot data for a National Institutes of Health-funded project.

Conclusions: The JFRN is a successful mentored collaborative of early-career investigators. The creation of this self-sustaining, independent research network may serve as a blueprint for other early-career physician-scientists to participate in productive multicenter research.

Key Words: urogynecology, physician-scientist, collaborative research network, mentorship

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The team science approach aims to bring together complementary and supplementary expertise to engage and interact as a network to advance science.¹ The National Institutes of Health (NIH) has and continues to support research networks/consortiums specifically to allow for large-scale research that would be difficult for a single investigator to achieve. The current networks with a “urogynecologic” focus include Urinary Incontinence Treatment Network (UITN), Pelvic Floor Disorders Network (PFDN), Symptoms of Lower Urinary Tract Dysfunction Research Network, Prevention of Lower Urinary Tract Symptoms Consortium (PLUS) and Multidisciplinary Approach to the Study of Chronic Pelvic Pain Research Network. Although these networks have all advanced science with many notable and highly visible studies, certain challenges to network-based studies have been cited, including maintenance

of a unified purpose and achieving integration across organizational boundaries.²

To improve high-quality collaborative research among early-career investigators, the American Urogynecologic Society (AUGS) funded and developed the Junior Faculty Research Network (JFRN). The purpose of this article is to describe the process of development of the network, discuss barriers, acknowledge accomplishments, and provide a framework for future collaborations for early-career investigators.

RATIONALE

Early-care physician-scientists have a unique set of barriers to overcome to develop productive research careers. The transition from a heavily mentored environment in residency and fellowship training to independent practice can be challenging. Many early-career physician-scientists struggle to secure funding, seek appropriate mentorship, and balance clinical demands. Previous research has documented significant attrition in every phase of the research career pipeline.^{3,4} Twombly et al⁵ noted that although individual awards allow junior faculty to develop specific projects, they often lack an adequate collaborative peer group and adequate mentors. In an effort to facilitate early-care research productivity, AUGS established the JFRN to provide financial sponsorship, mentorship, and the opportunity for collaboration.

INITIAL SPONSORSHIP

The JFRN was conceived in 2014 to enhance the early-care research experience and better use the AUGS Pelvic Floor Disorder (PFD) Research foundation investment in research. Historically, funds for research grants that were earmarked for fellow and junior faculty were allocated to individual projects. One such research award was the *J. Thomas Benson Award*, which was supported in part by contributions from Medtronic, Inc. Typically, several fellows received individual awards each year to fund a 1-year research project. Although several interesting projects were completed from that funding mechanism,^{6,7} their clinical impact was limited by the smaller size and scope of the projects. The Foundation recognized that improved mentorship and research support might allow these projects to do more with the funding they received.

Given the productivity of experienced collaborations, such as the PFDN, funded by the *Eunice Kennedy Shriver* National Institute of Child Health and Human Development, the AUGS Board of Directors asked the AUGS Research Committee to reconfigure a multicenter collaboration aimed at junior faculty members. The AUGS Board of Directors reasoned that the formation of a collaborative mentored network of early-care physician-scientists presented a better option to maximize the impact of research dollars while providing an unparalleled opportunity to continue the mentorship they had experienced during the formal training years of residency and fellowship.

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DEVELOPMENT OF THE JFRN

AUGS created the JFRN via a request for applications (RFA), soliciting proposals from junior faculty less than 5 years from completing their female pelvic medicine and reconstructive surgery fellowship. The RFA focused on neuromodulation to remain aligned with the original funds donated to the research foundation. The application requirements for grant applications included an NIH biosketch, abstract, candidate statement, research plan (a proposed multicenter research plan focused on neuromodulation), research environment, letter of support from their department chairperson, and a budget for their proposed research plan (up to \$75,000) to be split among 6 sites. Applications were reviewed and selected by the JFRN advisory board based on the NIH grant scoring system. The advisory board selected the top 6 sites/applicants in May 2015, as well as 1 proposal from the initial RFA, which had the highest score. This project was edited and refined by the network participants with senior advisory input starting in June 2015.

