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SHORT REPORT

Development of an interprofessional and interdisciplinary collaborative research practice for clinical faculty

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ABSTRACT

This article describes an interprofessional collaborative research practice fellowship designed to foster the research skills of clinical faculty. The year-long fellowship was grounded in big data analysis and the triangle of informatics—knowledge, information, and data. Fellows were selected to include diverse perspectives, training, and knowledge but had limited experience in team science or being a member of an interprofessional research team. The underlying philosophy of the fellowship was experiential learning. Protected time and formal mentorship were necessary factors for developing the interprofessional research practice and the skills to participate in an interprofessional research team. We believe that this innovative interprofessional faculty research fellowship is a viable option for supporting scholarly activity and research collaboration. The findings could inform interprofessional clinical practice and be implemented for patient care. Engagement in interprofessional collaborative research and incorporation of the perspectives, knowledge and expertise of multiple professions, is a model to *de silo* knowledge creation.

Introduction

This article presents an overview of an innovative 12-month United States–based faculty research fellowship that was designed to foster research skills within the context of an interprofessional collaborative research practice. The goal of the fellowship was to improve the scholarly productivity of clinical faculty seeking to enhance their research capabilities. The National Institute of Health's (NIH) concept of team science informed the theoretical underpinnings of this fellowship. Team members with training in different fields work together to combine and integrate their knowledge, skills, and perspectives into single research projects.

The fellowship was grounded in learning the analytic skills (data management, bio-statistics, and use of statistical analysis software) essential for big data analyses in healthcare informatics (Dalrymple, 2011). This form of analysis exposed fellows to the connections between data, information, and knowledge—the building blocks of informatics. As the foundations for informatics, data are defined as discrete observations providing raw material for information. Information was defined as contextualized data. Knowledge was defined as synthesized information.

Designing scholarly activity for clinical faculty that is interprofessional and interdisciplinary allows for sharing knowledge, expertise, and perspectives synergistically. We began by extending the conceptualizations of interprofessional education and collaborative practice (IPECP) to the production of health-related and clinically relevant research. We adhered to the World Health Organization's (2010) definition of interprofessional education and modified the definition of collaborative practice (Barr & Waterton, 1996) to: collaborative *research* practice occurs when disciplinarians from more than one health profession work together to jointly create new knowledge intended to provide the highest quality of patient care.

Under the guidance of an experienced research scientist as the mentor, participants developed the skills necessary to meaningfully query and analyse large publicly available databases. The fellowship mentor also provided overall direction and instruction in all dimensions of the fellowship—research question development, study design, selection of data for analysis, analysis and interpretation of data, and manuscript production. The mentor developed the syllabus, attended all seminar sessions, and provided all didactic and data analysis instruction.

Background

Fellows interested in taking part in this programme were selected by the mentor and a department head in the College of Pharmacy at the University of Minnesota. The selection criteria included: (1) doctorally trained biomedical faculty with diverse perspectives, (2) training from different health profession disciplines, and (3) clinical and scientific

knowledge and experience. The research expertise of participants varied along a continuum from novices to expert scientists but with limited interprofessional and interdisciplinary team science experiences. The fellows and faculty mentor collectively held various academic degrees and disciplinary expertise spanning basic science disciplines, clinical pharmacy, human and veterinary medicine, public health, and epidemiology.

'Big data' in the form of publically available large databases, epidemiological study designs and analysis strategies, and use of quantitative data analysis software formed the curricular foundation of the fellowship. The underlying philosophy of the fellowship was experiential learning. Participants had the opportunity to apply epidemiological study designs and analysis techniques to publicly available large databases such as the Center for Disease Control and Prevention's (CDC) Behavioral Risk Factor Surveillance System survey (BRFSS), the National Health and Nutrition Examination Survey (NHANES), and the National Ambulatory Care Survey (NAMCS), a database constructed from patient health records.

Epidemiology provided a bridge between professions, disciplines, and individual expertise. Regardless of experience in conducting original research, all participants understood and formulated research questions. Quantitative data analyses included univariate, bivariate, and multivariate techniques performed using SPSS (version 22, IBM, Chicago, IL, USA). Using big data minimized the time between development of research questions and generation of data, and also facilitated the completion of multiple research projects to produce generalizable results during the course of 12 months. Finally, all fellows entered the programme as novices in big data research. However, the flexibility of the methodological approach made it possible for all participants to contribute individual professional interests and disciplinary expertise. All fellows were granted a half day or 10% FTE time for fellowship participation.

Methods

Mixed methods were used to ascertain the impact of this faculty development research fellowship on the participating fellows. Qualitative observations were made and recorded after each seminar or learning session. All recorded observations were stored in a shared Dropbox folder. Even though, the qualitative data collected were mostly anecdotal, their examination provided insight into the experiences of the fellows as well as some of the emergent issues in implementing an interprofessional faculty development research fellowship.

