



UNDERGRADUATE SUMMER STUDENT RESEARCH PROGRAM (SSRP) 2024 PROJECT LIST

Content updated: **January 17, 2024**

Projects are posted in the order in which they are received. **Please keep checking the website as this list may be added to until the application deadline**

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Summer Student Research Program Project Description

Project #: SSRP24-Leung/Min

Supervisors: Larry Leung; Jason Min

Project Title: iixsatimutilh: we are medicine for each other

This project is only eligible for the Indigenous Undergraduate-SSRP (IU-SSRP) funding stream (i.e. only eligible Indigenous undergraduate students are invited to apply).

Hypothesis or Research Question being addressed:

This project seeks to uproot colonial and systemic issues pertaining to pharmacy and substance use experienced by Indigenous peoples, by exploring the following questions:

- What are the culturally safe principles of pharmacy services for substance use in a remote Indigenous community?
- What spiritual practices and education should be integrated into substance use services in a remote Indigenous community?
- What land-based healing programming should be integrated into substance use services in a remote Indigenous community?

Project Description:

Background

"iixsatimutilh - we are medicine for each other" is a Nuxalk saying that represents the importance of family, community, and traditional health and healing passed down from generation-to-generation. Nuxalk Health and Wellness is a leader in building of holistic health care services for its community members and has been chosen as one of the first pilot sites in British Columbia for the building of Nation-led primary care. As part of this work, the Nation has identified a critical need to support their continued self-governance by offering in-community services for substance use disorders. Nuxalk is currently in the process of building a substance use disorders clinic that will incorporate both Indigenous and western models of care. Far too often, pharmacists are not involved in these conversations and there is a significant opportunity for collaboration with the UPROOT Team at the University of British Columbia.

Rationale

This project seeks to uproot colonial and systemic issues pertaining to pharmacy and substance use experienced by Indigenous peoples, by exploring the question: What are the culturally safe principles of pharmacy services for substance use in a remote Indigenous community? We will co-build a model for culturally safe substance use pharmacy services that will be actionable by the Nuxalk Nation. This will represent an innovative model for pharmacy practice, which will see pharmacists balance western ways of healing with Indigenous worldviews of health and wellness. Most importantly, it will have transformative implications for the community and serve as a model for other communities both provincially and nationally.

Proposed Research Approach

The research will feature 4 phases:

- Phase 1: Community Engagement
- Phase 2: Pharmacy Model Design
- Phase 3: Spiritual Practices as Medicine
- Phase 4: Reciprocal Knowledge Exchange and Translation

This project will focus primarily on the building of a model for culturally safe substance use pharmacy services, iixsatimutilh. Although the project proposal has used the word, "research", this word will be avoided while in community. Stigma regarding substance use disorders is pervasive in the community and there is significant mistrust in the healthcare system and research from academic institutions. As much as possible, this project will center on creating safe spaces for Indigenous voices. We plan on being transparent regarding our experimental design with all partners and community members involved and maintain flexibility on our engagement process.

At the core, our team will implement a Two-Eyed seeing approach to community-based participatory action research (CBPAR) in answering our research question and creating a model for culturally safe substance use pharmacy services.

Expected Project Outcomes

- 1x formalized engagement framework
- 1x summary report on community engagement findings
- 1x book of prayers

Qualifications:

- An Indigenous undergraduate student enrolled in an undergraduate program at the University of British Columbia
- Interest in Indigenous health, cultural safety, education, and community engagement
- Knowledge and experience in Indigenous education, spiritual practices, and land-based healing would be an asset
- Proficient knowledge of basic office computer software (e.g. Microsoft Word, Excel)
- Excellent communication and community engagement skills
- Ability to work independently and meet deadlines for action items
- Good time management skills, professionalism, and judgement

Summer Student Research Program Project Description

Project #: SSRP24-Harrison-01

Supervisors: Mark Harrison

Project Title: Achieving Recruitment Success in Canadian Clinical Trials: Comparing Projected and Actual Sample Size

Hypothesis or Research Question being addressed:

How well do clinical trials with sites in Canada fare in terms of reaching the projected sample size? What factors influence achieving recruitment success?

Project Description:

Rationale

Low accrual in clinical trials compromises their potential to deliver robust information about an intervention's safety and efficacy. Estimates suggest that 87% of trials recruit at least 85% of their planned sample size, with a stark difference between industry and publicly funded trials.¹ Studies examining publicly funded trials in the UK found 55% to 63% of trials achieve desired sample size.^{2–4} In addition to public funding, greater number of eligibility criteria and having fewer research sites have also been associated with poorer accrual.¹ This presents researchers the challenge of balancing elements of trial design and budget concerns. This is particularly challenging during proposal development where researchers must anticipate the number of participants they can contact, recruit, and enroll with consent less the number of participants they believe they may lose over the course of the trial.

To support the development of recruitment tools and trial design guides in Canada, we aim to characterize the nature and extent of low accrual in trials with sites in Canada.

Research approach

The summer will begin with a literature review of similar studies to identify potential variables of interest and resources, and to refine the approach to data collection.