The JFRN advisors consisted of nationally recognized female pelvic medicine and reconstructive surgery researchers from urology and obstetrics and gynecology. All advisors had track records of successful NIH funding and participation within NIH networks. The network initially consisted of the investigators from 6 distinct sites, 6 research advisors, and 1 AUGS staff member to provide administrative support.

The advisory committee members were selected based on their past involvement as educators/mentors and researchers in lower urinary tract disorders—aligning with the RFA for the grant. As such, individuals who were nationally recognized AUGS educators/mentors and physician-scientists in lower urinary tract symptoms were considered and ultimately selected by the senior advisor, with special emphasis placed on those who had been involved with the Society of Gynecology Fellow's Pelvic Research Network.

Because the involvement of mentors was considered more of an advisory or consulting role, the advisor's oversight the development of this newly formed network as well as the implementation of the science proposed within the network. As the science diversified, the senior mentor with consultation from the advisory committee identified additional mentors and consultants.

ADMINISTRATIVE SUPPORT

The AUGS established a governance structure for the JFRN and routine administrative practices. To streamline administrative duties, AUGS staff members provided primary support for the network, including arranging conference calls, maintaining document-sharing accounts, maintaining research databases (eg, REDCap), and keeping minutes from network phone calls. They also helped organize the explicit institutional agreements between the institutions and AUGS, which was essential for individuals and institutions when participating in AUGS-sponsored network research. The AUGS initially required an agreement to serve as a "participation agreement" between AUGS and each institution. This agreement included "rules and regulations" of network research, which were later amended to cover future research projects. In hindsight, the development of these documents was an unforeseen research barrier. Disagreements arose between legal teams representing AUGS and the member institutions regarding specific language that each found necessary in these agreements. Ultimately, each JFRN member institution signed a slightly different agreement necessary to reach a compromise. The budget for each research site included salary support for research coordinators, who scheduled separate conference calls to discuss the operations and logistics of the research projects. Having research coordinators at each site permitted the investigator's monthly conference calls to be more focused on

scientific development. A representative study coordinator from the primary site attended all investigator calls to ensure questions from study coordinator calls were adequately discussed by investigators and to ensure logistics as directed by investigators were disseminated to all study coordinators. The timeline from the inaugural call to study recruitment was 2 years.

OVERARCHING AIMS OF JFRN AND INAUGURAL PROJECT

The overall goal of this initial AUGS/PFD grant RFA was to advance understanding of the effects of treatment for pelvic floor disorders, as well as health states, and to enhance the research performed by recipients through a multicenter approach. The inaugural project, which was required by the RFA to be focused on sacral neuromodulation, chosen by the JFRN network had a primary research aim to determine changes in the genitourinary (GU) microbiome in response to neuromodulation therapy, and whether those changes correlated with urinary incontinence symptoms.

This project allowed collaboration among sites that had established relationships with microbiome laboratories (ie, Northwestern University) and other sites with varying degrees of access to basic science resources related to microbial analyses and specimen processing. The multicenter structure of the network allowed for greater practice setting diversity, including geographic, racial, ethnic, and socioeconomic status, which in turn contribute to greater generalizability of the study findings. Each site added individual expertise and value to the network. Some had prior experience with other large network trials involving sacral neuromodulation, such as the PFDN, which aided in the selection of outcome measures and the development of clinical research forms. Others offered advice on how to incorporate satellite offices into basic science research by offering suggestions regarding specimen transportation and storage. Other investigators offered input on how to respond to institutional review board (IRB) inquiries and suggestions for enhancing participant recruitment. Research coordinators and other team members, such as fellows, residents, and medical students, were used in varying capacities, and these strategies cross-pollinated throughout the project to facilitate recruitment and successful completion of the study. Ultimately, it was a learning experience for all as well as a truly collaborative and mutually beneficial complementary effort.

