TRAINEE SECTION

Alberta's new health research paradigms: Are graduate students being prepared for interdisciplinary team research?

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Abstract

Strategic prioritization of research agendas to address health problems with a large social and economic burden has increased the demand for interdisciplinary research. Universities have addressed the need for interdisciplinary research in their strategic documents. However, research training to equip graduates for careers in interdisciplinary research teams has not kept pace. We offer recommendations to graduate students, universities, health services organizations, and health research funders designed to increase the capacity for interdisciplinary research team training, and provide an example of an existing training program.

Relationships among research intensive universities and their public and private stakeholders, including

government, funding agencies, industry, and health policy decision-makers, are changing.^{1,2} Under a global umbrella of increasing demands for fiscal accountability, shifts are occurring in the strategic prioritization of research agendas, as well as roles and responsibilities in assuring accountability for research goals. An emerging solution-driven model, to complement the work of independent scientists conducting hypothesis-driven experiments at the laboratory bench, is gaining momentum in health research.³ This emerging model requires collaborative, team-based approaches and has the potential to address problems with a large social and economic burden for society. Such problems are complex, and many can be addressed only through large interdisciplinary, inter-

institutional, and multinational research projects.² Universities have addressed the need for interdisciplinary research in their strategic planning documents,⁴⁻⁶ however, research training to equip graduates for careers in interdisciplinary research teams has not kept pace. Interdisciplinary researchers work jointly, but from each of their respective disciplinary perspectives, to address a common problem.⁷

A case in point is the rapidly changing research and health landscape in the Canadian province of Alberta. In 2007/2008, \$335 million dollars were invested in the form of health research grants, trainee and investigator salary awards, and contracts.⁸ The majority of this funding came from the federal Canadian Institutes of Health Research (CIHR) and the provincial Alberta Heritage Foundation for Medical Research (AHFMR). In a change initiated by the Government of Alberta's Ministry of Advanced Education and Technology (AET), AHFMR was dissolved and reformed as Alberta Innovates-Health Solutions (AI-HS) on January 1, 2010.⁹ This move was part of a major reorganization of AET's research infrastructure to align its priorities with other provincial research initiatives under the umbrella of Alberta's Research and Innovation System. The reorganization is designed to (a) build partnerships, (b) align agendas, (c) build on current strengths, and (d) achieve outcomes with the most benefit for the health care system while achieving economies of scale and purpose.¹⁰ As a result, we speculate that government will be more involved with the strategic prioritization of health research questions and the formation of an AI-HS research agenda that will likely focus on large complex health issues most pertinent to Albertans.

Another major change, initiated in April 2008, was the amalgamation of the province's nine regional health authorities, the Alberta Cancer Board, the Alberta Mental Health Board, and the Alberta Alcohol and Drug Abuse Commission into one entity: Alberta Health Services (AHS).⁸ Although AHS does not have an explicit mandate to conduct research, it has clearly identified involvement in research as a critical strate-

gic priority to improve the health of Albertans.¹¹ AHS's first objective is to support research with the greatest potential benefit to health service delivery and health outcomes.¹² AHS will leverage its funding to support health research that aligns with government's priorities,¹¹ thereby wielding considerable influence over the health research agenda.

It is anticipated that the roles and mandates of AHS and AI-HS will converge to some degree; thereby reshaping the model for health research in Alberta to emphasize solution-based research. Although the form and function of the new model is far from determined, certain characteristics will likely develop. First, there will be an increased focus on strategic alignment of research interests, questions and resources. Partnering and leveraging of research dollars will be encouraged. By investing in research alliances, funding will be focused towards areas of research deemed a priority for the province of Alberta. Second, health research corridors will evolve in Alberta.⁸ These will capture major pan-Alberta health services and research themes that cross university and organizational boundaries. Each corridor will include integrated health services and research objectives. Finally, there will be an increasing focus on clinical outcomes, health services, and population health research. For health research to thrive in this changing environment, interdisciplinary team-based research will emerge as the primary research vehicle to address large and complex health problems, as indicated by the Canadian Institutes of Health Research¹³ and the National Institutes of Health Roadmap Initiative.¹⁴

One threat to the success of this integrated health research system is the current lack of research capacity within the province to address complex health problems that require large interdisciplinary and inter-institutional research teams. For many years, inadequate funding for teams,¹³ too few mentors,¹⁵ and traditional performance evaluation structures at universities¹⁶ have slowed the development of investigators in interdisciplinary research; except for a few examples,¹⁷ formal training is almost non-existent.