Canadian clinical trials will be identified from existing literature and on ClinicalTrials.gov. The student will work with the supervisor to identify the relevant fields to extract for each included trial, as informed by the literature. The student will be responsible for data extraction, cleaning, and merging with other sources of information (e.g., with PubMed and Medline data to identify publications for trials). The supervisor will guide the student in the use of any web-based or user-developed tools that may assist in the data extraction process. The student will also be responsible for transforming data into variables suitable for analysis (e.g., structuring free-text fields, developing categories/levels of a variable). The student will work closely with the supervisor to develop and execute a data analysis plan for the collected data.

Expected outcomes

The expectation is that the data collection and analysis will be completed within the funding period. A short research summary (e.g., an abstract) is expected well before the end of the funding period. The supervisor will support the student for the SSRP poster competition following the end of the funding period.

Opportunities will be given to the student to contribute more broadly to writing and preparing additional research reporting; however, these are expected to fall outside of the funding period and are thus entirely voluntary.

Qualifications:

- Exceptionally organized and detail-oriented
- Intermediate knowledge of Excel (e.g. implementing and troubleshooting functions with minimal supervision)
- Basic knowledge of database management

Summer Student Research Program Project Description

Project #: SSRP24-Harrison-02

Supervisors: Mark Harrison

Project Title: What is the cost of extreme weather events to health systems?

Hypothesis or Research Question being addressed:

How comprehensive are cost evaluations of climate-related events in health research? Are the existing approaches potentially missing broader health system costs (e.g., associated healthcare workforce impacts/worker productivity), or too short-term in time horizon to accurately reflect the cost (and the value of intervention)?

Project Description:

Rationale

Extreme weather events, which include floods, heatwaves, and wildfires, are becoming more common and are escalating in intensity globally, posing substantial challenges to various sectors, including healthcare. The healthcare system is vulnerable to the immediate impacts of these events, having to respond to the increased healthcare demand caused by the climate event while simultaneously experiencing disruptions to the healthcare workforce and infrastructure.

The health implications of extreme weather events are relatively well-documented. However, there is a scarcity of research on the economic impacts on the health system. Furthermore, there is no existing framework to guide the development of economic evaluations of health system impacts of extreme weather events. This is the first phase of a larger project, and will consist of a scoping review to document the existing published evidence on health system costs associated with health service usage and delivery during extreme weather events and answer the following questions: 1) What is the current evidence for costs associated with healthcare delivery and broader health system costs of extreme weather events? 2) what economic evaluation or costing methodologies are used to estimate the cost of these events, and what assumptions do they make?

Research Approach

Working with the supervisors, a trained librarian and in consultation with experts at Health Canada, the student will conduct a scoping review which will include developing and executing a search of online electronic databases (for example, MEDLINE, Web of Science (WoS), and SCOPUS) and additional sources to find articles published between 2010 – 2023 that have attempted to estimate the health system costs of extreme weather events. Depending on the volume of articles found, the scope of the search may be subsequently expanded to include cost of extreme weather events beyond the health system or narrowed to specific extreme weather events like heat waves or to specific countries like Canada.

The included studies will be extracted to summarize context, content, methodological approach, time horizon, perspective, and sectoral coverage. A matrix will be developed to communicate the scope of the existing studies in costing health system impacts of extreme weather events.

Expected project outcomes

A short research summary (e.g., an abstract) will be developed on an ongoing basis, and will be expected before the end of the funding period. The outcomes of this review will be written for publication in a peer-reviewed journal, this will likely be submitted after the end of the project, and further contribution will be possible on a volunteer basis. Any gaps identified in the evidence base, or systematic issues with quality of

evidence identified, will be incorporated into subsequent projects which seek to provide a framework for economic evaluations quantifying the economic impact of extreme weather events on the health system, to support policymaking on resource allocation and capacity building.

Qualifications:

- Excellent written and oral communication skills.
- Self-motivated and independent.
- Organized and detail-oriented.
- Basic knowledge of excel and database searching skills.
- Familiarity with literature reviews is an asset.

Summer Student Research Program Project Description

Project #: SSRP24-Ross

Supervisors: Colin Ross

Project Title: Lipid nanoparticles for gene therapy and genome editing.

Hypothesis or Research Question being addressed:

Our hypothesis is that we can improve the efficacy and safety of genome editing by using lipid nanoparticles (LNPs) to deliver gene editing components to cell lines. Our specific research question for this project will be to investigate novel lipid formulations and novel genome editors for their efficacy and safety of genome editing. Our lab is collaborating with the Cullis lab for access to novel lipid nanoparticle formulations that will be tested. In addition, we have developed several novel base editor formulations to examine both their efficacy and safety.