A quantitative research self-efficacy scale (Bieschke, Bishop, & Garcia, 1996; Greeley et al., 1989) was used to measure the pre-/post-fellowship differences in perceived research skill capability. The sample size of faculty participating in this fellowship was small ($n = 6$), making meaningful statistical analyses unachievable.

Since the data collected were non-invasive and focused on an educational activity, institutional review board (IRB) approval was not applicable to this study.

Results

Qualitative analysis of the fellows' observation notes revealed that protected time and formal mentorship, development of an interprofessional research practice, and becoming an independent investigator who could work successfully on a team were important benefits of participation. Although the intent was to protect 10% FTE time for fellows to conduct research, occasionally other professional obligations restricted time available for research fellows to meet. While fellow attendance varied, work continued with those able to attend the sessions. Frustration with this variance in attendance and conflicts from other obligations was expressed by all fellows and was explicitly mentioned near the end of the fellowship when reflecting on the fellowship process and lessons learned.

Embedded in the fellowship was a formal ongoing structured relationship with a mentor who was also the fellowship director. The interprofessional nature of the fellowship created an environment where everyone learned from and with each other. A safe learning environment was facilitated by the understanding that no individual fellow was an expert, but all participants contributed different expertise, experiences, and perspectives to the group. Combining the different disciplinary and professional perspectives assisted fellows to collectively advance their knowledge in a manner that they could not have done individually. Working collaboratively allowed quick decisions in the interprofessional team (see comments in Table 1).

None of the fellows had much experience with large database analyses or epidemiological methods prior to the faculty development research fellowship. The results of the administered quantitative research self-efficacy scale indicated that by the conclusion of the fellowship, all fellows increased their research skills and developed a deeper and more comprehensive understanding of statistical analyses than they had previously encountered when reading clinically focused research articles (see Table 1). There were no differences before and after the fellowship regarding knowledge of conducting electronic literature searches or evaluating journal articles in terms of theoretical approach, study design, or data analysis techniques. Finally, no differences emerged in terms of understanding research ethics because on this scale item all fellows scored above 95 (on a 100-point scale) both before and after the fellowship.

Qualitative assessments indicated that the fellows better understood the reasons for calculating and reporting confidence intervals and odds ratios for a logistic regression model (Table 1).

Discussion

It is well recognized that there are limited opportunities for most clinicians to gain proficiency in research during their training (Oakley & Vieira, 2008). As a result, a significant number of biomedical clinical faculty enter academia with insufficient skills and expertise to conduct research either independently or collaboratively (Kim et al., 2011). One of the barriers for clinical faculty to pursue academic research is lack of adequate support, including mentorship (e.g., Cohen et al., 2012; Feldman, Arean, Marshall, Lovett & O'Sullivan,

Table 1. Quantitative and qualitative analyses of the collaborative research fellowship.

Quantitative assessment of research skills before and after participation in the fellowship using a research self-efficacy scale

Category	Number of fellows reporting increased skills ($n = 6$)
Developing a research question	6
Choosing a study design	6
Conducting data analyses	6
Interpreting analysed data	6
Drafting a manuscript	6
Prioritising research tasks	6
Research time management	6
Overall research self-efficacy	6

Qualitative assessment of fellows' research skills development using observation notes (excerpts are shown)

At the end of one meeting when fellows had spent 3 hours making decisions about the lab values for one of the research projects, the fellow taking the lead on that project commented: "That was incredible we accomplished in 3 hours what would have taken 3 months otherwise."

During the course of one seminar where odds ratios were calculated for a logistic regression model, one of the fellows commented that she "… now understood what an odds ratio meant and how to interpret such findings." The reason for calculating and reporting confidence intervals was commented on as well once understanding was reached, as one fellow commented "… so confidence intervals surround the estimate or odds ratio and close intervals are good [because they indicate a stable estimated effects size]."

2010) and protected time (Cohen et al., 2012; Feldman, et al., 2010) for research-related activities. In addition, there is a tendency for clinical practice responsibilities to infringe on the allocated time for academic pursuits such as research and scholarly activity (e.g., Oakley & Vieira, 2008).

Smesny et al. (2007) identified the lack of interdisciplinary cooperation as well as limited mentors for scholarship in a number of different academic disciplines and professions (nursing, medicine, pharmacy, and dentistry) as shared barriers to success in academic environments for clinical faculty. Creating an interprofessional collaborative research practice addresses many of the barriers identified by clinical faculty working in academic settings. Clinical faculty in many different academic departments needs to be connected to experienced researchers in order to develop productive scholarly partnerships (Smesny et al., 2007). These partnerships could begin as mentorships and eventually evolve into collaborative research partnerships among peers that are interprofessional and interdisciplinary (e.g., Smesny et al., 2007).

We have described the development of an interprofessional research practice. Some data were collected and examined, however, since a small number of faculty participated in the fellowship, conducting analyses using tests of statistical significance was not feasible.

Declaration of interest

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of this article.

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