Alberta's universities need to become more engaged in the setting of health research agendas and articulating their unique and essential roles in the emerging model because (a) they train and employ most of the researchers who will work in the new environment; (b) they provide the sites where most of the research will be performed; (c) they will be hosts of the health corridors; and (d) they are integral members of either integrated academic health science centres at each major health university or possibly a single pan-Alberta integrated academic health science centre. The intent to produce researchers with these skills and to create supportive environments is evident as Alberta universities have addressed the need for interdisciplinary research in their strategic planning documents;⁴⁻⁶ however, training and building supportive environments have not kept pace with intent or need. We offer the following recommendations for consideration.

For Graduate Students

To be an effective interdisciplinary research team member, each graduate student (or investigator) on the team must be very well grounded in his or her own discipline. Each team member must be an expert in a field of research necessary to the successful outcome of the team.

Students desiring interdisciplinary experiences need to be proactive by (a) seeking two supervisors from different disciplines or having an interdisciplinary supervisory committee; (b) seeking out supervisors who are on interdisciplinary teams whose agenda includes the student's research; and (c) presenting their work at interdisciplinary workshops or research conferences. Where formal courses or other training opportunities for interdisciplinary research exist, students should enroll.

For Universities

Universities should work collaboratively to expose all new health science graduate students to (a) the overall

health research paradigm in Alberta; (b) the four CIHR themes and how they are mutually supportive; (c) the broad implications of every research question; and (d) how research knowledge is disseminated and taken up into commercialization, practice and/or policy. Workshops for all graduate students would provide opportunities to experience interdisciplinary team-based work. Curriculum additions should expose students to a diversity of research areas, methods, and topics, from inside and outside their research theme, and provide a venue for faculty already working on interdisciplinary research teams to share their experiences and advice. New courses should focus on active skill building to encourage students to develop strategies and methods to engage in teamwork (e.g., team formation, fostering relationships, and conflict prevention, mediation and resolution), and practicums or workplace experiences should be created for advanced training. Universities need to overhaul organizational structures, tenure requirements, and support and reward systems to align with the direction and format of research. Valuing and recognizing efforts spent contributing towards team projects will pay dividends and make such research more attractive to other researchers.

Faculties and departments should take an active role in, at minimum, developing openness to interdisciplinary team-based research among faculty. Students will have a better chance of meaningfully developing the skills and attitudes necessary for interdisciplinary team-based research in an environment that promotes a positive rather than a dismissive attitude to other disciplines, or to the very concept of interdisciplinarity. Ideally, faculties and departments should support professors to mentor students in interdisciplinary team research by better supporting the interdisciplinary researchers themselves, and acknowledging faculty contributions to interdisciplinary team-based projects. Clinician scientists¹⁸ are particularly well-suited to take leadership roles in this transformation because their training is interdisciplinary. In addition, clinician

scientists are role models of success and can provide mentorship to graduate and post-doctoral fellows.¹⁹

For Health Services Organizations

As an end-user, AHS should directly support research identified by themselves and other stakeholders through government-university partnerships. Further, AHS should enable universities to carry out research that requires direct access to samples, patients, or health care systems and professionals. AHS should hold competitions for interdisciplinary team-based grants. AHS should work closely with the universities and government to create a pan-Alberta health science centre that removes jurisdictional boundaries and facilitates integration of researchers, resources, and infrastructure.

