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ACADEMIC PUBLISHING

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Type: Abstract

Keywords: psychiatry, innovation, curriculum , residency , geospatial information systems , GME, Chief Resident for Research and Wellness , cultural psychiatry , mental health, social determinants of health , community based approach , community , quality improvement , research

Edited By: Shuhan He, MD

Received: 2024-04-22

Published: 2024-10-02

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An Innovative Integrated Geospatial Information Systems & Quality Improvement Residency Research Training Program

Introduction

Participation in scholarly activity during residency has posed barriers to departments that include: research mentorship, an active and supportive research community, formal research infrastructure and programming, and diverse and accessible opportunities for scholarly activity with faculty, staff

and communities in our service region. In response to these barriers our team has created a formal QI research training program for psychiatry residents.[2] Our solutions include: assembling a dedicated team, which contains both department leadership and a GIS faculty expert, an expanded interdisciplinary team which includes research librarians and grant support, GIS as a tool and science to best orient residents to the regional landscape and needs of our service populations, formal research training covering GIS, Cultural Psychiatry, and Psychometrics in Psychiatry as curricular themes, and a Chief Resident for Research role to facilitate bridges between residents and faculty and to promote a continuous research community.

Methods

The core curriculum is designed to be asynchronous and themed progressively across each year of residency. An inquiry-based learning framework sets the tone for each of the four themes throughout each year (**see fig. 1**). Hence, year one is themed as *inquiry*. Residents are required to conduct a needs assessment using GIS technology for the population of interest to accurately assess and highlight key issues the target population is currently facing. Residents are required to choose between a prevention or supportive research model for their projects. This provides the foundation for their research projects. This not only enables residents to familiarize themselves with the geographical landscape impacting their patient population, but to also identify accurate needs that are typically offset by various access barriers within and across service communities.

The second year is themed *research*, and residents are required to complete a literature review, and begin collecting preliminary data to create either a Storymap, or preliminary Dashboard using ArcGIS software. The Storymap and/or Dashboard allow trainees to visually showcase their current findings in a manner that is easy to understand and visually engaging. Storymaps and Dashboards are populated with relevant data sets to capture a holistic representation of both the geography and population of interest with an initial mapping of mental health condition of emphasis and related SDoHs (social determinants of health) variables. Each group presents their Storymap or Dashboard at our monthly Journal Club, this provides a venue to receive faculty and peer feedback to further shape their projects.

Year three is themed *Implementation*, residents are encouraged to have further refined their dashboards to be used in support of an intervention targeted for its use within communities across our service region.

During this time, residents will map their intervention results and prepare materials to present. All PGY-3s are required to present at our annual QI/GIS conference in the Spring. Residents will be evaluated by faculty and judges and receive feedback directly related to their project's readiness for implementation in the community. An Implementation Readiness Inventory is used by the judges as the evaluation model for all resident projects The Implementation Readiness Inventory is a five dimensional instrument that is employed to assess each resident project across; 'feasibility', 'scalability', 'cost effectiveness', 'sustainability', and 'fit'. Community stakeholders, including: local government officials, community leaders, and county leadership are trained on the Implementation Readiness Inventory and Evaluation model and participate as judges to best provide feedback and support for resident projects being implemented and sustained in our service region.

Year four themed *construct*, supports residents in submitting their final projects to the program director. While residents have completed and satisfied their ACGME required QI projects; trainees are encouraged and supported to build upon their existing work.[1] Our curriculum gives way for residents to carve out an individualized path to scholarly activity. Options to further their research

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output include: developing and submitting manuscripts to journals, writing and submitting to regional and national grant funds, as well as, exploring intellectual property opportunities when warranted. Trainees who are interested in pursuing grant funding will be paired with a faculty advisor along with our Sponsored Research Program (SRP) team to best guide them through the grant application process. Residents who decide to pursue an entrepreneurial route are encouraged to participate in the INNOVA'R program hosted by the Office of Technology Partnership which is a 7-week program that utilizes the Lean Launchpad methodology to evaluate product-market fit for an idea, technology or product and determine if it has market potential.

Residents will receive mentorship from Entrepreneurs in Residence (EiR) if their research/innovation has market potential. Trainees that successfully complete the program and are among the top innovations will receive funding to further pursue their research.

Resident leadership development is also a key focus, PGY-4s will be trained on using the Implementation Readiness Inventory and Evaluation model. They will prepare to serve as judges during the conference and will score PGY-3's projects, this provides exceptional peer to peer feedback. Meeting our residents wherever they may fall across the research spectrum is important to best support and gauge the trainees' level of research expertise and interest. Our curriculum provides a model of structure, while allowing flexibility for a customized research experience. The development of our QI/GIS curriculum provides a catalyst for innovative, sustained, and equitable training for psychiatry residents.

