Research Assistant in Breast Cancer

Project & Job Description:	Breast cancer is the second most frequent cause of cancer deaths in women in Canada. Previous studies have shown there are significant disparities in treatment outcomes and cancer-specific survival of breast cancer patients across Ontario. Furthermore, recent publications confirmed that even after adjusting for age, socioeconomic and urban-rural status, outcomes for breast cancer patients vary significantly within the province. This is of concern as one of the aims of the Canadian universal health care system is to deliver equal health care regardless of geographical location. However, there is little published information about quality measures provided by individual health care centres in the province for both diagnostic and treatment performance. This research project investigates whether there are significant and addressable deviations from standard of care guidelines that can explain disparities between outcomes at Kingston Health Sciences Centre (KHSC) and those reported by more specialized hospitals. Areas of study include the lack of rigorous radiologic-pathologic correlation after each breast biopsy and lesion undersampling such that the diagnosis of cancer is only made once the lesion has been removed by surgeons. This project is part of a PhD thesis that began just over a year ago. Our preliminary data from breast conserving surgeries showed that inadequate surgical margins (that usually lead to re-operations) were almost twice as frequent at our hospital compared to other more specialized academic hospitals in Ontario. This SWEP project is part of a large investigation into the disparities in breast cancer patient outcomes between the local health integration networks (LHIN) in Ontario. The successful candidate will be able to work directly with experienced breast clinicians on an ongoing-basis for the 12-week period. The undergraduate student will learn real clinical breast cancer scenarios, including cancer detection, confirmation of cancer histology and molecular subtypes, surgical and oncological treatment options, and patient surveillance thereafter. The candidate will carry out the following tasks: 1) read and learn basic terminology commonly used in a breast cancer clinic environment, 2) collect clinical data that have already been established as potential indicators of quality of care, 3) assist with keeping up to date with related-literature and current guidelines accepted to deliver standard of care for breast cancer patients, 4) help in the statistical analysis of factors related to cancer detection, staging, and treatment, and 5) communicate updates to senior researches, including a professional statistician, during scheduled weekly meetings. The successful student will work under the supervision of Dr. David Berman and an MD with extensive breast cancer clinical experience who is currently pursuing a PhD in Pathology and Molecular Medicine. Using the local electronic pathology database, we will collect surgical pathology and associated demographic and clinical information for female patients who underwent surgery between 2016 and 2020. We will review imaging studies, clinical presentation (palpable versus non-palpable cancers), number of biopsies performed per lesion and per patient, operative notes, type and number of breast surgeries performed (breast-conserving, re-operations or mastectomy), and additional surgeries to assess axillary lymph nodes. All data will be subject to univariable and multivariable statistical analyses.

This study will identify opportunities to improve breast cancer detection at early stages. Currently, breast cancer patient outcomes in Ontario are influenced by geographical traditions that overshadow or even contradict evidence-based medicine. Identifying and addressing quality measures that do not adhere to current guidelines will have an immediate positive impact on breast cancer patients that are being treated in the Kingston, Frontenac, Lennox, and Addington area, but also apply to patients at regional health care centres elsewhere in Canada and beyond. The research aims to decrease inequity in health care delivered in breast cancer patients across Ontario.

Description of the Role

A research assistant (RA) is required for the summer period to take part in the breast cancer research project currently underway. The student's participation will help accelerate research findings required to improve breast cancer patient outcomes in the Kingston, Frontenac, Lennox, and Addington area.
This research project does not fall under the category of "wet-lab" requirement. Thus, the unfortunate but required measurements that Covid-19 has led the whole community to follow, such as social distancing and minimizing the number of students in an enclosed area, will not impact our research. The successful candidate will be able to carry out all the required tasks remotely, and on-going communication with other involved team members will be performed via Zoom, its access provided through Queen's. Before collecting data, the candidate will complete the "CORE" web-based course to ensure there is clear understanding of the importance of protecting patient confidentiality and privacy. All discussions done regarding data will refer to numbers generated through prior encryption to ensure protection of patients.
The graduate student leading the breast cancer research project will prepare and deliver a series of lectures to orient the candidate to basic medical knowledge and breast cancer biology and treatment. Through this orientation and subsequent twice weekly meetings, the student will learn to better understand the relevant clinical aspects of health care delivered to breast cancer patients.
Required Qualifications
The successful candidate will be required to have finished his/her second or third year in an undergraduate science degree. Successful students will demonstrate skills such as self-motivation, genuine interest in improving breast cancer patient outcomes, and ability to work independently. Relevant background and/or coursework in database construction and analysis and/or statistics will be viewed favorably.