For Health Research Funders

AI-HS has a key role to play at every level of academic training and research. While AI-HS already directly supports trainees through their independent studentship award program and indirectly through their Interdisciplinary Team Grant program, they should further support student training for interdisciplinary team-based research by providing resources for work placement experiences. A portion of funding available for student research should be earmarked for student projects that demonstrate a distinctly interdisciplinary element. AI-HS has already taken a proactive role in providing targeted educational and networking events for their funded students and researchers. Such events promote interdisciplinary approaches by exposing participants to other disciplines, current interdisciplinary team-based research, and training in team-building strategies. Similarly, funding provided to researchers and academics should be modified to ensure that more consistent support is provided to interdisciplinary team-based research, particularly projects that incorporate student participation and training.

The most obvious candidate organization to coordinate this training effort is AI-HS. It has a pan-

Alberta perspective, as well as the experience, the financial resources required to provide incentives, and the mandate to foster innovation and coordinate provincial efforts to increase capacity and develop tomorrow's researchers to work in the new Alberta health research environment. In addition, AI-HS has much to gain by taking a leadership role in coordinating the interdisciplinary research team training because they have already invested in funding interdisciplinary research teams.

Model for Interdisciplinary Research Team Training: The PreHOT Example

The AI-HS-funded Preterm Birth and Healthy Outcomes Team [PreHOT] (AI-HS Interdisciplinary Team Grant #200700595) serves as model for interdisciplinary research training. One of the core functions of PreHOT is building research capacity. In its Training Core, PreHOT has five main strategies: formal training, networking, advocacy, professional development and exposure to experiential learning in interdisciplinary team research. Formal training opportunities for graduate students and post-doctoral fellows include the course, *Building Foundations: An introduction to transdisciplinary research* (INTD600). INTD600 is a credit course available to graduate students and post-doctoral fellows at all Alberta universities and is recommended for all trainees associated with PreHOT.

Trainees have opportunities for networking at an annual conference and a facilitated mini-symposium. Participation in the conference is subsidized to ensure that cost is not a barrier. Similarly, trainees are encouraged to attend small focused national and international meetings. Travel to other laboratories is encouraged to learn new techniques and meet other scientists in the field. The mini-symposium is organized around the trainees' work in progress with the intent of further developing aspects of their work. For example, trainees may present their research with particular emphasis on knowledge translation strategies. Facilitators with expertise in knowledge translation

provide individualized feedback on the trainees' knowledge translation plans and suggest areas for improvement.

Further, PreHOT trainees are encouraged to actively participate in advocating for change in the research environment. For example, the students in INTD600 recognized that there was a gap in training to prepare them to work in interdisciplinary research teams. They conceptualized and wrote this paper, plus a discussion paper with recommendations for changes to the provincial training environment. The discussion paper was distributed broadly and will be used as a catalyst for consultations as AI-HS begins planning for restructuring. Through this experience, trainees learned a great deal about the structures and processes of graduate education in other disciplines, and that they could advocate for the changes that they believed important to their future success as investigators on interdisciplinary research teams.

PreHOT trainees have many professional development opportunities designed to prepare them for their careers as scientists. Trainees have opportunities to manage projects, and to supervise undergraduate and summer students. PreHOT scientists strive to provide appropriate mentorship and role modeling for trainees. In all interactions with PreHOT scientists, the work of trainees is recognized and valued as contributing to the overall success of the team.

Finally, through experiential learning PreHOT trainees gain insight into important aspects of interdisciplinary research that are not immediately obvious to outside observers. For example, trainees are encouraged to consider ways to work effectively as a team. These include clearly articulated mandate and deliverables for the team, *a priori* discussions about order of authorship on manuscripts and how to have a difficult conversation with team members who are not meeting expectations.

While PreHOT provides one model of interdisciplinary research training, it and other models will be necessary to help build the research capacity that will be required in Alberta and beyond. Together, graduate

students, universities, health services organizations, health research funders, and other stakeholders must engage in meaningful consultation and concerted action to meet the challenges ahead.

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