ADDITIONAL NIH FUNDING FOR A SECOND STUDY

The burgeoning infrastructure as well as the group's momentum from the inaugural study uniquely positioned the JFRN to be competitive for additional grant funding. In 2018, the network successfully received NIH funding through the NIDDK PLUS network as a pilot/supplemental grant. The AUGS/PFD Research foundation, which had initially created and supported the JFRN, received the funds and distributed them to network sites as a "pass-through" organization. The prior existing institutional agreements, which had originally been a network challenge, made this process much easier for the second study, which focused on how the GU microbiome affects self-perceived bladder health in women.

PILOT STUDY POSITIONS JFRN FOR OBTAINING ADDITIONAL FUNDING

A third project that was initiated focused on women referred for evaluation for urinary tract infections (UTI). These women are often seen and evaluated by junior faculty members who are still establishing a referral base. Although there are guideline-based recommendations for the management of routine UTI, recurrent

UTIs are less well studied. As a multicenter network with large patient populations, the JFRN was well suited to perform a retrospective study of patients presenting with recurrent UTI. Upon completion of this study, the plan is to incorporate this UTI information into microbiome work in future projects.

ROADBLOCKS/KEYS TO SUCCESS

Building the infrastructure of a multicenter research network sponsored by a nonprofit entity was a barrier in and of itself. Some aspects of network development were anticipated, but others were hidden barriers, which were time-consuming. The development of institution-approved participation agreements was the first hidden barrier the network incurred. Each institution's legal team had different requirements for participation agreements, necessitating the creation of individualized agreements. This process delayed disbursement of funding to each institution, which delayed starting the projects. Based on this experience, we would caution future collaborations modeled after the JFRN to budget up to 6–12 months for resolution of agreement differences. Once the legal aspects of creation and execution of "participation agreements" were settled, the next barrier was the IRB process. Each institution had prespecified rules and regulations regarding multicenter network trials, which provided challenges to navigate. After attempts at using a single central IRB, it was concluded that it was more time-efficient to proceed with multiple separate IRB applications. However, the NIH has since implemented a new policy requiring a single IRB for all multicenter studies they fund as of January 25, 2018. This mandate will hopefully lead to better streamlining of multiinstitutional IRB applications and approval processes. For now, our best recommendation for those attempting to replicate the current success is to anticipate multiple unforeseen delays. Nonetheless, through the grassroots development of this network, it has been determined that several important factors that contributed to our network's success can help others in building similar networks. We have identified the following 4 important factors that are helpful for creating a successful multicenter network.

1. *Mentorship.* As previously stated, the initial goal of the network was to transition early-career physician-scientists to productive, independent researchers working as a collaborative network. The mentors helped shape the network. In the early phase of the network, the advisors were heavily involved and steered the group and introduced sound network-centric processes (ie, drafting and distributing minutes before and after conference calls) in addition to providing significant scientific input on the research. They also served as resources when complex scenarios were presented (ie, funding opportunities). Throughout the lifetime of the network, they provided graduated guidance. As the network and investigators matured, the role of the advisors transitioned to a supervisory one, offering guidance as needed.
2. *An eager group of investigators with clearly defined goals.* The individuals within the network were each driven by similar goals. Maintaining a commitment to the primary aim allowed the network to stay on course, and individually each investigator was focused on conducting high-quality research. Collaboration within the group came naturally as network members were respectful of each other's ideas and beliefs and were willing to work toward a common goal. Over time, these established collegial relationships helped the network navigate career moves as 2 members changed institutions and a third transitioned site principal investigator duties to a new member.

3. *Administrative support.* The duties that often get overlooked proved to be very important in securing success for the network. Having one administrative support person to set up conference calls, create shared folders, distribute minutes, and act as a point person for administrative questions worked well for the JFRN. Having a support person with a research background was initially overlooked, but the network was ultimately very lucky to welcome a research savvy administrative member to the team. She was indispensable for her ability to navigate research questions, interface directly with site research coordinators, communicate with scientific officers and grant administrators, and build/manage shared research databases. This centralization of administrative support proved very helpful.
4. *Centralized data collection and management.* The network used the REDCap (Research Electronic Data Capture) platform for building and managing our shared databases. This web-based, secure data collection tool meant each institution was able to enter data, decreasing unnecessary multistep data-entry processes directly. This also facilitated real-time updates in data collection and entry.