Benefits to student
This research project is purely clinical. Therefore, it will offer a unique opportunity for science students who are considering pursuing a health care profession after graduation to acquire clinically relevant knowledge first-hand. Additionally, the student will be able to discuss and understand the application of concepts explored through their undergraduate courses. This project will grant the student the opportunity to learn research methodology concepts in a true clinical environment. This exposure will provide the student with a solid

	background in clinical cancer research with applicability to careers in research, medical practice, government, or industry.
Learning Plan::	Skill development At the end of this project, we anticipate the student will have developed and/or enhanced the following skills: Critical thinking Acquire research methodology Critique clinical research papers Objectively carry out quality improvement analyses in a real health care setting Develop greater empathy towards cancer patients Communication Professional skills Project leader **Development Opportunities** **Critical thinking:** the candidate will be able to appraise the sequence of events that occur in health care delivered to breast cancer patients at KHSC. Breast cancer treatment can be quite challenging as it is usually tailored according to both tumour-related factors (i.e. tumour size, stage at diagnosis, molecular subtype, etc.) and other clinical factors unique to each patient (i.e. age, existing comorbidities, etc.). Only after considering all these factors do clinicians plan and deliver oncologic treatment. The student will learn the complexity of this decision-making by reviewing cases and through weekly discussions with clinicians and the graduate student leading the project. Throughout the 12-week summer job, the student will gain insight into different scenarios presented to clinicians when diagnosing and treating breast cancer. While acquiring this extensive knowledge, the student will participate in discussions to improve the current health care delivered and will be encouraged to contribute to the development of new strategies by asking themselves: "What could have we done better for this patient?", or "How did we do?". **Acquire research methodology skills:** Currently, students with research experience benefit in both a variety of career pathways. The candidate will learn the different steps involved in a research project from determining areas that are lacking in investigation or that have not yet been addressed, to study design and statistical analysis. As opposed to most PhD theses, this project includes both qualitative and quantitative analyses. The concept of "quality" is quite complex, and it can even be considered as a relative term. Many times, improving quality requires changes, another concept difficult to implement. The student will learn how to navigate these terms in practice while carrying out research. **Critique clinical research papers:** Literature search is an important component of this research project. It includes published papers (i.e. original research, reviews, meta-analyses, etc.) as well as clinical practice guidelines and consensus by breast experts. To carry out this task, at the beginning of the 12-week period the student will be provided with both written material and oral presentations by the graduate student addressing basic medical terminology to better understand breast cancer. Throughout undergraduate

courses, students are given papers to read and use as resources of essays and presentations. However, performing a thorough critique of a publication requires extensive knowledge in that topic developed over time. We intend, through a multidisciplinary approach, to accelerate this learning process for the successful candidate so they can, for example, uncover potential biases that have not been disclosed by authors, determine whether the research methodology applied in a publication was the best possible approach, and better depict limitations not necessarily stated by authors. Moreover, the student will learn to deduce logical study extensions or further investigations within the field.

Objectively carry out a quality improvement analysis in a real-health care setting: for the past decades, the concept of "quality improvement" has become an important aspect for health care organizations and professionals. With the ongoing technical innovations, aging population, and financial strains on the system, the ongoing effort to find ways to deliver the best possible health care is critical. This concept is rarely taught in undergraduate courses and is particularly important in Canada, one of the few developed countries that offers universal health care to its population. Policy makers usually rely on health systems research such as the current project when considering changes to health policy. The summer student will have the opportunity to consider the impact of clinical research on health policy, including strategies for distinguishing between local and system-wide influences on healthcare quality.

Develop greater empathy towards cancer patients: the student will learn the journey a breast cancer patient goes through from time of diagnosis until end of treatment, including surveillance studies thereafter. This will include becoming aware of certain challenges some patients must face such as wait times to see a surgical oncologist, referrals and discussion of genetic results, awaiting final surgical pathology results to plan definitive oncologic treatments, and complications during chemotherapy that might delay subsequent treatments and follow-up recommendations. By exploring in depth these realities, the student will be able to enhance their empathy towards all cancer patients and their families. We believe that this is a crucial skill for students intending to pursue a career in a health-related profession.

Communication: the student will be able to further develop their oral and written skills over the summer. This will be achieved by attending regular meetings with Dr. Berman, other clinicians, and graduate students and by taking note of important points addressed in the meetings. These points will be further discussed with the primary graduate student to ensure they are complete, accurate, and address any remaining questions the student may have. Additionally, the student will be asked to deliver two presentations to graduate and undergraduate students in Dr. Berman's lab. The first presentation will be given after 8 weeks to share and discuss the research progress, and the second presentation will summarize the overall achievements throughout the summer and future relevant steps.

Professional skills: these include excelling in meeting deadlines, time management, and collaborative interdisciplinary teamwork. The student will have the opportunity to discuss and clarify medical concepts with the graduate student on a "one-on-one" basis. At the

	end of each week, the student will present a summary of knowledge they have recently acquired. By attending weekly virtual meetings with clinicians where different patient cases are discussed, the student will be able to apply previously acquired knowledge. They will be expected to take notes during these weekly meetings and answer challenging questions through extensive literature search. **Project leader**: the student will receive direct and ongoing guidance by the graduate student and Dr. Berman to reach milestones and deadlines throughout the project. They will be able to see first-hand the various "hats" that a leader must develop to achieve certain goals. These include, but are not limited to, organizing and coordinating meetings, developing clear agendas and future steps, and resolving unexpected issues that arise over the course of a research study. We expect that towards the end of the summer, and after having been closely working with Dr. Berman and "shadowing" the graduate student, the student will have been exposed enough to these various roles of a project leader, applying such crucial concepts in future work. **Unique opportunity** This breast cancer research, which is already underway, will provide the successful candidate a unique opportunity to carry out research in a clinical setting as an undergraduate student. They will be able to recognize the innumerable challenging scenarios with which clinicians deal daily. Many of the skills the student will develop are not currently part of course syllabi at the undergraduate level. Moreover, the experience gained will aid the candidate in pursuing further