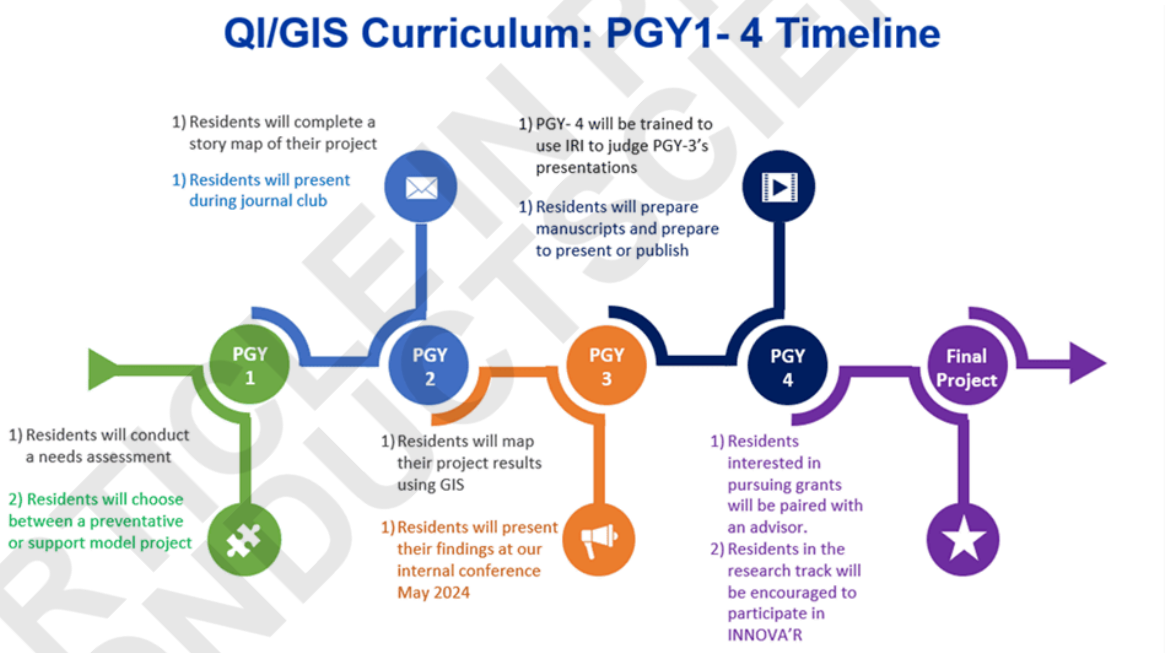

Fig. 1

An Interdisciplinary Approach

Our curriculum is built on the principle of interdisciplinary collaboration. While residents are expected to lead their quality improvement efforts with the support of faculty mentors, our longitudinal supportive research model facilitates various components of their projects throughout the four years of residency.

Our interdisciplinary partners include a team of research librarians that provide residents with journal club, manuscript generation, and GIS support.[4] Residents have access to a dedicated GIS librarian to assist them with library related resources and services on GIS and mental health.

Residents are trained on how to submit an IRB protocol while our internal team provides submission and revision mentorship.

The office of Sponsored Research Programs provides pre and post award support, for residents who would like to pursue grant funds for their projects. Topics surrounding funding support include: How to search for grants, How to submit a grant, and How to write a competitive application.

The Vice Chair of Research and the Research and Grants Program Coordinator work together to provide research mentorship to trainees. This becomes a critical component of the curriculum that guarantees residents receive a quality research experience. Residents become immersed in a community of support via cross-departmental collaborations. Fostering a team of highly skilled partners creates an encouraging environment for our trainees to succeed and develop high level impact research projects.

Results

Our pre-pilot phase was underway as of July 1st, 2023. To begin integrating within the Psychiatry & Neuroscience department as a formal program our team targeted core departmental programming; Grand Rounds, Journal Club, and didactics. We presented our curriculum to department staff, faculty, leadership and some residents during Grand Rounds in a detailed PowerPoint presentation. We worked with the faculty and staff directors of Journal Club to have our 2nd year deliverable of a StoryMap or Dashboard become the presentation for each PGY2. We presented it to all residents at a didactic session.

As a follow-up to the didactic presentation we sent residents a QI attitudes and interest survey, which was an adaptation from the BASiC-QI. An estimated 20% of residents responded to the survey. From the residents who responded to the survey, the majority have followed-up with starting regular research mentor meetings with the Vice Chair for Research and advancing their projects.

Findings/Conclusions

Our pre-pilot year is nearing an end. Our full pilot year will begin on July 1st 2024. Thus far we have accomplished increasing buy-in for the program, and selecting a Chief Resident for Research and Wellness. We have also invited our new cohort of residents to our first annual QI/GIS conference showcase enabling a group of interns to begin a new year within our formal curriculum. We will also formalize the tracking of our increases in scholarly activities and our effectiveness with promoting and supporting scholarly activities within our department. Results from the integration of this program into the department and residency training program will be more evident in phases to come.

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