LESSONS FROM ORGANIZATIONAL PSYCHOLOGY AND TEAM SCIENCE

In a qualitative analysis using organizational psychology, Guise et al³ identified 7 key elements, which promote team science in the NIH's Building Interdisciplinary Research Careers in Women's Health grant program. These elements include (1) a semiformal meta-organizational structure, (2) shared context and goals, (3) formal evaluation processes, (4) meetings to promote communication, (5) role clarity in mentoring, (6) building interpersonal competencies among faculty and trainees, and (7) designing promotion and tenure processes to support interdisciplinary team science. In retrospect, the JFRN replicated many of these same themes. By definition, a semiformal meta-organizational structure was created by using preexisting differential investigator and mentor knowledge as well as leveraging each institution's strengths to minimize collective weaknesses.

Additionally, a research framework that has been stronger than the limitations of our coordination barriers is shared here. Shared goals and experiences allowed the JFRN network to overcome any gaps created by our different locations. Finally, the mentoring relationships had defined role clarity, and scheduled monthly meetings promoted communication among investigators and between investigators and mentors. It is acknowledged that a formal evaluation process is lacking. This may be inherent to a new network and is an item recommended for those who seek to establish similar networks in the future. The best assessment tool for the establishment of a new network can be variably defined; however, a pipeline of publications and subsequent funding are often used as metrics for junior faculty success, metrics that the JFRN has met.^{5,8} As this physician-scientist initiated research network evolves, an external evaluating or advisory committee could add value by evaluating future proposals as formal mentorship evolves to a more scientific advisory role.

As previously mentioned, mentorship is a pillar in team science. In academic medicine, typical mentorship relationships are more directly symbiotic, where mentors work with junior faculty within their organization with more direct benefits for the mentor to the mentor's institution. The creation of this network veered away from this typical structure and, hence, the traditional "mentor" benefit was shifted to AUGS and the urogynecologic expertise field at large. Within this framework, engaged mentors

provided insight, experience, guidance, and support to highly motivated junior faculty identified by AUGS as promising early-career physician-scientists. It is recommended that identifying mentors who will embrace this more altruistic, nontraditional model was instrumental in the JFRN network's success. This model could help support early-career physician-scientists from institutions that may not have strong mentorship in their subspecialty as well as others who may feel "siloed." We suggest that the individual experiences of the mentors as well as the investigators did contribute to the successes of the investigations. Thus, groups considering this structure should choose lines of investigation with which they are familiar.

As mentioned with the initial pilot study, each individual institution contributed unique experiences and vantage points to provide a truly collaborative network. Although the aforementioned keys to success are imperative for team research, a basic research infrastructure at each institution is necessary to effectively participate within a research network.

FUTURE DIRECTION AND CONCLUSIONS

Armed with the tools and experience necessary to conduct high-quality research, this group of eager investigators plan to continue their collaboration. As expected, the role of the veteran advisors has become less directive and more consultative. The JFRN plans to pursue additional funding, keeping with the aims of the network centered in the past work in the urinary microbiome and UTIs with plans to expand. The administrative roles have transitioned as well, with duties previously executed by AUGS now largely completed within the individual participating institutions, allowing for a self-sustaining network. Given the recent restructuring within the NIH, women's health research has seen a large cut in federally funded research networks. Unfortunately, other historical networks, including the PFDN, may need to reinvent how team science and multiinstitutional research will be conducted for pelvic floor disorders. Although member institutions of the PFDN or similar networks have provided one avenue through which early-career physician-scientists could participate in high-quality multicenter research in the past, future physician-scientists will have to look elsewhere. The purpose of this report was to describe the creation of this self-sustaining, independent research network that has served as an alternative strategy for early-career physician-scientists to participate in multicenter research. We attribute the keys to success, including mentorship, eager, goal-oriented surgeon-scientists, administrative support, and centralized data collection, to the success of our research network. It is our hope that the reported experience can inspire and serve as a blueprint for others

interested in pursuing similar pathways to support early physician-scientists eager to contribute to and advance the science of their fields.

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