Project Description:

Outline of research project

This project will investigate using lipid nanoparticles (LNPs) as a method to deliver gene editing components to cell lines with the goal of improving both the LNP delivery system and gene editing efficiency. Gene editing has the potential to correct thousands of genetic diseases which currently have no treatment options. This project will primarily use base editors – a technology which corrects single nucleotides at a specific site in the genome which is designated by a guide RNA. To effectively correct a cell, both the base editor and the guide RNA must be able to get inside the cell. The project will use different LNPs to deliver mRNA which encodes for a base editor and guide RNA. LNPs have an advantage over current systems as they are less toxic to cells and can be more easily translated to animal models. The student will learn how to conduct mammalian cell culture and will administer LNPs to different cell lines. They will be responsible for the data collection within this project with the ultimate goal of identifying a top LNP for transfection of cell lines and an optimized protocol to use within this project. The summer student will be involved in all steps of this project – from learning about experimental design to analysis of results.

Student responsibilities

The student will be responsible for several tasks, for which they will receive detailed hands-on training beforehand. A typical week will consist of (1) maintenance and plating of cell culture colonies, (2) transfecting cells with LNPs, (3) preparing cells for flow cytometry, and (4) conducting and analysing flow cytometry experiments. The student will learn proper aseptic technique and protocols for the care and maintenance of HEK293T cells. Flow cytometry is a powerful tool to analyze editing efficiency – the student will learn how to remove cells from a plate and prepare them for analysis. The student will be taught how to run a flow cytometer and analyse the results. These skills are highly transferrable to other labs and industry, providing the student with valuable knowledge. There are opportunities for the student to learn a wider array of techniques if they are interested as well including PCR, DNA sequencing and bacterial cloning.

The student will work closely with a PhD student, Tessa Morin, with whom the student will be interacting with daily. The student will meet at least two times a week with Dr. Ross including a 1 hour lab bench-side discussion on weekly progress. The student will attend weekly lab meetings as well where they will be able to present their results and receive support from a wider team. At the end of the summer the student will present their poster at the SSRP poster competition.

Skills gained

- Mammalian cell culture & transfection protocols. Biosafety and chemical safety
- Flow cytometry, PCR, DNA extraction & DNA sequencing, and gel electrophoresis
- Cloning, bacterial culture, gene therapy, gene editing

Qualifications:

The student will be taught all relevant techniques but previous knowledge in genetics, basic laboratory techniques and biochemistry is an asset.

- 2nd or 3rd year in a BPSc (or similar) with an interest in gene editing and gene therapy.
- Previous lab experience or the completion of advanced laboratory courses is an asset.

Summer Student Research Program Project Description

Project #: SSRP24-Charrois

Supervisors: Terri Charrois

Project Title: Primary care pharmacists providing minor ailments consultations: How do they handle uncertainty in prescribing decisions?

This project is only eligible for the Indigenous Undergraduate-SSRP (IU-SSRP) and the Enhanced Opportunities Undergraduate-SSRP (EOU-SSRP) funding streams.

Hypothesis or Research Question being addressed:

The objective of this project is to determine what strategies primary care pharmacists use to manage uncertainty and ambiguity in decision-making for minor ailments prescribing.

Project Description:

Background and Rationale

Pharmacists in BC were granted the ability to prescribe for minor ailments and contraception services (MACS) in June 2023 and the uptake of these services have provided patients increased access to medical services in the community. This strategy is critical to improving primary care services in BC given that at least 25% of people in BC do not have a primary care provider (i.e. physician, nurse practitioner). Clinical decision-making is a process that includes a final step of enacting a decision. For MACS prescribing, that final step includes prescribing for a medication, referring the patient to another health care provider or urgent care, or deciding no intervention is required. This final step requires the pharmacist to take responsibility for the patient assessment and accountability for the final decision; however, pharmacists often hesitate in this final step of the process. Pharmacists hesitate to make clinical decisions based on patient factors, lack of information, lack of confidence, environmental factors (such as workplace dynamics and workflow), along with other reasons identified in the literature. Based on previous research, we understand what processes pharmacists use in their decision-making, however, a concrete understanding of how pharmacists handle both uncertainty and ambiguity in their decision-making is lacking. By having a deeper understanding of this phenomenon, educational initiatives can be created to help pharmacists navigate this uncertainty in their practice, which would ideally increase the uptake of MACS opportunities in their practice.

Research Approach

The research project will start with a literature review focused on pharmacist prescribing and clinical decision making to inform development of an interview tool. Once the interview tool is developed in consultation with the study team, an ethics application will be submitted for the project. The main project will use a critical incident approach to understanding situations where practicing pharmacists were unable to come to a decision for a patient who presented with a MACS request. Interviews will be conducted with self-identified primary care pharmacists to explore this phenomenon. If time permits, analysis of interview data will be conducted using a thematic approach.

Project Outcomes

By the end of the funding period, a completed literature review, an ethics submission and a plan for interviews will be submitted. If time permits, and with support from the research team, the student may conduct some of the initial interviews and data analysis.

Qualifications:

- Strong oral and written communication skills
- A strong understanding of community and primary care pharmacy practice in BC
- Self-directed and independent, along with strong time management skills
- Exemplifies professionalism
- Interest in pharmacist prescribing
- Proficiency in basic computer software (i.e. Microsoft Word, Excel)