Suicide Prevention Research at The Royal

Spotlight Report

With the unwavering support of the DIFD community, researchers at The Royal are advancing cutting-edge discoveries—bringing us closer to a future without suicide. Over the past year, The Royal has gained remarkable momentum, particularly through the work of Dr. Zachary Kaminsky, DIFD Mach-Gaensslen Chair in Suicide Prevention Research. Whether you hosted an event, donated, or volunteered, you made a difference. We are grateful to have you by our side.

"Each life lost to suicide is a profound loss, highlighting the critical need to deepen our understanding of the biological underpinnings of this complex issue. With every breakthrough, we advance our ability to diagnose and treat mental illness and prevent suicide more effectively. The DIFD community's support of The Daron Fund at The Royal makes these achievements possible so everyone can lead long, healthy, and happy lives."

Dr. Zachary Kaminsky,
DIFD Mach-Gaensslen Chair in Suicide Prevention Research at The Royal

TAILORED SUPPORT FOR YOUTH AT RISK OF SUICIDE

The rates of suicide for young people in Canada are particularly concerning, reflecting the need for targeted mental health support and preventative approaches. With this in mind, The Royal launched a pilot initiative called the Youth Nominated Support Team (YNST) in partnership with Suicide Prevention Ottawa, Parents' Lifelines of Eastern Ontario (Pleo), and individuals with lived experience. Participating young people choose a support team of trusted adults, trained to provide personalized support, as part of their hospital discharge treatment plan.

To scale the program, the team accepted referrals from Queensway Carleton Hospital, Youth Services Bureau and the Ottawa branch of the Canadian Mental Health Association, in addition to patients at The Royal. New data shows the initiative is reducing suicidal thoughts and the will to make a suicide plan, measured by a decrease in survey responses such as "I think about killing myself" and "I thought nobody cared if I lived or died."

The YNST is supplementing and continuing the great work that happens in hospital, helping youth continue to improve, and providing effective and much needed support to fill the gap in services available after they leave the hospital.

MAPPING DIGITAL SIGNATURES TO PREDICT SUICIDE RISK

One of Dr. Kaminsky's research specialties is applying machine learning techniques to advance mental health research and discovery. With a multidisciplinary team of researchers, Dr. Kaminsky is currently identifying trends in Ontario electronic health record data from 2008 to 2020 covering all psychiatric inpatient admissions.

The goal of this project is to predict the risk of suicide and suicidal thoughts to intervene effectively. From nearly 350,000 records, Dr. Kaminsky draws out useable data to train several machine learning models to measure different risk factors.

Suicide or suicide attempt after hospital admission

Data is being leveraged to predict suicide attempts after a hospital stay with high accuracy. Although the algorithms perform well in the short term, their effectiveness diminishes over extended periods. The team is refining the machine learning models, resulting in improved accuracy rates compared to the previous year.

89% accuracy in five days following admission

84% accuracy in three weeks following admission

78% accuracy in one year following admission

Suicide or suicide attempt during hospital admission

Suicide during a hospital stay is rare but severe, and Dr. Kaminsky is determined to pinpoint the contributing factors. A second model analyzes a series of data points and successfully predicts suicide attempts with a 76% accuracy, and death by suicide with a 92% accuracy. The model analyzes important factors, including social determinants of health such as income, housing and education, patient diagnoses, and staff and patient satisfaction.

Clinical recommendations during admission to decrease risk

By improving the efficacy of the models, the team hopes to use them to predict suicide risk and to recommend clinical interventions to reduce risk. Although this project is still in its early stages, the extensive data available holds considerable promise. The initial results are showing encouraging trends, indicating that the approach has the potential to make a meaningful impact on suicide prevention.

DEVELOPING A BLOOD TEST FOR POSTPARTUM DEPRESSION

At the crossroads of human genetics and artificial intelligence is the goal of diagnosing mental illness through a simple blood test, just as we do for other medical conditions.

The good news is that Dr. Kaminsky is a trailblazer in this area and is progressing toward a blood test for postpartum depression. Dr. Kaminsky is a founder of a U.S.-based start-up, Dionysus Digital Health, which is partnering with the U.S. Department of Defense and the National Institutes of Health to run clinical trials. The study uses current data combined with benchmarks from a decade of research into pregnant people who did and did not develop postpartum depression. The goal is to create a test that will be widely available and covered by insurance in the coming years, and they are well on their way.

A BREAKTHROUGH IN BRAIN IMAGING AND PTSD RESEARCH

A research study is using advanced brain imaging techniques to show how a specific area of the brain, known as the "blue spot" for its pigmentation, behaves differently in military veterans with post-traumatic stress disorder (PTSD) compared to those without. A new publication by 14 authors, including Dr. Kaminsky and seven other Royal-affiliated scientists, found this area to be more active in veterans with PTSD. This suggests that imaging in this area of the brain could improve the diagnosis of PTSD and increase understanding of its neurobiology, leading to more personalized and effective treatments.

MENTORING THE NEXT GENERATION OF SUICIDE PREVENTION EXPERTS

As the first Black student accepted into the highly competitive seven-year MD/PhD program at the University of Ottawa, which admits only four students annually, Patricia Burhunduli's achievements are already remarkable.

Under the leadership of Dr. Jennifer Phillips, Dr. Pierre Blier, and Dr. Zachary Kaminsky, Patricia is exploring depression and suicide using advanced techniques, including machine learning and brain imaging. Beyond her studies and life-changing research, Patricia is a passionate advocate for racial equality and a change maker, actively creating spaces where fellow Black medical students can feel seen and heard.

Scan the QR code to hear from Patricia.

ADDITIONAL SUICIDE PREVENTION RESEARCH PROJECTS AT THE ROYAL

The prevalence of depression is alarming. One in six Canadians is diagnosed at some point in their lifetime. Yet, one-third of them are not responding to existing treatments. Despite its high prevalence, very little is known about the biology of depression. Dedicated teams of researchers at The Royal are tackling this complex issue from multiple angles, deepening our understanding of the brain and the body as it relates to depression and suicide.

Suicidal Brain Imaging Study

Dr. Jennifer Phillips, Interim Scientific Director of The Royal's Institute of Mental Health Research, is leading a team of staff and graduate students studying brain biomarkers linked to severe depression and suicide risk. Using neuroimaging and blood analysis, they are looking at what differs in people who are thinking about or planning suicide. They have made discoveries using both techniques and share their findings through global knowledge translation efforts, including published findings and conference presentations.

Translating research into clinical care

Providing access to care through research creates hope for people who are not getting better with current treatments. **The Royal has established two research centres where patients can receive groundbreaking access to novel treatments that can change their lives.** One centre offers esketamine, a nasal form of ketamine that quickly alleviates depressive symptoms and suicidal thoughts. The other provides repetitive transcranial magnetic stimulation (rTMS), a non-invasive treatment targeting malfunctioning circuits in the brain. Both treatment approaches are being scaled to amplify their impact and further researched to enhance their efficacy.
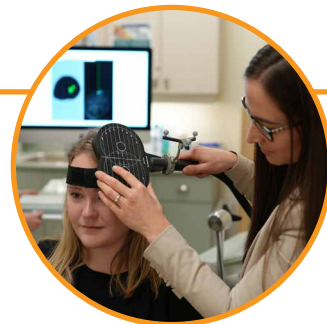
Thank you for creating a more promising future

As we reflect on the past year, there is much to be proud of. As supporters of DIFD and The Daron Fund, you are not only helping the residents of Ottawa but also shaping the future for people across the country and around the world. We are deeply grateful for the vital role you play in making this life-saving work possible.